



**SKR & SKR GOVT. COLLEGE FOR WOMEN, KADAPA.**

**(AUTONOMOUS)**

Reaccredited with 'B' Grade by NAAC

Y.S.R. Kadapa District – 516001, Andhra Pradesh, India.

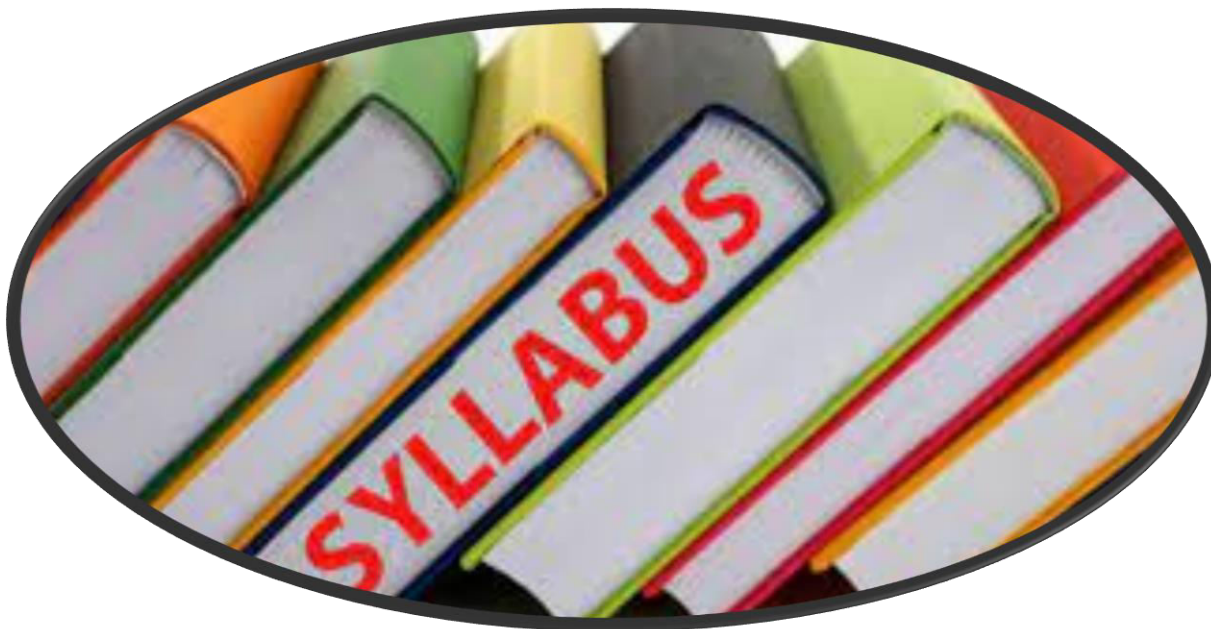
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**AUTONOMOUS SYLLABUS**

**UG & PG**

**2021-2022**



**UG Syllabus**

**2021-22**



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2021-22

ENGLISH

SEMESTER – I



## English Syllabus-Semester-I (modified)

English Praxis Course-I

### A Course in Communication and Soft Skills

#### Learning Outcomes

*By the end of the course the learner will be able to :*

- Use grammar effectively in writing and speaking.
- Demonstrate the use of good vocabulary
- Demonstrate an understating of writing skills
- Acquire ability to use Soft Skills in professional and daily life.
- Confidently use the tools of communication skills

#### I. UNIT: Listening Skills

- i. Importance of Listening
- ii. Types of Listening
- iii. Barriers to Listening
- iv. Effective Listening

#### II. UNIT: Speaking Skills

- a. Sounds of English: Vowels and Consonants
- b. Word Accent
- c. Intonation

#### III. UNIT: Grammar

- a) Parts of Speech
- b) Concord
- c) Tenses (Present/Past/Future)
- d) Articles
- e) Prepositions
- f) Question Tags
- g) Sentence Transformation (Voice, Reported Speech & Degrees of Comparison)
- h) Error Correction

#### IV. UNIT: Writing

- i. Punctuation
- ii. Spelling
- iii. Paragraph Writing



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ENGLISH



**English Syllabus-Semester-II (modified)**

English Praxis Course-II

**A Course in Reading & Writing Skills**

**Learning Outcomes**

*By the end of the course the learner will be able to :*

- Use reading skills effectively
- Comprehend different texts
- Interpret different types of texts
- Analyse what is being read
- Build up a repository of active vocabulary
- Use good writing strategies
- Write well for any purpose
- Improve writing skills independently for future needs

**I. UNIT**

Prose : **1. Knowledge and Wisdom Bertrand Russell**  
Skills : 2. Vocabulary: Conversion of Words  
: 3. One Word Substitutes  
: 4. Collocations

**II. UNIT**

Prose : 1. The Doll's House Katherine Mansfield  
Poetry : **2. Ozymandias P B Shelley**  
Non-Detailed Text : 3. Florence Nightingale Abrar Mohsin  
Skills : 4. Skimming and Scanning

**III. UNIT**

Prose : 1. The Night Train at Deoli Ruskin Bond  
Poetry : **2. Where the Mind is Without Fear Rabindranath Tagore**  
Skills : 3. Reading Comprehension  
: 4. Note Making/Taking

**IV. UNIT**

Poetry : 1. Coromandel Fishers Sarojini Naidu  
Skills : 2. Expansion of Ideas  
: 3. Notices, Agendas and Minutes

**V. UNIT**

Non-Detailed Text : 1. An Astrologer's Day R K Narayan  
Skills : 2. Curriculum Vitae and Resume  
: 3. Letters  
: 4. E-Correspondence

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ENGLISH

**English Syllabus-Semester-III (Modified)**

English Praxis Course-III

**A Course in Conversational Skills**

**Learning Outcomes**

*By the end of the course the learner will be able to :*

- Speak fluently in English
- Participate confidently in any social interaction
- Face any professional discourse
- Demonstrate critical thinking
- Enhance conversational skills by observing the professional interviews

**I. UNIT**

Speech : **1. In London** **M.K.Gandhi**  
Skills : 2. Greetings  
: 3. Introductions

**II. UNIT**

Speech : 1. Yes, We Can Barack Obama  
Interview : 2. A Leader Should Know How to Manage Failure  
Dr.A.P.J.Abdul Kalam/ India Knowledge at Wharton  
Skills : 3. Requests

**III. UNIT**

Interview : 1. Nelson Mandela's Interview With Larry King  
Skills : 2. Asking and Giving Information  
: 3. Agreeing and Disagreeing

**IV. UNIT**

Interview : 1. JRD Tata's Interview With T.N.Ninan  
Skills : 2. Dialogue Building  
: 3. Giving Instructions/Directions

**V. UNIT**

1. Speech : 1. You've Got to Find What You Love Steve Jobs  
Skills : 2. Debates  
: 3. Descriptions  
: 4. Role Play



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**DEPARTMENT OF TELUGU  
SYLLABUS 2021-2022  
GENRAL TELUGU  
COMMON FOR BA/B.COM/B.SC  
SEMESTER - I  
SEM:1 COURSE – 1 PRACHINA TELUGU KAVITWAM  
PATYA PRANALIKA**

**UNIT – I- Rajneesh - Nannaya (MahaBharatham - Sabha ParvamPradhamaswasam**

**(26 nundi 57 padyamvaraku)**

**UNIT II- DakshaYagnamNannechodudu kumara sambhavamdviteeyaaswasam**

**(49nundi 86 padyamvaraku)**

**UNIT -III- DoumyadharmopadeshamThikkanaMahaBharathamvirataparvamPradhamaswasam(116  
nundi146 padyamvaraku**

**UNIT- IV- PalanatiBebbuliSreenadhudu (Palanativeeracharitra -dvipadaKavyam (puta 108nundi  
112 varaku)**

**UNIT -V- Seetha RavanaSamvadam -MollaRaamayanamSundaraKhanda (40 nundi 87 varaku)**

- 1. VYAKARANAM**
- 2. SANDHULU: utwa, trika, druthaprakruthika,nugagama,  
Dviruktatakaaradesha,Yanadesha ,Vruddi,chutwa, Jastwa, Anunasika, Savarnaderga,  
Gunasandhimodalagunavi**
- 3. SAMASALU: Avyayibhava, TatpuruSha karmadharaya,dwandwa,dvigu, Bahuvreehi,  
modalagunavi**
- 4. ALANKARALU:Arthalaakaralu,:Upama,Utpreksha, Rupaka,Swabhavokthi,  
arthantaranyasalankaramodalagunavi.**
- 5. Sabdhalankaralu: VrutyAnuprasa, chekanuprasa,latanuprasa,antyanuprasa.**
- 6. CHANDASSU: Vruthalu:champakamala, utpmalama,Shardulam,mathebbham**
- 7. Jathipadyalu :kandam , Dvipada.**
- 8. Upajatulu: Ataveladi ,Tetageethi,Seesam, MutyalaSaraalu.**



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SYLLABUS 2021-2022

GENERAL TELUGU

COMMON FOR BA/B.COM/B.SC

SEMESTER – II

SEM:2 COURSE – 2 ADHUNIKA TELUGU SAAHITYAM  
PATYA PRANALIKA



**UNIT:I - ADHUNIKA KAVITWAM**

1. Adhunikakavitwam -parichayam

2. Kondaveedu -Kavi kokilaDuvvuriraamireddy

(Grmdaavali-khandakaavyaalu-nakshatramaalasamputi)

3. Maatrusangeetham -Anisetty Subbarao

(Agniveena Kavitha samputinundi)

4. ShivataandavamPuttaparthi Narayana charyulu

(modatikhandikaemaandamubhumitalamuna-ilatalambuna)

**UNIT II - KATHANIKA**

5. Telugu Kathanika-parichayam

6. Bhayam(katha) Kaalipatnam Ramarao

7. SwedamkareduRental Nageswara Rao

**UNIT III - NAVALA**

8. Telugu Navala - Parichayam

9. Radhachakralu (Navala) MaheedararamohanRao(Samkshiptaithivrutham)

10. Radha chakralu( Samekshavyasam) Dr.Yallapragadamallikarjuna Rao

**UNIT -IV -NATAKAM**

11. Telugu Natakamparichayam

12. Yakshaganam (Natika) M.V.S. Haranadha Rao

13. ApurupaKalarupalavidwamsadrusyam ``Yakshaganam'' ( Samekshavyasam)  
Dr.KandimallaSambashiva Rao

UNIT – V - VIMARSHA

14. Telugu sahitya vimarsha - parichayam

15. Vimarsha - SwarupaSwabhavalu, Uttamavimarshakudu - Lakshanalu



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SYLLABUS 2021-2022

GENRAL TELUGU

COMMON FOR BA/B.COM/B.SC

SEMESTER - III

SEM:3 COURSE – 3 SRUJANAATHMAKA RACHANA,



PATYA PRANALIK

UNIT- I : VYAKTHEEKARANA NAIPUNYAALU

1.Vinathi patralu, Phiryadulu,

2.Lekhalu: adikaarika, vyakthigatalekhalu

3.Postarlu,karapatralu

UNIT- II :SRUJANATHMAKA RACHANA

1.Kavitha rachana,:Uthamakavitha –lakshanalu

2. katha rachana ,Uthama katha –lakshanalu

3 .vyasarachana: UthamaVyasam –lakshanalu

UNIT- III: ANUVADA RACHANA

1.Anuvadham nirvachanam,anuvadapaddathulu

2.Anuvadha samasyalu –bougolika,bhasha,saamskrutikasamasyalu ,parishkaraalu.

3.Abyasam:

AnglamunundiTeluguku,Telugunundianglamunakuokapeeruanuanuvadimchatam.

UNIT- IV: MADYALAKU RACHANA -1

1.Mudranaa maadyamam(achumaadyamam) :Parichayam,paridhivikaasam.

2.Vividha rakaalapatrikalupariseelana :patrika bhasha ,shyili,vaividyam.

3.Patrika rachana: Vartharachana ,sampaadakeeyalu,sameekshalu-avagaahana

UNIT- V: MAADYAMALAKU RACHANA -2(PRASAARA MAADYAMAM/ ELECTRONIC MEDIA)

- 1.Prasaara madyamaalu,;nirvachanam, rakaalu,vistruthi,prayojanaalu.
- 2.Sravana maadyamaalu – rachana: Radio rachana, prasangalu,naatikalu, prasaarasamaachaaram.
3. Drusyamadyamaalu – rachana: vyakyaanam(anchoring) television rachana



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GENRAL HINDI  
COMMON FOR BA/B.COM/B.SC  
Semester -I



**I- Gadya Sandesh (Prose)**

1. Sahitya Ki Mahatta - Mahaveer Prasad dwivedi
2. Sachiveevath – Sardar Poornasingh
3. Mitratha- Acharya Ramachandra Shukla

**II- Kathalok(Short Story)**

- 1.Mukthidhan- Munshi Premchand
2. Purraskar- Jaya shankara Prasad
3. UsneKhatha- Chandradhar Sharma Guleri

**III- Vyakaran (Grammar)**

1. Ling, Vachan, Shabdh, Kal ,Vachya, Vakyon ki shuddi, Shabdh-Vilome, English- Hindi  
ParibhashikShabdh Soochi

**IV- Karyalayeen Hindi (Official Language)**

1. Karyalayeen Hindi
2. Shadhavali

**V- Patralekhan( Letter Writing)**



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**GENRAL HINDI**  
**COMMON FOR BA/B.COM/B.SC**  
**Semester -II**

**I- Gadhyasandesh (Prose)**

1. Sahitya aur Sanskruthi ka PraasparSanbandh - Dr. G. Sundar Reddy
2. Bharath ek Hai - Ramdharee Sing Dinakar
3. HIV/AIDS - Prakash BathalKhandeevan Dr. Ramana Ganga Khadekar  
( Anuvad-Sreenathi Sadhana Monrya)

**II- Katha Lok (Short Story)**

1. Vapasee - Usha Priyanvada
2. BhookHadthal- Balashouri Reddy
3. Paramtma ka Kutta – Mohan Rakesh

**III- Vyakaran (Grammar)**

1. Karyalayeen Hindi Shabdavali English – Hindi
2. KaryalyoomeiPrayagHonevale Hindi – English Shabdh.
3. Vakyansh English – Hindi Shabdoo kaVakyameiPrayog

**IV- Sandhi – Vichedh**

**V- Patra Lekhan**



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Semester -III**

**I- Kavyadeep (Ancient and Modern Poetry)**

- 1.Kabeerdas- Sakhee(2-20)
2. Soordas ka Balvarnan
3. MathruBhoomi- MythilisharanGuptaji
4. ThodthiPattar- SuryakanthThripatiNirala
5. DeshKagaj Par Bana NakshaNaheehai- SarwesudarDayal Saxena

**II - Hindi Sahitya Ka Itihas (History of Hindi Literture)**

1. Bhaktikal
- 2.Gnanasrayi Sakha- Khaeer
- 3.Pramasrayi Sakha- Jyasee

**III- SadharanNibandh (General Essays)**

- 1.Samachar Patra
- 2.Bekari ki Samasya
- 3.Computer
- 4.Paryavaran Aur Pradhooshan
- 5.Sahitya aur Samaj

**IV- Anuvaad (Translation)**

- 1.Anuvaad Abyas- English to Hindi (Four to Five Lines)

**V- PrayojanMoolak Hindi (Funtional Hindi)**

- 1.Paripatra
2. KaryalayGnapan 3. Adhisoochana



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2021-22

URDU

Syllabus for (B.A./ B.Com. / B.Sc.) U.G. under CBCS  
Second Language – Urdu  
First year Degree Course Second Language Part - 1(b)

Paper – I: URDU POETRY

SEMESTER - I

- UNIT – I
1. GHAZAL  
MEER – *Raah-e-Daur-e-Ishq me Roota hai kya*
  2. NAZM  
Nazeer Akbarabadi – *Kaljug*
- UNIT – II
1. GHAZAL  
GHALIB – *Dard Minnat kash-e-Dawa na hua*
  2. NAZM  
SHIBLI – *Adl-e-Farooqi*
- UNIT – III
1. GHAZAL  
MOMIN – *Who jo Hum me Tum me Qaraar tha*
  2. NAZM  
IQBAL – *Chaand aur Tare*
- UNIT – IV
1. GHAZAL  
DAGH DEHLAVI – *Duniya me Aadmi ko Museebat Kahan nahi*
  2. NAZM  
AKBAR – *Naseehat-e-Akhlaqi*
- UNIT – V
1. GHAZAL  
JIGAR MURADABADI – *Koi Ye Kehde Gulshan Gulshan*
  2. NAZM  
FAIZ – *Lauh-o-Qalam*

**SUGGESTED READING:**

**URDU SHAIRY KA FANNI IRTEQA – FARMAN FATEHPOOR**



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Second Language – Urdu  
First Year Degree Course Second Language Part - 1(b)

Paper – II: URDU POETRY

SEMESTER - II

- UNIT – I           MASNAWI  
MEER HASAN – *Aaghaaz-e-Dastaan* (Sehrul Bayan)
- UNIT – II           MARSIYA  
MEER ANEES – *Jab Qataa Ki Masafat-e-Shab Aaftaab ne*  
(Ibtedayi 6 Bandh)
- UNIT – III          QASEEDA  
GHALIB – *Dar Madh-e- Bahadur Shah Zafar*  
(*Haan Mahe Nau Sunen Hum Uska Naam*)
- UNIT – IV          RUBAIYAAT  
  
AMJAD HYDERABADI  
1. *Rutba Jise Duniya me Khuda Deta hai*  
2. *Har Cheez Mussabab-e-Sabab se Maangoo*  
SAGHAR JAYYEDI  
1. *Tareef ki Meezan pe Tul jate hain*  
2. *Zulmat ka Toofan Utha deta hai*
- UNIT – V          TA'ARUF  
Muthtasar Ta'aruf aur Sawanehi Haalat  
1. *Amjad Hyderabad*  
2. *Saghar Jayyedi*

**SUGGESTED READING:**

URDU SHAIRI KA TANQEEDI MUTA'A – SUMBUL NIGAAR  
TAREEK-E-ADAB-E-URDU – NOORUL HASAN NAQUI  
MUKHTASAR TAREEK-E-ADAB-E-URDU – EJAZ HUSSAIN

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Second Language – Urdu  
Second Year Degree Course Second Language Part - 1(b)

Paper – III: Urdu Prose Fiction

SEMESTER - III

- UNIT – I            AFSANAWI ADAB KA TA'ARUF
- UNIT – II            DASTAN  
*Shuru Qisse ka (Baagh-oBahar: Meer Amman)*
- UNIT – III            NOVEL  
*Kaleem ka Mirza Zahirdaar Baig ke yahan Mehmaan Jana  
(Taubatun Nasooh: Dy. Nazeer Ahmed)*
- UNIT – IV            DRAMA  
*Gud Ki Makhkhiyaan (Dr. Kareem Roomani)*
- UNIT – V            AFSANA  
*Ek Aur Din (Abdus Samad)*

**SUGGESTED READING:**

URDU SHAIRI KA TANQEEDI MUTA'A – SUMBUL NIGAAR  
TAREEK-E-ADAB-E-URDU – NOORUL HASAN NAQUI  
MUKHTASAR TAREEK-E-ADAB-E-URDU – EJAZ HUSSAIN



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2021-22

Life Skill course

B.Sc. / B.Com / B.A

Revised Syllabus under CBCS w.e.f. 2020-2021



### LIFE SKILL COURSE BASIC COMPUTER APPLICATIONS

Semester	Course Code	Course Title	Hours	Credits
I	Life skill course	BASIC COMPUTER APPLICATIONS	30	2

#### Objectives:

This course aims at providing exposure to students in skill development towards basic office applications.

#### Course Learning Outcomes:

After successful completion of the course, student will be able to:

1. Demonstrate basic understanding of computer hardware and software.
2. Apply skills and concepts for basic use of a computer.
3. Identify appropriate tool of MS office to prepare basic documents, charts, spreadsheets and presentations.
4. Create personal, academic and business documents using MS office.
5. Create spreadsheets, charts and presentations.
6. Analyze data using charts and spread sheets.

#### Unit-I: (08 hrs)

**Basics of Computers:** Definition of a Computer - Characteristics of computers, Applications of Computers – Block Diagram of a Digital Computer – I/O Devices, hardware, software human ware, application software, system software, Memories - Primary, Auxiliary and Cache Memory.

**MS Windows** – Desktop, Recycle bin, My Computer, Documents, Pictures, Music, Videos,

Task Bar, Control Panel.

**Unit-II:** (08 hrs)

**MS-Word :** Features of MS-Word - MS-Word Window Components - Creating, Editing, Formatting and Printing of Documents – Headers and Footers – Insert/Draw Tables, Table Auto format – Page Borders and Shading – Inserting Symbols, Shapes, Word Art, Page Numbers, Mail Merge.

**Unit-III:** (10 hrs)

**MS-Excel :** Overview of Excel features – Creating a new worksheet, Selecting cells, Entering and editing Text, Numbers, Inserting Rows/Columns –Changing column widths and row heights, Formulae, Referencing cells , Changing font sizes and colors, Insertion of Charts, Auto fill, Sort.

**MS-PowerPoint:** Features of PowerPoint – Creating a Presentation - Inserting and Deleting Slides in a Presentation – Adding Clip Art/Pictures -Inserting Other Objects, Audio, Video - Resizing and scaling of an Object – Slide Transition – Custom Animation.

**RECOMMENDED CO-CURRICULAR ACTIVITIES:** (04 hrs)

(Co-curricular activities shall not promote copying from textbook or from others work and shall encourage self/independent and group learning)

1. Assignments (in writing and doing forms on the aspects of syllabus content and outside
  - a. the syllabus content. Shall be individual and challenging))
2. Student seminars (on topics of the syllabus and related aspects (individual activity))
3. Quiz, Group Discussion
4. Solving MCQ's available online.
5. Suggested student hands on activities:
  - Create two folders, Rename the folder, create two files each using notepad and paint, move the files from one folder to another folder, delete a file you have created, copy and paste text within notepad.
  - Create a letter head for your college with watermark, your resume, visiting card, brochure for your college activity, organization chart for your college, any advertisement, Prepare your Class time table.



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2021-22

Life Skill course



### HUMAN VALUES AND PROFESSIONAL ETHICS (HVPE)

(SYLLABUS)

#### Learning Outcome:

On completion of this course, the UG students will be able to

- ✓ Understand the significance of value inputs in a classroom and start applying them in their life and profession
- ✓ Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.
- ✓ Understand the value of harmonious relationship based on trust and respect in their life and profession
- ✓ Understand the role of a human being in ensuring harmony in society and nature.
- ✓ Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.

#### UNIT: 1 Introduction – Definition, Importance, Process & Classifications of Value Education

- ❖ Understanding the need, basic guidelines, content and process for Value Education
- ❖ Understanding the thought provoking issues; need for Values in our daily life
- ❖ Choices making – Choosing, Cherishing & Acting
- ❖ Classification of Value Education: understanding Personal Values, Social Values, Moral Values & Spiritual Values.

#### UNIT: 2 Harmony in the Family – Understanding Values in Human Relationships

- ✓ Understanding harmony in the Family- the basic unit of human interaction
- ✓ Understanding the set of proposals to verify the Harmony in the Family;
- ✓ Trust (*Vishwas*) and Respect (*Samman*) as the foundational values of relationship
- ✓ Present Scenario: Differentiation (Disrespect) in relationships on the basis of body, physical facilities, or beliefs.
- ✓ Understanding the Problems faced due to differentiation in Relationships
- ✓ Understanding the harmony in the society (society being an extension of family): *Samadhan*, *Samridhi*, *Abhay*, *Sah-astitva* as comprehensive Human Goals
- ✓ Visualizing a universal harmonious order in society- Undivided Society (*AkhandSamaj*), Universal Order (*SarvabhaumVyawastha*)- from family to world family.

#### UNIT: 3 Professional Ethics in Education

- ✓ Understanding about Professional Integrity, Respect & Equality, Privacy, Building Trusting Relationships.
- ✓ Understanding the concepts; Positive co-operation, Respecting the competence of other professions.
- ✓ Understanding about Taking initiative and Promoting the culture of openness.
- ✓ Depicting Loyalty towards Goals and objectives.



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### Life Skill course

#### LIFE SKILL COURSE

#### ENTREPRENEURSHIP DEVELOPMENT

(With Learning Outcomes, Unit-wise Syllabus, References, Co-curricular Activities & Model Question Paper)

(To be Implemented from 2020-21 Academic Year)

Sl. No	Code	Sem	Course	Name of Life Skill Course ( Course consists 3 Units)	Hours/ Week	Credits	Marks (Sem-End)
1		I		Entrepreneurship Development	2	2	50

#### Syllabus

#### ENTREPRENEURSHIP DEVELOPMENT

(Total 30Hrs)

**Course Objective:** A Generic Course that is intended to inculcate an integrated personal Life Skill to the student.

#### Learning Outcomes:

After successful completion of the course the student will be able to;

- Understand the concept of Entrepreneurship, its applications and scope.
- Know various types of financial institutions that help the business at Central, State and Local Level
- Understand Central and State Government policies, Aware of various tax incentives, concessions
- Applies the knowledge for generating a broad idea for a starting an enterprise/start up
- Understand the content for preparing a Project Report for a start up and differentiate between financial, technical analysis and business feasibility.

#### Syllabus:

**Unit-I: Entrepreneurship:** Definition and Concept of entrepreneurship - Entrepreneur Characteristics - Classification of Entrepreneurs - Role of Entrepreneurship in Economic Development - Start-ups.

**Unit-II: Idea Generation and Project Formulation:** Ideas in Entrepreneurships - Sources of New Ideas - Techniques for Generating Ideas - Preparation of Project Report - Contents; Guidelines for

Report preparation - Project Appraisal Techniques - Economic Analysis - Financial Analysis - Market Analysis.

**Unit-III: Institutions Supporting and Taxation Benefits:** Central level Institutions: NABARD; SIDBI, - State Level Institutions - DICs - SFC - Government Policy for MSMEs - Tax Incentives and Concessions.

#### Reference Books:

1. Arya Kumar, Entrepreneurship, Pearson, Delhi
2. Poornima MCH, Entrepreneurship Development - Small Business Enterprises, Pearson, Delhi
3. Sangeetha Sharma, Entrepreneurship Development, PHI Learning
4. Kanishka Bedi, Management and Entrepreneurship, Oxford University Press, Delhi



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(AUTONOMOUS)**

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Y.S.R. Kadapa District – 516001, Andhra Pradesh, India.  
Affiliated to Yogi Vemana University



2021-22

**Life Skill course**

B.Sc./B.Com/B.A

Syllabus under CBCS w.e.f.2020-21

**INFORMATION & COMMUNICATION TECHNOLOGY**

Semester	Course Code	Course Title	Hours	Credits
II	Life skill Course	INFORMATION & COMMUNICATION TECHNOLOGY	30	2

**Objectives:**

This course aims at acquainting the students with basic ICT tools which help them in their day to day and life as well as in office and research.

**Course outcomes:** After completion of the course, student will be able to;

1. Understand the literature of social networks and their properties.
2. Explain which network is suitable for whom.
3. Develop skills to use various social networking sites like twitter, flickr, etc.
4. Learn few GOI digital initiatives in higher education.
5. Apply skills to use online forums, docs, spreadsheets, etc for communication, collaboration and research.
6. Get acquainted with internet threats and security mechanisms.

**SYLLABUS:**

**UNIT-I: (08 hrs)**

Fundamentals of Internet: What is Internet?, Internet applications, Internet Addressing – Entering a Web Site Address, URL–Components of URL, Searching the Internet, Browser –Types of Browsers, Introduction to Social Networking: Twitter, Tumblr, LinkedIn, Facebook, flickr, Skype, yahoo, YouTube, WhatsApp .

**UNIT-II: (08 hrs)**

E-mail: Definition of E-mail -Advantages and Disadvantages –User Ids, Passwords, Email Addresses, Domain Names, Mailers, Message Components, Message Composition, Mail Management.

**UNIT-III: (10 hrs)**

Overview of Internet security, E-mail threats and secure E-mail, Viruses and antivirus software, Firewalls, Cryptography, Digital signatures, Copyright issues.

What are GOI digital initiatives in higher education? (SWAYAM, SwayamPrabha, National Academic Depository, National Digital Library of India, E-Sodh-Sindhu, Virtual labs, e-acharya, e-Yantra and NPTEL).

**RECOMMENDED CO-CURRICULAR ACTIVITIES: (04 hrs)**

(Co-curricular activities shall not promote copying from textbook or from others work and shall encourage self/independent and group learning)



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2021-22

**Life Skill course**

**B.A., B. Com & B. Sc Programmes**

Revised CBCS w.e.f 2020-21

**LIFE SKILL COURSE**

**Indian Culture & Science**

Total 30 hrs (02 h/wk, 02 Cr & Max 50 Marks)

**Learning Outcomes:**

By successful completion of the course, students will be able to:

1. Understand the evolution of India's culture
2. Analyze the process of modernization of Indian society and culture from past to future
3. Comprehend objective education and evaluate scientific development of India in various spheres
4. Inculcate nationalist and moral fervor and scientific temper

**Syllabus:**

**Unit – I: Unity in Diversity in India: (09 hrs)**

Coexistence of various religions since ancient times - Hinduism, Buddhism, Jainism and Atheism, and later Sikhism, Islam and Christianity

The Bhakti (Vishnavite and Saivaite) and Sufi Movements

The concepts of seela, karuna, kshama, maitri, vinaya, santhi and ahimsa Achievements in Literature, Music, Dance, Sculpture and Painting - Craftsmanship in cloth, wood, clay, metal and ornaments

Cultural diversity, Monogamy, Family system, Important seasonal festivals

**Unit – II: Social Reforms and Modern Society: (09 hrs)**

Reforms by Basaveswara - Raja Rama Mohan Roy – Dayananda Saraswathi –Swamy

Vivekananda –Mahatma Gandhi - B. R. Ambedkar - Reforms in Andhra by

Vemana, Veerabrahmam, Gurajada, Veeresalingam and GurramJashua (only reforms in brief, biographies not needed)

Modern Society: Family unity, Community service, Social Harmony, Civic Sense,

Gender Sensitivity, Equality, National Fervor

**Unit – III: Science and Technology: ((09 hrs)**

Objectivity and Scientific Temper – Education on Scientific lines (Bloom's Taxonomy) - Online Education

Developments in Industry, Agriculture, Medicine, Space, Alternate Energy, Communications, Media through ages



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2021-22

Life Skill course

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## Elementary Statistics

*Objective:* To provide basic understating of general statistical tools and their elementary applications and to create awareness on Indian Statistical System.

### Learning outcomes

**Unit-I:** To understand the concept of Statistics and its merits and demerits. Distinguishing primary and secondary data. Classification, Tabulation and Pictorial representation of data.

**Unit - II:** To understand the basic nature of data and how a single value describes the entire data set. Measuring the degree of departure of a distribution from symmetry and reveals the direction of scatterness of the items.

**Unit - III:** To understand the spread of the data and to draw conclusions from the comparison of averages.

To understand the concept of correlation and regression and to learn the degree of association between two variables and establishing relationship between the variables.

**Unit I:** Meaning, scope and limitations of Statistics

*Collection of data:* Primary and Secondary, Classification and Tabulation, Construction of frequency distribution.

*Graphical Representation:* Histogram, Bar, Pie and Frequency polygon.  
(8hrs)

**Unit II:** *Measures of Central Tendency:* Features of good average, Arithmetic Mean, Median, Mode. Empirical relationship between Mean Median and Mode and skewness based on central values. (8hrs)

**Unit III:** *Measures of Dispersion:* Range, Quartile Deviation(QD), Mean Deviation(MD), Variance, Standard Deviation(SD), relationship between QD, MD and SD. Familiarization of the concepts relating to Correlation and Linear Regression line. (8hrs)



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**2021-22**

**Life Skill course**

**HEALTH & HYGIENE**



**Unit I: Basics of Nutrition**

**10 Hrs.**

1. Nutrition – definition, importance, Good nutrition and mal nutrition; Balanced Diet; Basics of Meal Planning
2. Carbohydrates –functions, dietary sources, effects of deficiency.
3. Lipids –functions, dietary sources, effects of deficiency.
4. Proteins –functions, dietary sources, effects of deficiency.
5. Brief account of Vitamins- functions, food sources, effects of deficiency,
6. Macro and micro minerals –functions, effects of deficiency; food sources of Calcium, Potassium and Sodium; food sources of Iron, Iodine and Zinc
7. Importance of water– functions, sources, requirement and effects of deficiency.

**Unit II: Health**

**10 Hrs.**

8. Health - Determinants of health, Key Health Indicators, Environment health & Public health; Health-Education: Principles and Strategies
9. Health Policy & Health Organizations: Health Indicators and National Health Policy of Govt. of India-2017; Functioning of various nutrition and health organizations in India viz., NIN (National Institution of Nutrition), FNB (Food and Nutrition Board), ICMR (Indian Council of Medical Research), IDA (Indian Dietetics Association), WHO-India, UNICEF-India
10. National Health Mission: National Rural Health Mission (NRHM) Framework, National Urban Health Mission (NUHM) Framework
11. Women & Child Health Care Schemes: Reproductive, Maternal, Newborn, Child and Adolescent Health (RMNCH+); Janani Shishu Suraksha Karyakaram (JSSK); Rashtriya Bal Swasthya Karyakram (RBSK); India Newborn Action Plan (INAP); Adolescent Health- Rashtriya Kishor Swasthya Karyakram (RKSK)
12. Disaster Management – Containment, Control and Prevention of Epidemics and Pandemics – Acts, Guidelines and Role of Government and Public

### Unit III: Hygiene

10 Hrs.

13. Hygiene – Definition; Personal, Community, Medical and Culinary hygiene; WASH (Water, Sanitation and Hygiene) programme
14. Rural Community Health: Village health sanitation & Nutritional committee (Roles & Responsibilities); About Accredited Social Health Activist (ASHA); Village Health Nutrition Day, Rogi Kalyan Samitis
15. Community & Personal Hygiene: Environmental Sanitation and Sanitation in Public places
16. Public Awareness through Digital Media - An Introduction to Mobile Apps of Government of India: NHP, Swasth Bharat, No More Tension, Pradhan Mantri Surakshit Mantritva Abhiyan (PM Suman Yojana), My Hospital (Mera aspataal), India fights Dengue, JSK Helpline, Ayushman Bhava, Arogya Setu, Covid 19AP

### REFERENCES

- **Bamji, M.S., K. Krishnaswamy & G.N.V. Brahmam (2009)** *Textbook of Human Nutrition(3rd edition)* Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi
- **Swaminathan (1995)***Food & Nutrition(Vol I, Second Edition)* The Bangalore Printing &Publishing Co Ltd., , Bangalore
- **Vijaya Khader (2000)**Food, nutrition & health, Kalyan Publishers, New Delhi
- **Srilakshmi, B., (2010)***Food Science, (5th Edition)* New Age International Ltd., New Delhi
- Weblinks: <https://nhm.gov.in/>

- National Rural Health Scheme:



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2021-22

Life Skill course



Revised CBCS w.e.f 2020-21

**LIFE SKILL COURSE**

**Personality Enhancement & Leadership**

Total 30 hrs (02 h/wk, 02 Cr & Max 50 Marks)

**Learning Outcomes:**

By successful completion of the course, students will be able to:

1. Develop comprehensive understanding of personality
2. Know how to assess and enhance one's own personality
3. Comprehend leadership qualities and their importance
4. Understand how to develop leadership qualities

**Syllabus:**

**Unit – I:**(7 hrs)

Meaning of Personality – Explanations of Human Personality – Psychodynamic Explanations – Social Cognitive Explanation – Big Five traits of Personality

**Unit – II:** (8 hrs)

Assessment of Personality - Projective & Self Report Techniques - Building Self-Confidence – Enhancing Personality Skills

**Unit – III:**(10 hrs)

Leadership Characteristics – Types of Leaders – Importance of Leadership – Leadership Skills – Building and Leading Efficient Teams – Leadership Qualities of Abraham Lincoln, Mahatma Gandhi, Prakasam Pantulu, Dr. B. R. Ambedkar & J.R.D. Tata

**Co-curricular Activities Suggested:** (05 hrs)

1. Assignments, Group discussions, Quiz etc
2. Invited Lecture by a local expert
3. Case Studies (ex., on students behavior, local leaders etc.)

**Reference Books:**

- Girish Batra, Experiments in Leadership, Chennai: Notion Press, 2018
- Mitesh Khatri, Awaken the Leader in You, Mumbai: Jaico Publishing House, 2013
- Carnegie Dale, Become an Effective Leader, New Delhi: Amaryllis, 2012
- Hall, C.S., Lindzey. G. & Campbell, J.B Theories of Personality. John Wiley & Sons, 1998



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2021-22

Life Skill course

CBCS/ SEMESTER SYSTEM

(w.e.f 2020-21)

ANALYTICAL SKILLS

Syllabus

Total 30 Hrs

**Course Objective:** Intended to inculcate quantitative analytical skills and reasoning as an inherent ability in students.

**Course Outcomes:**

After successful completion of this course, the student will be able to;

- 1) Understand the basic concepts of arithmetic ability, quantitative ability, logical reasoning, business computations and data interpretation and obtain the associated skills.
- 2) Acquire competency in the use of verbal reasoning.
- 3) Apply the skills and competencies acquired in the related areas
- 4) Solve problems pertaining to quantitative ability, logical reasoning and verbal ability inside and outside the campus.

**UNIT – 1: (10 Hours)**

**Arithmetic ability:** Algebraic operations BODMAS, Fractions, Divisibility rules, LCM & GCD (HCF).

**Verbal Reasoning:** Number Series, Coding & Decoding, Blood relationship, Clocks, Calendars.

**UNIT – 2: (10 Hours)**

**Quantitative aptitude:** Averages, Ratio and proportion, Problems on ages, Time-distance – speed.

**Business computations:** Percentages, Profit & loss, Partnership, simple compound interest.

**UNIT – 3: (07 Hours)**

**Data Interpretation:** Tabulation, Bar Graphs, Pie Charts, line Graphs. Venn diagrams.

**Recommended Co-Curricular Activities (03 hrs)**

Surprise tests / Viva-Voice / Problem solving/Group discussion.

**Text Book:**

Quantitative Aptitude for Competitive Examination by R.S. Agrawal, S.Chand Publications.

**Reference Books**

1. Analytical skills by Showick Thorpe, published by S Chand And Company Limited, Ramnagar, New Delhi-110055
2. Quantitative Aptitude and Reasoning by R V Praveen, PHI publishers.
3. Quantitative Aptitude for Competitive Examination by Abhijit Guha, Tata Mc Graw Hill Publications.



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2021-22

**Life Skill course**

A Mandatory Course for BA/BCom/BSc etc.

### **ENVIRONMENTAL EDUCATION**

(Total hours of Teaching – 30 Hrs. @ 02 Hrs. per Week)

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**Course objective:** A Generic Course intended to create awareness that the life of human beings is an integral part of environment and to inculcate the skills required to protect environment from all sides.

**Learning outcomes:** On completion of this course the students will be able to .....

1. Understand the nature, components of an ecosystem and that humans are an integral part of nature.
2. Realize the importance of environment, the goods and services of a healthy biodiversity, dependence of humans on environment.
3. Evaluate the ways and ill effects of destruction of environment, population explosion on ecosystems and global problems consequent to anthropogenic activities.
4. Discuss the laws/ acts made by government to prevent pollution, to protect biodiversity and environment as a whole.
5. Acquaint with international agreements and national movements, and realize citizen's role in protecting environment and nature.

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#### **Unit 1: Environment and Natural Resources**

**06 Hrs.**

1. Multidisciplinary nature of environmental education; scope and importance, need for public awareness
2. Structure and composition of Atmosphere, Hydrosphere, Lithosphere and Biosphere
3. Man as an integral product and part of the Nature.
4. A brief account of land, forest and water resources in India and their importance.

5. Biodiversity : Definition; importance of Biodiversity , Levels of Biodiversity, genetic, species and ecosystem diversity.

**Unit-2: Environmental degradation and impacts**

**10Hrs**

1. Human population growth and its impacts on environment; land use change, land degradation, soil erosion and desertification.
2. Use and over-exploitation of surface and ground water, construction of dams, floods, conflicts over water (within India).
3. Deforestation: Causes and effects due to expansion of agriculture, firewood, mining, forest fires and building of new habitats.
4. Non-renewable and renewable energy resources and their utilization.
5. A brief account of air, water, soil and noise pollutions; Biological, industrial and solid wastes in urban areas. Human health and economic risks.
6. Green house effect - global warming; ocean acidification, ozone layer depletion, acid rains and impacts on living organisms, agriculture and health.
7. Threats to biodiversity: Natural calamities, habitat destruction and fragmentation, over exploitation, hunting and poaching, introduction of exotic species, pollution, predator and pest control.

**Unit 3: Conservation of Environment**

**10 Hrs**

1. Concept of sustainability and sustainable development with judicious use of land, water and forest resources; afforestation.
2. Control measures for various types of pollution; use of renewable and alternate sources of energy.
3. Solid waste management: Control measures of urban and industrial waste.
4. Conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.
5. Environment Laws: Environment Protection Act; Act; Wildlife Protection Act; Forest Conservation Act.
6. International agreements: Montreal and Kyoto protocols; Environmental movements: Bishnois of Rajasthan, Chipko, Silent valley.



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2021-22

## Skill Development Courses

B.A., B. Com & B. Sc Programmes

Revised CBCS w.e.f. 2020-21

### SKILL DEVELOPMENT COURSES

Arts Stream

### Tourism Guidance

Total 30 hrs (02 h/wk, 02 Cr & Max 50 Marks)

#### **Learning Outcomes;**

*By successful completion of the course, students will be able to:*

1. Understand the basic tourism aspects
2. Comprehend the requirements, role and responsibilities of profession of a Tourist Guide
3. Apply the knowledge acquired in managing different groups and guiding in a tour
4. Explain basic values related to tourism and heritage

#### **Syllabus:**

##### **Unit I: (06 hrs)**

Tourism – What is Tourism - Characteristics of Tourist Places – Guidance in Tourism  
- Meaning of Guidance – Types of Tour Guidance - Government/Department Regulations

##### **Unit II: (10 hrs)**

Types of Guides – Characteristics of a Guide - Duties and Responsibilities of a Guide  
- The Guiding Techniques –Guide's personality- Training Institutions – Licence.  
Leadership and Social Skills - Presentation and Communication Skills - Working with different age and linguistic groups - Working under difficult circumstances – Precautions at the site -Relationship with Fellow Guides and Officials.

##### **Unit III: (10 hrs)**

Guest Relationship Management- Personal and Official - Arrangements to Tourists – Coordinating transport - VISA/Passport -Accident/Death -Handling Guests with Special Needs/ Different Abilities –Additional skills required for Special/Adventure Tours - Knowledge of Local Security and Route Chart – PersonalHygiene and Grooming - Checklist - Code of Conduct

#### **Co-curricular Activities Suggested: (04 hrs)**

1. Assignments, Group discussion, Quiz etc.
2. Invited lecture/training by local tourism operators/expert/guides
3. Visit to local Tourism Department office and a tourist service office
4. Organisation of college level short-duration tours to local tourist sites.





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2021-22

### Skill Development Courses

A.P. State Council of Higher Education

B.A., B. Com & B. Sc Programmes

Revised CBCS w.e.f 2020-21

#### SKILL DEVELOPMENT COURSES

*(To be offered from Semesters I to IV)*

Arts Stream

#### PUBLIC RELATIONS

Total 30 hrs (02 h/wk, 02 Cr & Max 50 Marks)

#### Course Outcomes:

*After successful completion of this course, the student will be able to:*

1. Understand the historical background and role Public Relations in various areas
2. Have insight into the use of the technological advancements in Public Relations
3. Comprehend tools of Public Relations in order to develop the required skills.
4. Understand the ethical aspects and future of Public Relations in India
5. Develop writing skills for news papers and creation of Blogs.

#### Syllabus:

- Unit I Public Relations-Meaning, Definition, Nature and Scope, Historical Background, Technological and Media Revolution and Role in Business, Government, Politics, NGOs and Industry.  
06 Hrs
- Unit II Concepts of Public Relations-Press, Publicity, Lobbying, Propaganda, Advertising, Sales Promotion and Corporate Marketing Services, Tools of Public Relations- Press Conferences, Meets, Press Releases, Announcements, Webcasts  
10 Hrs
- Unit III Public Relations and Mass Media, Present and future of Public Relations in India, Ethics of Public Relations and Social Responsibility, Public Relations and Writing- Printed Literature, Newsletters, Opinion papers and Blogs  
10 Hrs

#### Co-curricular Activities Suggested: (04 Hrs)

1. Invited lecture by local field expert/ eminent personality on Public Relations
2. Visit to Press
3. Opinion Survey, Media Survey and Feedback
4. Case Studies
5. Organising mock press conferences, exhibitions
6. Assignments, Group discussion, Quiz etc.

#### Reference Books:

1. Brown, Rob, Public Relations and the Social Web, Kogan Page India, New Delhi, 2010.
2. Cutlipscottetal, Effective Public Relations, London, 1995.
3. Black Sam, Practical Public Relations, Universal Publishers, 1994.
4. S.M.Sardana, Public Relations: Theory and Practice.



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2021-22

## Skill Development Courses

Revised CBCS w.e.f 2020 - 21

To be Offered from Semester I to IV

**SKILL DEVELOPMENT COURSE**

COMMERCE STREAM

### OFFICE SECRETARYSHIP

#### SYLLABUS

#### Learning Outcomes:

*By the successful completion of course, the student will be able to:*

1. Understand the organizational hierarchy and outlines of functioning
2. Comprehend the role of office secretaryship in a small and medium organization
3. Acquire knowledge on office procedures and interpersonal skills
4. Apply the skills in preparing and presenting notes, letters, statements, reports in different situations.

#### Syllabus

**UNIT I:** 06 hrs

Introduction – Organisational structure of a small and medium organization – Types of offices - Kinds of secretaries - The scope of office secretaryship

**UNIT II:** 10 hrs

The role of an office secretary -Duties and responsibilities- Usage of different devices - Flowchart and office manuals – Coordinating different wings of an office/organisation – Arranging common meetings - Operations of banking and financial services - travel and hospitality management services

**UNIT III:** 10hrs

Office procedures – Filing– Circulating files - Preparation of notes, circulars, agenda and minutes of meetings – Issue of press notes - Maintenance of files and records - Inventory, office, human resources, financial and confidential - maintaining public relations.

**Co curricular Activities:** 04 hrs

1. Visit various organizations (Hospitals, Hotels, Hospitality centers)
2. Preparation of appointment letters, dismissal letters, memos, Issue of appreciation/ motivation letters,
3. Releasing of Press notes, notices and circulars
4. Arranging invited lectures from office executives, auditors and managers
5. Assignments, Group discussion, Quiz etc.

#### Reference books:

1. Rapindex Professional course - PustalMahal Group





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2021-22

### **Skill Development Courses**

B A, B Com & B Sc Programmes

Revised CBCS w.e.f. 2020-21

### **SKILL DEVELOPMENT COURSES**

To be Offered from Semesters I to IV

### **COMMERCE STREAM**

Syllabus of

### **INSURANCE PROMOTION**

Total 30 hrs (02h/wk), 02 Credits & Max 50 Marks

#### **Learning Outcomes:**

*By successful completion of the course, students will be able to;*

1. Understand the field level structure and functioning of insurance sector and it's role in protecting the risks
2. Comprehend pertaining skills and their application for promoting insurance coverage
3. Prepare better for the Insurance Agent examination conducted by IRDA
4. Plan 'promoting insurance coverage practice' as one of the career options.

#### **SYLLABUS:**

##### **Section I: 06 Hrs**

Introduction of Insurance - Types of insurances. Growth of Insurance sector in India - Regulatory mechanism (IRDA) - Its functions

##### **Section II: 10 Hrs**

Life Insurance plans. Health insurance plans. Products and features. Contents of documents – Sales Promotion methods - Finding prospective customers –Counselling – Helping customers in filing - Extending post-insurance service to customers.

##### **Section III : 10 Hrs**

General Insurance - It's products (Motor, Marine, Machinery, Fire, Travel and Transportation) and features. Contents of documents. Dealing with customers – Explaining Products to Customers - Promoting Customer loyalty. Maintenance of Records.

#### **Co-curricular Activities Suggested: (4 hrs)**

1. Collection of pamphlets of various insurance forms and procedures
2. Invited Lectures by Development Officers concerned



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2021-22

### Skill Development Courses

B A, B Com & B Sc Programmes

Revised CBCS w.e.f. 2020-21

#### SKILL DEVELOPMENT COURSES

#### SCIENCE STREAM

#### Syllabus of ELECTRICAL APPLIANCES

**Total 30 hrs (02h/wk),**

**02 Credits & Max Marks :50**

#### Learning Outcomes:

*By successful completion of the course, students will be able to:*

- 1. Acquire necessary skills/hand on experience/ working knowledge on multimeters, galvanometers, ammeters, voltmeters, ac/dc generators, motors, transformers, single phase and three phase connections, basics of electrical wiring with electrical protection devices.*
- 2. Understand the working principles of different household domestic appliances.*
- 3. Check the electrical connections at house-hold but will also learn the skill to repair the electrical appliances for the general troubleshoots and wiring faults.*

#### SYLLABUS:

##### UNIT-I

**(6 hrs)**

Voltage, Current, Resistance, Capacitance, Inductance, Electrical conductors and Insulators, Ohm's law, Series and parallel combinations of resistors, Galvanometer, Ammeter, Voltmeter, Multimeter, Transformers, Electrical energy, Power, Kilowatt hour (kWh), consumption of electrical power

##### UNIT-II

**(10 hrs)**

Direct current and alternating current, RMS and peak values, Power factor, Single phase and three phase connections, Basics of House wiring, Star and delta connection, Electric shock, First aid for electric shock, Overloading, Earthing and its necessity, Short circuiting, Fuses, MCB, ELCB, Insulation, Inverter, UPS

##### UNIT-III

**(10 hrs)**

Principles of working, parts and servicing of Electric fan, Electric Iron box, Water heater; Induction heater, Microwave oven; Refrigerator, Concept of illumination, Electric bulbs, CFL, LED lights, Energy efficiency in electrical appliances, IS codes & IE codes.

#### Co-curricular Activities (Hands on Exercises): (04 hrs)

*[Any four of the following may be taken up]*





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B.A, B.Com & B.Sc. PROGRAMMES

Revised CBCS w.e.f. 2020-21

#### SKILL DEVELOPMENT COURSES

#### Science Stream

Syllabus of

#### PLANT NURSERY

Total 30 hrs (02h/wk),

02 Credits & Max Marks: 50

#### Learning Outcomes :

*On successful completion of this course students will be able to;*

1. Understand the importance of a plant nursery and basic infrastructure to establish it.
2. Explain the basic material, tools and techniques required for nursery.
3. Demonstrate expertise related to various practices in a nursery.
4. Comprehend knowledge and skills to get an employment or to become an entrepreneur in plant nursery sector.

#### Syllabus:

##### Unit-1 :Introduction to plant nursery

06 Hrs.

1. Plant nursery: Definition, importance.
2. Different types of nurseries –on the basis of duration, plants produced, structure used.
3. Basic facilities for a nursery; layout and components of a good nursery.
4. Plant propagation structures in brief.
5. Bureau of Indian Standards (BIS-2008) related to nursery.

##### Unit- 2 :Necessities for nursery

09 Hrs.

1. Nursery beds – types and precautions to be taken during preparation.
2. Growing media, nursery tools and implements, and containers for plant nursery, in brief.
3. Seeds and other vegetative material used to raise nursery. in brief.
4. Outlines of vegetative propagation techniques to produce planting material.
5. Sowing methods of seeds and planting material.

##### Unit-3 :Management of nursery

09 Hrs.

1. Seasonal activities and routine operations in a nursery.
2. Nursery management – watering, weeding and nutrients; pests and diseases.
3. Common possible errors in nursery activities.
4. Economics of nursery development, pricing and record maintenance.
5. Online nursery information and sales systems.



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2021-22

### Skill Development Courses

B.A., B. Com & B. Sc Programmes

Revised CBCS w.e.f 2020-21

#### SKILL DEVELOPMENT COURSES

Arts Stream

#### JOURNALISTIC REPORTING

Total 30 hrs (02 h/wk, 02 Cr & Max 50 Marks)

#### Course Outcomes:

After successful completion of this course, the student will be able to:

1. Understand the evolution of journalism with a focus on its development in India.
2. Comprehend the role of Press in the Indian democracy and various reporting methods.
3. Realise the ethical aspects of Journalism in India
4. Develop basic writing skills for news papers, Radio and Television.

#### Syllabus:

##### Unit-I: 06 Hrs

Introduction to Journalism-Nature, Growth and Development in post independence era -Print Media, Mass Media and Electronic Media, Press as a Fourth Estate-Role of Press in Democracy.

##### Unit-II: 10 Hrs

Concept of News-News Values-Sources of News - News gathering ways: Press Conferences, Press Releases, Events, Meets, Interviewing-Types of Interviews and Interviewing Techniques- Methods of News Writing: Leads, News Stories and Body Development.

##### Unit- III 10 Hrs

Reporting-Kinds of Reporting-Objectives, Interpretative, Investigative, Legal, Developmental, Political, Sports, Crime, Economic, Commercial, Disaster, Technical and Scientific Reporting-Writing Special features: Photo features, Human interest features, Profiles, Column Writing, Writing for Radio and Television-Values and Ethics of Journalism.

#### Co-curricular Activities Suggested: (04 Hrs)

1. Collection and study of various English and Telugu Newspapers
2. Invited lecture/basic training by local experts
3. Visit to local Press office
4. Informally attending Press Conferences and Meets and taking notes
5. Assignments, Group discussion, Quiz etc.

#### Reference Books:

1. Mencher Melvin, News Reporting and Writing, 1997, Columbia University Press.
2. Mazumdar Aurobindo, Indian Press and Freedom Struggle, 1993, Orient Longman.
3. Barun Roy, Beginners Guide to Journalism and Mass Communication, V&S Publishers, New Delhi.





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### Skill Development Courses

A.P. State Council of Higher Education

B.A., B. Com & B. Sc Programmes

Revised CBCS w.e.f. 2020-21

***SKILL DEVELOPMENT COURSES***

Arts Stream

**SURVEY & REPORTING**

Total Hours : 30 (2h/w), Credits : 02, Max Marks: 50.

#### **Learning Outcomes:**

*After successful completion of this course, the student will be able to:*

1. Understand the basics of survey and reporting needs and methods
2. Comprehend designing of a questionnaire
3. Conduct a simple and valid survey and Collect data
4. Organize and interpret data and Prepare and submit report.

#### **Syllabus:**

- Unit I** Survey: Meaning and Definition –Identifying need for survey - Identifying  
08Hrs Sample –Characteristics of Sample - Types of Survey – Survey Methods –  
Advantages and Disadvantages of Survey – Essential Steps in Survey – Online  
Survey.
- Unit II** Preparing Questionnaire: Types and Parts of Questionnaire – Qualities of good  
09Hrs Questionnaire – Precautions in Preparing Questionnaire  
Administering/Piloting Questionnaire –Collection of data -Dealing with People –  
Maintaining objectivity/neutrality.
- Unit III** Methods of Organizing data – Forms of data presentation - Tables and Figures –  
10Hrs Basic Statistical Methods of Analysis of data –Percentages - Mean, Mode and  
Median –Simple Ways of showing Results– Tables/Graphs/Diagrams  
Report Writing: Forms of Reporting - Parts of a Report - Title page to  
Acknowledgements -Characteristics of a Good Report – Style of language to be  
used - Explaining Data in the Report – Writing fact-based Conclusions – making  
Recommendations – Annexing required material.

#### **Recommended Co-curricular Activities (03 hrs):**

1. Invited Lecture/Training by a Local Expert
2. Collection and study of questionnaires
3. Preparation of sample questionnaire and conduct a live sample survey
4. Preparation of a sample Report
5. Assisting a real time field survey and report writing
6. Assignments, Group discussion, Quiz etc.





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### **Skill Development Courses**

B.A., B. Com., B.Sc. etc. Programmes  
(Revised CBCS w.e.f.2020-2021)

#### **Skill Development Courses**

To be offered from Semesters I to IV

#### **ARTS STREAM**

Syllabus of

#### **SOCIAL WORK**

(Total 25 hrs (02h/wk), 02 Credits & Max. 50 Marks)

#### **Learning Outcomes:**

*By successful completion of the course, students will be able to:*

1. Understand the basic concepts relating to social work practice, values, principles of social work and social problems in India
2. List out different approaches of providing help to the people in need.
3. Acquaint the process of primary methods of social work
4. Get to know the skills of working with individuals, groups and communities.

#### **Syllabus**

##### **Unit-I:(07Hrs)- Introduction to social work and concepts related to social work**

Introduction to Social Work- Definition- Scope- objectives - Functions- social service, social welfare services, social reform, major social problems in India; Social work philosophy, values, objectives, principles, methods and fields of social work.

##### **Unit-II:(09Hrs) Methods of Working with Individuals and Groups**

Social case work –Definition-scope and importance of social case work, principles and process of social case work -Tools and techniques in social case work- Counselling skills. Social Group Work-Definition-scope- the need for social group work –Group work process - Principles of Group Work -Stages of Group Work-Facilitation skills and techniques.

##### **Unit-III: (09Hrs)Workingwith Communitiesand Field Work in social work**

Community – definition - characteristics- types- community organisation as a method of social work-definition-objectives-principles- phases of community organization -



concepts of community development, community participation and community empowerment.

Field work in social work – Nature, objectives and types of field work - Importance of field work supervision.

**Suggested Co-curricular Activities:(05 hours)**

1. Divide the students into groups, each group containing not exceeding 10 students depending upon the total number of students in a class or section. Each group can search in internet about any one of the institutions which work for the welfare of children or women or elderly or scheduled caste and scheduled tribe children or differently abled persons or Juvenile homes or Correctional homes or hospitals or Mahila Pragathi pranganam or Swadhar project or any social welfare project or non governmental organizations (NGOs) to have an idea about welfare agencies working for the needy.
2. Ask each group to exchange and discuss the information with other groups in the classroom with the information they collected on Internet.



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**Skill Development Courses**



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**SKILL DEVELOPMENT COURSES**

**ARTS STREAM**

Syllabus of

**PERFORMING ARTS**

Total 30 hrs (02h/wk), 02 Credits & Max. 50 Marks

**Learning Outcomes:**

After successful completion of this course, the student will be able to:

1. Acquire the basic knowledge in performing arts
2. Understand the modern stage and performance on the stage
3. Comprehend and improve the skills related to performing arts on the stage
4. Understand various Telugu folk arts and their significance
5. Know the modes of presentation and skills pertaining to folk arts.

**SYLLABUS:**

**Unit-I: Introduction to performing Arts**

06 Hrs

Arts – and its definition; Fine Arts; Arts - Learning & Imitation – Rasaas, Bhaavas and Rasa Sutra. Dasaropakaas; Nritha, Nrithya, Natya; Action – Kinds of Actions; Ancient Costume style

**Unit-II: Performing Arts – Stage Arts**

10 Hrs

Origin of Drama (Theatre); Features of Stage; Varieties of Modern Telugu Drama; Famous Telugu Dramas.

Stage performance; Dramatic Actor and its definition; Actor-characteristics, Functions and Responsibilities.

Traits of an Actor – Diction, Articulation, Dialogue modulation, Time sense, Observation, Mime, Improvisation, Commentary,

Dress code, Make-up, lighting & Stage Direction.

**Unit-III: Performing Arts – Forms**

10 Hrs

Folk Arts, their nature and significance – Brief introduction to Pagaveshalu, Bommalaatalu, Veedhinaatakaalu, Yakshagaanaalu, Harikathalu, Burrakathalu, Oggukathalu, Chindu, Yakshaganam, Kolaatamand Pulivesham.

**Co-curricular Activities Suggested: (4 hrs)**



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**Skill Development Courses**

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**SKILL DEVELOPMENT COURSES**

**COMMERCE STREAM**

**AGRICULTURAL MARKETING**

Total 30 hrs (02h/wk), 02 Credits & Max 50 Marks

**Learning Outcomes:**

*By the successful completion of this course, the student will be able to;*

1. Know the kinds of agricultural products and their movement
2. Understand the types, structure and functioning of agricultural marketing system
3. Comprehend related skills and apply them in sample situations
4. Extend this knowledge and skills to their production/consumption environment

**SYLLABUS:**

**Unit- I:** 06hrs

Introduction of Agriculture and agricultural products (including agriculture, horticulture, sericulture, floriculture, aquaculture- genetic culture and dairy product) - Agricultural Marketing - Role of marketing - Concepts - Goods and services - Movement of product from farm to consumer - Middlemen - Moneylenders - Types of agricultural markets (basic classification).

**Unit- II:** 09hrs

Basic structure and facilities of an agricultural market - Primary, secondary and tertiary markets - Functioning of Market Yards - Market information - RythuBharosaKendras (RBK) - Govt market policies and regulations - Contract farming - Govt Apps for marketing of agri products.

**Unit- III:** 10hrs

Planning production - assembling - grading - transportation - storage facilities. Price fixation. Dissemination of market information - and role of ICT. Marketing - Mix - Product element - Place element - Price element - Promotion element. Selection of target market. Government programs in support of Agricultural marketing in India.

**Suggested Co-curricular Activities: 05hrs**

1. Study visit to agricultural markets and RythuBharosaKendras (RBK)
2. Invited lecture by field expert



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### Skill Development Courses

SKILL DEVELOPMENT COURSE

COMMERCE STREAM

### **BUSINESS COMMUNICATION**

Total 30 hrs (02hrs/wk), 02 Credits, Max 50 marks

#### **Learning Outcomes:**

*After successful completion of this course, students will be able to;*

1. *Understand the types of business communication and correspondence*
2. *Comprehend the processes like receiving, filing and replying*
3. *Acquire knowledge in preparing good business communications*
4. *Acquaint with organizational communication requirements and presentations.*

#### **SYLLABUS:**

##### **UNIT I : 06hrs**

Introduction and Importance of communication an overview - meaning and process of communication - organizational communication and its barriers.

##### **UNIT II: 10hrs**

Types of Business Communications –Categories, methods and formats - Business vocabulary - Business idioms and collocations – Organisational Hierarchy - Various levels of communication in an organization – Top-down, Bottom-up and Horizontal-Business reports, presentations– Online communications.

##### **UNIT III: 10hrs**

Receiving business communications -Filing and processing -Sending replies. Routine cycle of communications – Writing Communications - Characteristics of a good business communication -Preparation of business meeting agenda – agenda notes - minutes –circulation of minutes – Presentations of communication using various methods.

#### **Recommended Co-curricular Activities (04hrs):**

1. Collection of various model business letters
2. Invited lecture/field level training by a local expert
3. Reading of various business reports and minutes and its analysis
4. Presentations of reports, charts etc.
5. Assignments, Group discussion, field visit etc.





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**Skill Development Courses**



Revised CBCS w.e.f 2020-21  
SKILL DEVELOPMENT COURSES  
COMMERCE STREAM

### **ADVERTISING**

Total 30 hrs (2hrs/wk) 02 credits & Maximum 50 Marks

#### **Learning Outcomes:**

*After Successful completion of this course, the students are able to;*

1. Understand the field of Advertising
2. Comprehend opportunities and challenges in Advertising sector
3. Prepare a primary advertising model
4. Understand applying of related skills
5. Examine the scope for making advertising a future career

#### **Syllabus**

##### **UNIT I: 06hrs**

Introduction of advertising concepts- functions - Types of advertising - Creative advertising messages - Factors determining opportunities of a product/service/Idea

##### **UNIT II: 10 hrs**

Role of advertising agencies and their responsibilities - scope of their work and functions -  
- Ethical issues - Identifying target groups -Laws in advertising. Advertising Statutory Bodies in India - Role of AAAI (Advertising Agencies Association of India), ASCI (Advertising Standard Council of India)

##### **UNIT III: 10hrs**

Types of advertising – Basic characteristics of a typical advertisement –Reaching target groups - Local advertising – Feedback on impact of advertisement - Business promotion.

#### **Recommended Co-curricular Activities (04 hrs):**

1. Collection and segmentation of advertisements
2. Invited Lectures/skills training on local advertising basics and skills
3. Visit to local advertising agency
4. Model creation of advertisements in compliance with legal rules
5. Assignments, Group discussion, Quiz etc.

#### **Reference books and Websites:**

1. Bhatia. K. Tej - Advertising and Marketing in Rural India - Mc Millan India



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### **Skill Development Courses**

Revised CBCS w.e.f. 2020-21

#### **SKILL DEVELOPMENT COURSES**

#### **COMMERCE STREAM**

Syllabus of

### **LOGISTICS AND SUPPLY CHAIN MANAGEMENT**

Total 30 hrs (02h/wk), 02 Credits & Max 50 Marks



#### **Learning Outcomes:**

*At the successful completion of the course, the student will able to;*

1. Summarize relationship between marketing and Logistic Management
2. Understand the concepts of Supply Chain Management in connection with products.
3. Understanding various types of seller and suppliers
4. Evaluate best logistic method among all means of transport operations
5. Analysis of different distribution strategies - online and physical distribution
6. Compare the Logistics in National and International Scenario.
7. Design and develop new methods and models of Logistics in SCM

#### **SYLLABUS:**

##### **Unit-I: Introduction to Logistics and Supply Chain Management (SCM):**

Functions of Logistics - Structure of logistics - Logistics Costs - Modes of Logistics - Logistics in 21st Century -- Role of Supply Chain Management - Design and Development of Supply Chain Network - Different types of Supply Chain Networks

##### **Unit-II: Logistics:**

Customer Selection - Process -Customer Service and Customer Retention – Relationship Management - Integrating Logistics and Customer Relationship Management

##### **Unit-III: Supply Chain Management:**

Managing and Estimating Supply Chain Demand – Forecasting Techniques – Supplier Networks –Skills to Manage SCM - Recent Trends in SCM

#### **Suggested Co-curricular Activities:**

1. Invited lecture from Domain/Industry Experts
2. Field Visit (Manufacturing units, Suppliers)
3. Assignments, Seminars, Group Discussion, Quiz and Role Play
4. Poster presentations on SCM
5. Case Study Development



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## Skill Development Courses

B.A, B.Com & B.Sc. PROGRAMMES

Revised CBCS w.e.f. 2020-21

### SKILL DEVELOPMENT COURSES

#### Science Stream

Syllabus of

#### SOLAR ENERGY

Total 30 hrs (02h/wk),

02 Credits & Max Marks: 50

#### Learning Outcomes:

After successful completion of the course, students will be able to:

1. Acquire knowledge on solar radiation principles with respect to solar energy estimation.
2. Get familiarized with various collecting techniques of solar energy and its storage
3. Learn the solar photovoltaic technology principles and different types of solar cells for energy conversion and different photovoltaic applications.
4. Understand the working principles of several solar appliances like Solar cookers, Solar hot water systems, Solar dryers, Solar Distillation, Solar greenhouses

#### SYLLABUS:

##### UNIT-I – Solar Radiation:

(6 hrs)

Sun as a source of energy, Solar radiation, Solar radiation at the Earth's surface, Measurement of Solar radiation-Pyroheliometer, Pyranometer, Sunshine recorder, Prediction of available solar radiation, Solar energy-Importance, Storage of solar energy, Solar pond

##### UNIT-II – Solar Thermal Systems:

(10 hrs)

Principle of conversion of solar radiation into heat, Collectors used for solar thermal conversion: Flat plate collectors and Concentrating collectors, Solar Thermal Power Plant, Solar cookers, Solar hot water systems, Solar dryers, Solar Distillation, Solar greenhouses.

##### UNIT-III – Solar Photovoltaic Systems:

(10 hrs)

Conversion of Solar energy into Electricity - Photovoltaic Effect, Solar photovoltaic cell and its working principle, Different types of Solar cells, Series and parallel connections, Photovoltaic applications: Battery chargers, domestic lighting, street lighting and water pumping

#### Co-curricular Activities (Hands on Exercises): (04 hrs)

[Any four of the following may be taken up]

1. Plot sun chart and locate the sun at your location for a given time of the day.
2. Analyse shadow effect on incident solar radiation and find out contributors.
3. Connect solar panels in series & parallel and measure voltage and current.
4. Measure intensity of solar radiation using Pyranometer and radiometers.
5. Construct a solar lantern using Solar PV panel (15W)
6. Assemble solar cooker
7. Designing and constructing photovoltaic system for a domestic house requiring 5kVA power
8. Assignments/Model Exam.





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B.A, B.Com & B.Sc. PROGRAMMES

Revised CBCS w.e.f. 2020-21

**SKILL DEVELOPMENT COURSES**

**Science Stream**

Syllabus of

**FRUITS AND VEGETABLES PRESERVATION**

Total 30 hrs (02h/wk),

02 Credits & Max Marks: 50

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**Learning Outcomes:**

*On successful completion of this course the students will be able to;*

1. Identify various types of fruits and vegetables and explain their nutritive value.
2. Understand the fragile nature of fruits and vegetables and causes for their damage.
3. Explain various methods of preservation for fresh fruits and vegetables.
4. Get to know the value-added products made from fruits and vegetables.

**Syllabus:**

**Unit – 1 : Introduction to fruits and vegetables**

06 Hrs.

1. Fruits: Definition, elementary knowledge on types of fruits (fleshy and dry) with local /common examples.
2. Vegetables: Definition, elementary knowledge on types of vegetables (root, leafy, stem, flower and fruit) with local/ common examples.
3. Importance of fruits and vegetables in human nutrition.
4. Concept of perishable plant products – maturation and spoilage, shelf life; preservation – definition and need for preservation of fruits and vegetables.

**Unit – 2 :Preservation of Fruit**

09 Hrs.

1. Fruits – ripening and biological aging; storage and preservation concerns.
2. Preservation of fresh fruits at room temperature and in cold storage.
3. Fruit preservation at room temperature as juices, squashes and syrups.
4. Preservation of fruits by application of heat; making of fruit products (jams, jellies and fruit slices in processing factories).
5. Preservation by dehydration (Eg. banana chips), application of sugar (Eg. mango candy), application of salt (pickling).
6. Fruit preservation by freezing – storage at the lowest temperatures.

**Unit – 3 :Preservation of vegetables**

09 Hrs.

1. Vegetables – losses after harvesting and causes; problems in handling and storage.
2. Modern methods of packaging and storage to reduce losses.
3. Trimming of vegetables and packing in cartons; dehydration technique -factory processing.
4. Making of vegetable products (flakes/chips of potato and onion; garlic powder).
5. Frozen vegetables – Carrots, Cauliflower, Okra and Spinach.
6. Preservation of sliced vegetables in factories by canning and bottling.
- 7.

**Suggested Co-curricular activities (6 Hrs.)**

1. Assignments/Group discussion/Quiz/Model Exam.
2. Invited lecture and demonstration by local expert
3. Exhibition of various types of locally available fruits and vegetables.
4. Hands on training on handling and packaging methods of fresh fruits and vegetables.
5. Hands on training on making fruit juices.
6. Display of various preserved fruit products available in local markets.
7. Hands on training on making of potato, yam, onion chips.
8. Display of various preserved vegetable products available in local markets.
9. Watching videos on preservation of fruits and vegetables.
10. Visit to Horticulture University or research station to learn about value added products of fruits and vegetables.



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**SKILL DEVELOPMENT COURSES**

To be Offered from Semesters I to IV

**ZOOLOGY STREAM**

Syllabus of

**DAIRY TECHNOLOGY**

Total 30 hrs (02h/wk), 02 Credits & Max 50 Marks



**Learning Outcomes:**

After successful completion of the course, students will be able to;

1. Understand the pre-requisites for starting a Dairy farm
2. Recognize different breeds of Cows & buffaloes following safety precautions.
3. Prepare and give recommended feed and water for livestock
4. Maintain health of livestock along with productivity
5. Vaccination of cattle, nutrients requirements
6. Entrepreneurship i.e., Effectively market dairy products
7. Ensure safe and clean dairy farm and Standard safety measures to be taken in establishing an industry
8. Efficiently start and manage to establish or develop a Dairy Industry

**SYLLABUS:**

**Section I (Introduction and Establishment of a Dairy Farm): 05 Hrs**

- 1.1 Dairy development in India – Dairy Cooperatives (NDRI, NDDB, TCMPI)(1hr)
- 1.2 Constraints of Present Dairy Farming and Future Scope of Dairy Farmer.(1 hr)
- 1.3 Selection of site for dairy farm; Systems of housing – Loose housing system, Conventional Dairy Farm; Records to be maintained in a dairy farm. (2 hrs)

**Section II (Livestock Identification and Management): 13 Hrs**

- 2.1 Breeds of Dairy Cattle and Buffaloes – Identification of Indian cattle and buffalo breeds and Exotic breeds; Methods of selection of Dairy animals. (5 hrs)
- 2.2 Systems of inbreeding and crossbreeding. (2 hrs)
- 2.3 Weaning of calf, Castration, Dehorning, Deworming and Vaccination programme (3 hrs)
- 2.4 Care and management of calf, heifer, milk animal, dry and pregnant animal, bulls and bullocks. (3 hrs)

### **Section III (Feed Management, Dairy Management, Cleaning and Sanitation): 8 Hrs**

- 3.1 Basic Principles of Feed, Important Feed Ingredients, Feed formulation and Feed Mixing(2 hrs)
- 3.2 Operation Flood –Definition of Milk and Nutritive value of milk and ICMR recommendation of nutrients –Per Capita Milk production and availability in India and Andhra Pradesh -Methods of Collection and Storage of Milk–Labelling and Storage of milk products (4 hrs)
- 3.3 Cleaning and sanitation of dairy farm – Safety precautions to prevent accidents in an industry. (2 hrs)

### **Co-curricular Activities Suggested: (4 hrs)**

1. Group discussion&SWOT analysis
2. Visit to a Dairy Farm
3. Visit to Milk Cooperative Societies
4. Visit to Feed Milling Plants
5. Market Study and Identification of Government Schemes, Insurance and Bank Loans in relation to dairy farming

### **Reference books:**

1. Dairy Science: Petersen (W.E.) Publisher – Lippincott & Company
2. Principles and practices of Dairy Farm –Jagdish Prasad
3. Text book of Animal Husbandry - G C Benarjee
4. Hand book of Animal Husbandry - ICAR Edition
5. Outlines of Dairy Technology – Sukumar (De) – Oxford University press
6. Indian Dairy Products – Rangappa (K.S.) & Acharya (KT) – Asia Publishing House.
7. The technology of milk Proceesing – Ananthakrishnan, C.P., Khan, A.Q. and Padmanabhan, P.N. – Shri Lakshmi Publications.
8. Dairy India 2007, Sixth edititon
9. Economics of Milk Production – Bharati Pratima Acharya Publishers.
10. <http://www.asci-india.com/BooksPDF/Dairy%20Farmer%20or%20Entrepreneur.pdf>
11. <https://labour.gov.in/industrial-safety-health>



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### Skill Development Courses

B.A, B.Com & B.Sc. PROGRAMMES

Revised CBCS w.e.f. 2020-21

#### SKILL DEVELOPMENT COURSES

#### Science Stream

Syllabus of

#### FOOD ADULTERATION

Total 30 hrs (02h/wk),

02 Credits & Max Marks: 50

#### Learning Outcomes:

After successful completion of the course, students will be able to:

1. Get basic knowledge on various foods and about adulteration.
2. Understand the adulteration of common foods and their adverse impact on health
3. Comprehend certain skills of detecting adulteration of common foods.
4. Be able to extend their knowledge to other kinds of adulteration, detection and remedies.
5. Know the basic laws and procedures regarding food adulteration and consumer protection.

#### SYLLABUS:

#### UNIT-I – Common Foods and Adulteration: (07hrs)

Common Foods subjected to Adulteration - Adulteration – Definition – Types; Poisonous substances, Foreign matter, Cheap substitutes, Spoiled parts. Adulteration through Food Additives – Intentional and incidental. General Impact on Human Health.

#### UNIT-II –: Adulteration of Common Foods and Methods of Detection: (10hrs)

Means of Adulteration Methods of Detection Adulterants in the following Foods; Milk, Oil, Grain, Sugar, Spices and condiments, Processed food, Fruits and vegetables. Additives and Sweetening agents (at least three methods of detection for each food item).

#### UNIT-III –: Present Laws and Procedures on Adulteration: (08hrs)

Highlights of Food Safety and Standards Act 2006 (FSSA) – Food Safety and Standards Authority of India – Rules and Procedures of Local Authorities.  
Role of voluntary agencies such as, Agmark, I.S.I. Quality control laboratories of companies, Private testing laboratories, Quality control laboratories of consumer co-operatives.  
Consumer education, Consumer's problems, rights and responsibilities, COPRA 2019 - Offenses and Penalties – Procedures to Complain – Compensation to Victims.

#### Recommended Co-curricular Activities (including Hands on Exercises): (05hrs)

1. Collection of information on adulteration of some common foods from local market
2. Demonstration of Adulteration detection methods for a minimum of 5 common foods (one method each)
3. Invited lecture/training by local expert



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2021-22

**Skill Development Courses**

B.A, B.Com and B.Sc Programmes  
Revised CBCS w.e.f 2020-21

**SKILL DEVELOPMENT COURSES**

**ARTS STREAM**

Syllabus of

**FINANCIAL MARKETS**

Total 30 hrs (2hrs/wk) 02 credits & Maximum 50 Marks

**Learning Outcomes:**

*After successful completion of this course, the students will be able to;*

1. *Acquire knowledge of financial terms*
2. *Know the concepts relating to and markets and different avenues of investment*
3. *Understand the career skills related to Stock Exchanges*
4. *Comprehend the personal financial planning and money market skills*

**Syllabus**

**UNIT-I: 06hrs**

Indian Financial System- its components - Financial markets and institutions

**UNIT-II: 10hrs**

Capital Market - its function - organizations - elements - (shares, debentures, bonds, mutual funds) debt market - Equity market (SEBI) and secondary market (NSE)

**UNIT-III: 10hrs**

Money market - Organized - Unorganized - Sub market (call money, commercial bills, Treasury bill, Certificate of Deposit, Commercial papers)

**Co-curricular activities: (04 hrs)**

1. Collection and study of pamphlets, application forms etc.
2. Invited lectures on the field topics by local experts
3. Introducing Online classes from NSE
4. Field visit to mutual fund offices/share brokers
5. Observation, study and analysis of selected companies share prices
6. Assignments, Group discussion, quiz etc.

**Reference books:**

1. T.R. Jain R.L.Sarma - Indian Financial System- VK Global publisher
2. Jithendra Gala - Guide to Indian Stock markets Buzzing Stock publishing house



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**SKILL DEVELOPMENT COURSES**

**ARTS STREAM**

**DISASTER MANAGEMENT**

Total 30hrs (2hrs/week) 2 Credits Total 50 Marks

**Learning Outcomes:**

*After successful completion of the course, the students are able to;*

1. Understand the nature, cause and effects of disasters
2. Comprehend the importance of Disaster Management and the need of awareness
3. Acquire knowledge on disaster preparedness, recovery remedial measures and personal precautions
4. Volunteer in pre and post disaster management service activities

**Syllabus:**

**UNIT-I: 06 hrs**

Introduction of Disaster - Different types of disasters- Natural- (flood, cyclone, earthquake, famine and pandemic) - Accidental- (Fire, Blasting, Chemical leakage, Rail, Aviation, Road boat tragedies and nuclear pollution) - Disaster Management Act 2005

**UNIT-II: 09hrs**

Causes and immediate effects of Disasters - Preparedness of disasters - Precautions - Dissemination of information - Nature and concepts - Role of National Disaster Management Authority and Role of Government and non governmental organizations in protecting human livestock and natural resources. - Use of technology - Role of Citizens and Youth in the prevention.

**UNIT-III - 09 hrs**

Post disaster effects - short term - Procedures for Rehabilitation and Recovery - Role of volunteers and Safety Precautions - Long term remedial and preventive measures - Collection, filing and storage of information - Case studies

**Suggested co curriculum Activities: (06 hrs)**

1. Invite lectures by local experts
2. Training on preparedness, post disaster services
3. Analysis of Case studies
4. Visit to a disaster management office and facility
5. Assignments, Group discussion, quiz etc.

**References:**

1. Jagbirsingh - Disaster Management Future challenges and opportunities - K.W.Publishers



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B A, B Com & B Sc Programmes

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**SKILL DEVELOPMENT COURSES**

**COMMERCE STREAM**

Syllabus of  
**ONLINE BUSINESS**

Total 30 hrs (02h/wk), 02 Credits & Max 50 Marks

**Learning Outcomes:**

*After successful completion of the course, students will be able to;*

1. Understand the online business and its advantages and disadvantages
2. Recognize new channels of marketing, their scope and steps involved
3. Analyze the procurement, payment process, security and shipping in online business
4. Create new marketing tools for online business
5. Define search engine, payment gateways and SEO techniques.

**SYLLABUS:**

**Section-I: 06 Hrs**

Introduction to Online-business-Definition-Characteristics-Advantages of Online Business- Challenges- Differences between off-line business, e-commerce and Online Business.

**Section-II: 10 Hrs**

Online-business Strategies-Strategic Planning Process- Procurement -Logistics & Supply Chain Management- Customer Relationship management.

**Section-III: 10 Hrs**

Designing Online Business Website – Policies - Security & Legal Issues - Online Advertisements - Payment Gateways - Case Study

**Co-curricular Activities Suggested: (4 hrs)**

1. Assignments, Group discussion, Quiz etc.
2. Short practical training in computer lab
3. Identifying online business firms through internet
4. Invited Lectures by e-commerce operators
5. Working with Google and HTML advertisements.
6. Visit to a local online business firm.



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### Skill Development Courses

B.A, B.Com & B.Sc Programmes  
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#### SKILL DEVELOPMENT COURSES

#### COMMERCE STREAM

#### RETAILING

Total 30hrs (02hrs/wk) 02 credits & Maximum 50 Marks

#### Learning Outcomes:

*After successful completion of this course, the students are able to;*

1. Know the retailing business, its growth in India and social impact
2. Understand the organization and supply in retailing
3. Comprehend the opportunities and challenges in retailing
4. Learn the functions that support outlet operations, sales and services
5. Create a shopping experience model that builds customer loyalty and business promotion

#### SYLLABUS:

##### Unit I: 06hrs

Introduction -Retailing - Definition- Role of Retailing- Types of Retailing – Factors influencing the Growth of Retailing in India.

##### Unit II: 10 hrs

Store location – factors influencing selection of location - Types of retail outlets - stores design & operations- Merchandise planning - Administrative mechanism

##### Unit III: 10hrs

Human resources in retailing - Job profile- Services to customers – Customer care - Communications with customers - Visual merchandising – enhancing customer loyalty and Sales promotion.

#### Recommended Co-curricular Activities (04 hrs):

1. Collection of information on local retailing
2. Invited lecture/skills training by a local expert
3. Visit near-by stores /Godowns/warehouses and prepare study projects
4. Field training during leisure hours
5. Assignments, Group discussion, Sharing of experience etc.

#### Reference books:

1. Swapna pradhan.R.M - Retail Management - Tata McGraw Hill





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### Skill Development Courses

B A, B Com & B Sc Programmes

Revised CBCS w.e.f. 2020-21

#### SKILL DEVELOPMENT COURSES

#### SCIENCE STREAM

Syllabus of

#### ENVIRONMENTAL AUDIT

Total 30 hrs (02h/wk), 02 Credits & Max 50 Marks

#### Learning Outcomes:

By successful completion of the course, students will be able to;

1. Understand the basic concepts Environmental health
2. Learn and identify the industrial pollution
3. Explain the highlights in the regulatory aspects of Environmental law and policy
4. Understand the various phases of Environmental Audit

#### UNIT – I

##### Industrial Pollution and its effects

06h

Climate – Weather and Air Pollution – Classification of water and water bodies – Water Quality Parameters – Water Pollution – Sources – Classification, nature and Toxicology of water pollutants. - Soil parameters – Soil pollution and impacts – Soil conservation

#### UNIT - II

##### Environmental Law & Policy:

09h

Highlights of the Acts, Institutional arrangements for: (1) The Water (Prevention & Control of Pollution) Act, 1974 amended in 1988; (2) The Air (Prevention and Control of Pollution) Act, 1981 amended in 1987; (3) The Water (Prevention and Control of Pollution) Cess Act, 1977 amended in 1991; (4) The Environment (Protection) Act, 1986; (5) The Public Liability Insurance Act, 1991; – Indian Policy Statement for abatement of Pollution, 1992.

#### UNIT - III

##### Environmental Audit - Scope & Requisites:

10h

Environmental Audit: Definition; Objectives; Scope, Coverage - GOI Notification on Environmental Audit - Benefits to Industry. Reporting Environmental Audit Findings - Importance of Environmental Audit Report to industry, public and the governments.



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### Skill Development Courses

B A, B Com & B Sc Programmes

Revised CBCS w.e.f. 2020-21

### SKILL DEVELOPMENT COURSES

To be Offered from Semesters I to IV

### ZOOLOGY STREAM

Syllabus of

### POULTRY FARMING

Total 30 hrs (02h/wk), 02 Credits & Max 50 Marks

#### Learning Outcomes:

By successful completion of the course, students will be able to;

1. Understand the field level structure and functioning of insurance sector and its role in protecting the risks
2. Comprehend pertaining skills and their application for promoting insurance coverage
3. Prepare better for the Insurance Agent examination conducted by IRDA
4. Plan 'promoting insurance coverage practice' as one of the career options.

#### SYLLABUS:

##### Section I (Introduction to Poultry Farming): 10Hrs

- 1.1 General introduction to poultry farming -Definition of Poultry; Past and present scenario of poultry industry in India.
- 1.2 Principles of poultry housing. Poultry houses. Systems of poultry farming.
- 1.3 Management of chicks, growers and layers. Management of Broilers.
- 1.4 Preparation of project report for banking and insurance

##### Section II (Feed and Livestock Health Management): 10 Hrs

- 2.1 Poultry feed management – Principles of feeding, Nutrient requirements for different stages of layers and broilers. Feed formulation and Methods of feeding.
- 2.2 Poultry diseases – viral, bacterial, fungal and parasitic(two each); symptoms, control and management; Vaccination programme.

##### Section III(Harvesting of Eggs and Sanitation): 10 Hrs

- 3.1 Selection, care and handling of hatching eggs. Egg testing.Methods of hatching.
- 3.2 Brooding and rearing. Sexing of chicks.
- 3.3 Farm and Water Hygiene, Recycling of poultry waste.



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2021-22

Core papers

Advance Urdu

PAPER – 1

URDU PROSE

*Afsanavi Adab aur Drama*

UNIT – I	Novel	Taaruf aur Irteqa
UNIT – II	Novel 'Nirmala' by Premchand	
UNIT – III	Afsana	Taaruf aur Irteqa
UNIT – IV	Urdu Afsane edited by Raziya Sajjad Zaheer. The following four short stories only:	
	1. 'Woh' by Balraj Menra	
	2. 'Computer Ishq' by Joginder Pal	
	3. 'Lal aur Peela' by K.A.Abbas	
	4. 'Mom ki Mariyam' by Jeelani Banu	
UNIT – V	Drama 'Darwaze Khol Do' by Krishan Chander	

**SUGGESTED READING:**

FANNE AFSANA NIGARI – WAQAR AZEEM  
BEESWIN SADI MEIN URDU NOVEL – YOUSUF SARMAST  
URDU DRAMA – ISHRAT RAHMANI





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2021-22

Core papers

Advance Urdu

Core Course Under CBCS

PAPER – II

URDU PROSE

*Ghair Afsanavi Adab*

UNIT – I SAFARNAMA  
*'Bullet Train mein kabhi na baitho'*  
by Mujtaba Hussain

UNIT – II KHAKA – Taaruf aur Irteqa

UNIT – III Khaka – *'Dr. Abdul Haq Marhoom'*  
by Rasheed Ahmed Siddiqui.

UNIT – IV INSHAIYA - Taaruf aur Irteqa

UNIT – V Inshaiya – *'Jheengar ka Janaza'*  
by Khwaja Hasan Nizami

SUGGESTED READING:

URDU MEIN KHAKA NIGARI – SABIRA SAYEED  
URDU SAFARNAMOUN KA TANQEEDI MUTALA – KHALID MAHMOOD  
INSHAIYA AUR INSHAIYE – SYED MOHAMMED HASNAIN



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2021-22

Core papers

Advance Urdu



Syllabus for II B.A. Part – II Urdu

SEMESTER - III

Second year Optional Urdu Paper - III

URDU POETRY

Prescribed book : Gowhare Adab by A.P.Urdu Academy

- UNIT – I                      **MASNAVI – A portion of Gulzar-e-Naseem**  
**'Aana tajul mulook ka sehrae tilism se'**
- UNIT – II                      **GHAZAL – The following Ghazals only:**  
1. 'Bas ke dushwar hai har kaam'      by Ghalib  
2. 'Woh adae dilbari ho ke nawae'      by Jigar  
3. 'Jala ke mashale jan hum'              by Majrooh
- UNIT – III                      **NAZM**  
1. 'Roohe arzi aadam ka isteqbal karti hai'  
    By Allama Iqbal  
2. 'Sagar ke kinare'                      by Maqdoom
- UNIT – IV                      **Ghazalgo shora ki sawaneh**  
1. Ghalib      2. Jigar      3. Majrooh
- UNIT – V                      **Nazmgo shora ki sawaneh**  
1. Allama Iqbal      2. Maqdoom

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2021-22

Core papers

Advance Urdu

Syllabus for II B.A. Part – II Urdu

SEMESTER - IV

Second year Optional Urdu Paper - IV

URDU POETRY

Prescribed book : Gowhare Adab by A.P.Urdu Academy

- UNIT – I            QASEEDA – Ta'aruf
- UNIT – II            QASEEDA – Mohsin Kakori (Selected portion)  
'Simte kashi se chala janibe mathura badal'
- UNIT – III            MARSIIYA – Ta'aruf
- UNIT – IV            MARSIIYA – Meer Anees (Selected portion)  
'Namake khwane takallum hai fasahat meri'
- UNIT – V            Biography of following poets:  
1. Mohsin Kakori 2. Meer Anees

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2021-22

Core papers

Advance Urdu

Semester-IV

**UNIT –I**

1-Urdu Zuban Ka Agaz-O-Irtakha:

1-1 MiktalifNazriyat-ShokatThanavi-

1-2 Mahamood Khan Shirani

**UNIT– II.**

2- DakniDouar-Ke-Qusivat-Mahammad Quli Qutub Sha

2-1 Mulawajahi

2-2 Nusrathi

**UNIT – III**

3- DabistanaDilhi--Ke-Qusivat-

3-1 Dard

3-2 Zaqak

**UNIT – IV**

4-DabistanaLaknow--Ke-Qusivat-

4-1 Attish

4-2 Nasiq

**UNIT –V**

5- SirSayedTaharikKe-Qusivat-

5-1 RumaniTaharik

5-2 TarakhiPasandTaharik

**Prescribed book- TariqeAdabe Urdu by Noorulhasn Naqvi**



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2021-22

Core papers

Special Urdu

Semester-V Paper-V

**UNIT –I**

1-Urdu Zuban Ka Agaz-O-Irtakha:

1-1 MiktalifNazriyat-ShokatThanavi-

1-2 Mahamood Khan Shirani

**UNIT– II.**

2- DakniDouar-Ke-Qusivat-Mahammad Quli Qutub Sha

2-1 Mulawajahi

2-2 Nusrathi

**UNIT – III**

3- DabistanaDilhi--Ke-Qusivat-

3-1 Dard

3-2 Zaqak

**UNIT – IV**

4-DabistanaLaknow--Ke-Qusivat-

4-1 Attish

4-2 Nasiq

**UNIT –V**

5- SirSayedTaharikKe-Qusivat-

5-1 RumaniTaharik

5-2 TarakhiPasandTaharik

**Prescribed book- TariqeAdabe Urdu by Noorulhasn Naqvi**



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2021-22

Core papers

Advance Urdu



**SKR & SKR GOVT. COLLEGE FOR WOMEN (A), KADAPA**

Semester – V (CBCS Special Urdu for BA)

**Paper – VI : Tanqeed aur Balaghat**

No. of Hours/week: 05 credits-4

**UNIT – I**

- 1- Urdu Tanqeed- Agaz-O-Irtakha
- 1-1 Tazirati Tanqeed
- 1-2 Shari maa Tanqeedi Naqhas

**UNIT – II**

- 2- Altaf Hussain Hali- Tanqeed
- 2-1 Makhadama Shair-O-Shariri-Ahamiath
- 2-2 Allama Shibli Nomaniky Tasneef Shair-ul-Ajaz-Ahamiath

**UNIT – III**

- 3- Thakhak-O-Tanqeed ka Bahami Rishta
- 3-1 Takleek-O-Tanqeed
- 3-2 Nakhad ka Faravaz

**UNIT – IV**

- 4- Tanqeed ka Mukhtalif Rumani Tankhidki Khusisvath
- 4-1 Tasorati Tanqeedki Khusisvath
- 4-2 Markasi Tanqeedki Khusisvatha

**UNIT – V**

- 5- Aham Tanqeed Nigar-Syed Ehtasham Hussin
- 5-1 Mahammad Hussin Ajad
- 5-2 Firak Gorakhpuri

**List of reference books :**

- 1- Fann Tanqeed aur tanqeed Nigari By Noorul Hasan Naqvi
- 2- Makhadama Shair-o-Shari
- 3- Shair-Al-Ajjam



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2021-22

Core papers

Advance Urdu



### SKR & SKR GOVT. COLLEGE FOR WOMEN (A), KADAPA

Semester – VI (CBCS Common to BA/BSc/B.com)

Paper – VII: Urdu Shari-KhadeemAsnaf

No.ofHours/week : 5credits4

#### UNIT-I

- 1- Masnavi: Agaz-o-Artakha
- 1-1 Masnavi: AjazaTakibi
- 1-2 Masnavi: Khusisivath

#### UNIT-II

- 2- Qasida : Agaz-o-Artakha
- 2-1 Qasida : AjazaTakibi
- 2-2 Qasida : Khusisivath

#### UNIT-III

- 3- Marsiya: Agaz-o-Artakha
- 3-1 Marsiya: AjazaTakibi
- 3-2 Marsiya: Khusisivath

#### UNIT-IV

- 4- Rubayi: Agaz-o-Artakha
- 4-1 Rubayi: AjazaTakibi
- 4-2 Rubayi: Khusisivath

#### UNIT-V

5. Shorakisavani: Meer Hussain
- 5-1 Soda
- 5-2 Dabir
- 5-3 AkbarAlhabadi

**Reference Books :**



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2021-22

Core papers

Advance Urdu

**SKR & SKR GOVT. COLLEGE FOR WOMEN (A), KADAPA**

Semester – VI (CBCS Special Urdu Common to BA/BSc/B.com)

Paper – VIII(A1): AfsanaviAdab

No. of Hours/week:05

Credits:4

**UNIT-I**

1. Dastan: Agaz-o-Irtakha

1.1 Dastan :AjzaTarkibi

1.2 Dastan: Kusisvath

**UNIT-II**

2 Drama: Agaz-o-Irtakha

2.1 Drama :AjzaTarkibi

2.2 Drama: Kusisvath

**UNIT-III**

3. Novel: Agaz-o-Irtakha

3.1 Novel :AjzaTarkibi

3.2 Novel: Kusisvath

**UNIT-IV**

4. Afsana: Agaz-o-Irtakha

4.1 Afsana :AjzaTarkibi

4.2 Afsana: Kusisvath

**UNIT-V**

5. AhamAfsanaviAddib: Meer Aman

5.1 Imtaiz Ali Taj

5.2 Deputy Nazeer Ahamad

**Reference Books:**



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Core papers

Advance Urdu

**SKR & SKR GOVT. COLLEGE FOR WOMEN (A), KADAPA**  
Semester – VI (CBCS With Maths Combination Common to BA/BSc)

Paper – VIII(A2) : Gair Afsanavi Adab

No. of Hours/week: 05

Credits: 4

**UNIT-I**

1. Savani Nigari : Agaz-o-Irtakha
- 1.2 Savani Nigari : Khusisiyath
- 1.3 Savani Nigar : Altaf Hussainki Savani Nigari

**UNIT-II**

2. Khutut Nigari : Agaz-o-Irtakha
- 2.2 Khutut Nigari : Khusisiyath
- 2.3 Khutut Nigar : Galibki Khutut Nigari

**UNIT-III**

3. Khaka Nigari : Agaz-o-Irtakha
- 3.2 Khaka Nigari : Khusisiyath
- 3.3 Khaka Nigar : Rashid Ahamadki Khaka Nigari

**UNIT-IV**

4. Mazmoon Nigari : Agaz-o-Irtakha
- 4.2 Mazmoon Nigari : Khusisiyath
- 4.3 Mazmoon Nigar : Sir Syed Ahamadki Mazmoon Nigari

**UNIT-V**

5. Safar Nama : Agaz-o-Irtakha
- 5.2 Safar Nama : Khusisiyath
- 5.3 Safar Nama Nigar : Yusaf Nazim ki Safar Nama nigari  
( Safar Nama “ Kolambas ka Dash Maa” )

Books Recommended:



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2021-22

Core papers

Advance Urdu

**Syllabus for B.A. Part – II Urdu**

**Third year Optional Urdu Paper (Cluster Elective)**

**PAPER-VIII-A3**

**SPECIAL STUDY OF MOULANA ABUL KALAM AZAD**

Prescribed book: Moulana Azad ki Kahani

by Zaffar Ahamed Nizami

**UNIT-I BACH'PAN**

**UNIT-II SAHAFAT**

**UNIT-III CONGRESS KI SADARAT**

**UNIT-IV VIZARAT**

**UNIT-V TASANIF**

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2021-22

Core papers

Political Science



**SYLLABUS**

**B.A. POLITICAL SCIENCE**

**FIRST YEAR**

**FIRST SEMESTER**

**(Under CBCS w.e.f. 2020-21)**

**Course-1: INTRODUCTION TO POLITICAL SCIENCE**

**Learning Outcomes:**

On successful completion of the course the students will be able to;

- Recall the previous knowledge about Political Science and understand the nature and scope, traditional and modern approaches of Political Science.
- Understand concepts intrinsic to the study of Political Science.
- Have solid theoretical understanding of Rights and its theories along with the basic aspects of certain political ideologies.
- Apply the knowledge to observe the field level phenomena

<b>UNIT-I :</b>	<b>INTRODUCTION</b>
	1. Definition, Nature, Scope and Importance of Political Science – Relations with allied disciplines (History, Economics, Philosophy and Sociology)
	2. Approaches to the study of Political Science: Traditional Approaches-Philosophical, Historical. Modern Approaches-BehavioralandSystem Approach.

<b>UNIT-II :</b>	<b>STATE</b>
	1. Definition of the State, Elements of the State, Theories of Origin of the State-(Divine Origin, Force, Evolutionary and Social Contract).
	2. Concepts of Modern State and Welfare State.

<b>UNIT-III :</b>	<b>CONCEPTS OF POLITICAL SCIENCE</b>
	1. Law, Liberty, Equality.
	2. Power, Authority and Legitimacy.

<b>UNIT-IV :</b>	<b>THEORIES OF RIGHTS</b>
	1. Meaning, Nature and Classification of Rights
	2. Theories of Rights.

<b>UNIT-V :</b>	<b>POLITICAL IDEOLOGIES</b>
	1. Liberalism, Individualism, Anarchism.
	2. Socialism, Marxism and Multiculturalism.



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2021-22

Core papers

Political Science



B.A. POLITICAL SCIENCE

FIRST YEAR

SECOND SEMESTER

(Under CBCS w.e.f 2020-21)

**Course-2: BASIC ORGANS OF THE GOVERNMENT**

**Learning Outcomes:**

On successful completion of the course the students will be able to:

- Understand the Origin and Evolution of the concept of Constitutionalism and classification of Constitutions.
- Acquaint themselves with different theories of origin of State.
- Understand and analyses organs and forms of Governments along with a deep insight into the various agents involved in the political process.
- Apply the knowledge to analyse and evaluate the existing systems

<b>UNIT-I :</b>	<b>CONSTITUTION</b>
	1. Meaning, Definition, Origin and Evolution of Constitution.
	2. Classification of the Constitutions-Written and Unwritten; Rigid and Flexible.

<b>UNIT-II :</b>	<b>ORGANS OF THE GOVERNMENT</b>
	1. Theory of Separation of Powers-B.D.Montesquieu.
	2. Legislature-Unicameral and Bicameral-Power and Functions, Executive-Types,Powers and Functions. Judiciary-Powers and Functions.

<b>UNIT-III :</b>	<b>FORMS OF GOVERNMENT</b>
	1. Unitary and Federal forms of Governments-Merits and Demerits.
	2. Parliamentary and Presidential forms of Governments- Merits and Demerits.

<b>UNIT-IV :</b>	<b>DEMOCRACY</b>
	1. Meaning, Definition, Significance, Theories and Principles of Democracy.
	2. Types of Democracy: Direct and Indirect Democracy-Methods, Merits and Demerits-Essential Conditions for Success of Democracy.

<b>UNIT-V :</b>	<b>POLITICAL PARTIES, PRESSURE GROUPS AND PUBLIC OPINION</b>
	1. Meaning, Definition and Classification of Political Parties: National and Regional-Functions of Political Parties.
	2. Pressure Groups (Interest Groups)- Meaning, Definition, Types, Functions and Significance of Public Opinion.



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Political Science



**B.A. POLITICAL SCIENCE**

**SECOND YEAR**

**THIRD SEMESTER**

**(Under CBCS w.e.f 2020-21)**

**Course-3: INDIAN GOVERNMENT AND POLITICS**

**Learning Outcomes:**

On successful completion of the course the students will be able to:

- Acquire knowledge about the historical background of Constitutional development in India, appreciate philosophical foundations and salient features of the Indian Constitution.
- Analyze the relationship between State and individual in terms of Fundamental Rights and Directive Principles of State Policy.
- Understand the composition of and functioning of Union Government as well as State Government and finally
- Acquaint themselves with the judicial system of the country and its emerging trends such as judicial reforms.

<b>UNIT-I :</b>	<b>SOCIAL AND IDEOLOGICAL BASE OF THE INDIAN CONSTITUTION</b>
	1. Constitutional Development in India during British Rule-A Historical Perspective with reference to Government of India Acts, 1909,1919 and 1935.
	2. Constituent Assembly-Nature, Composition, Socio-Economic, Philosophical Dimensions and Salient Features of the Indian Constitution.

<b>UNIT-II :</b>	<b>INDIVIDUAL AND STATE</b>
	1. Fundamental Rights, Directive Principles of State Policy and Fundamental Duties-Differences between Fundamental Rights and

	Directive Principles of State Policy.
	2. The 'Doctrine of Basic Structure of the Constitution' with reference to Judicial Interpretations and Socio-Political Realities.

<b>UNIT-III :</b>	<b>UNION EXECUTIVE</b>
	1. President of India-Mode of Election, Powers and Functions.
	2. Parliament-Composition, Powers and Functions, Legislative Committees, Prime Minister and Council of Ministers-Powers and Functions, Role in Coalition Politics

<b>UNIT-IV :</b>	<b>STATE EXECUTIVE</b>
	1. Governor-Mode of Appointment, Powers and Functions.
	2. Legislature-Composition, Powers and Functions, Chief Minister and Council of Ministers-Powers and Functions

<b>UNIT-V :</b>	<b>THE INDIAN JUDICIARY</b>
	1. Supreme Court-Composition and Appointments, Powers and Functions or Jurisdiction of the Supreme Court, Judicial Review, Judicial Activism.
	2. High Court-Composition, Powers and Functions, Debates on the mode of appointment of Judges-National Judicial Appointments Commission and Judicial Reforms.



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Core papers

Political Science



**B.A. POLITICAL SCIENCE**

**SECOND YEAR**

**FOURTH SEMESTER**

**(Under CBCS w.e.f 2020-21)**

**Course-4 : INDIAN POLITICAL PROCESS**

**Learning Outcomes:**

On successful completion of the course the students will be able to :

- Know and understand the federal system of the country and some of the vital contemporary emerging issues.
- Evaluate the electoral system of the country and to identify the areas of electoral reforms.
- Know the constitutional base and functioning of local governments with special emphasis on 73<sup>rd</sup> & 74<sup>th</sup> Constitutional Amendment Acts.
- Understand the dynamics of Indian politics, challenges faced and gain a sensitive comprehension to the contributing factors.
- Apply the knowledge and critically comprehend the functioning of some of the regulatory and governance institutions.
- Propose theoretical outline alternate models

<b>UNIT-I :</b>	<b>FEDERAL PROCESSES</b>
	1. Features of Indian Federal System- Centre-State Relations- Legislative, Administrative and Financial
	2. Emerging Trends in Centre-State Relations- Restructuring Centre-State Relations- Recommendations of Sarkaria Commission, M.M.Punchi Commission

<b>UNIT-II :</b>	<b>ELECTORAL PROCESSES</b>
	1. The Election Commission of India, Powers and Functions.
	2. Issues of Electoral Reforms, Voting Behaviour-Determinants and

	Problems of Defections.
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<b>UNIT-III :</b>	<b>GROSSROOT DEMOCRACY-DECENTRALISATION</b>
	1. Panchayat Raj system-Local and Urban Governments-Structure, Powers and Functions.
	2. Democratic Decentralization-Rural Development and Poverty alleviation with reference to 73 <sup>rd</sup> and 74 <sup>th</sup> Constitutional Amendment Acts, Challenges and Prospects.

<b>UNIT-IV :</b>	<b>SOCIAL DYNAMICS AND EMERGING CHALLENGES TO INDIAN POLITICAL SYSTEM</b>
	1. Role of Caste, Religion, Language and Regionalism in India.
	2. Politics of Reservation, Criminalization of Politics and Internal threats to Security.

<b>UNIT-V :</b>	<b>REGULATORY AND GOVERNANCE INSTITUTIONS</b>
	1. NITI Ayog, Finance Commission, Comptroller and Auditor General of India.
	2. Central Vigilance Commission, Central Information Commission, Lokpal and Lokayukta.



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Core papers

Political Science

B.A. POLITICAL SCIENCE

SECOND YEAR

FOURTH SEMESTER

(Under CBCS w.e.f 2020-21)



## Course 5: WESTERN POLITICAL THOUGHT

### Learning Outcomes:

On successful completion of the course the students will be able to:

- Understand the fundamental contours classical, western political philosophy, basic features of medieval political thought and shift from medieval to modern era.
- Understand the Social Contract Theory and appreciate its implications on the perception of State in terms of its purposes and role.
- Acquaint with the Liberal and Marxist philosophy and analyze some trends in Western Political Thought.
- Critically analyse the evolution of western political thought

<b>UNIT-I :</b>	<b>ANCIENT GREEK POLITICAL THOUGHT</b>
	1. Plato-Rule of Philosopher Kings-Theory of Justice-Ideal State and Education
	2. Aristotle-Theory of State-Classification of Governments-Citizenship, Slavery and Theory of Revolutions.

<b>UNIT-II :</b>	<b>MEDIEVAL AND MODERN POLITICAL THOUGHT</b>
	1. St.Augustine-Theory of Two Cities.
	2. NiccoloMachiavelli-State and Statecraft.

<b>UNIT-III :</b>	<b>CONTRACTUAL POLITICAL THOUGHT</b>
	1. Thomas Hobbes- Social Contract and Absolute Sovereignty.
	2. John Locke- Human Nature, State of Nature, Social Contract, Natural Rights and Limited Government

	3. Jean Jacques Rousseau- Human Nature, State of Nature, Social Contract, General Will and Popular Sovereignty
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<b>UNIT-IV :</b>	<b>UTILITARIAN POLITICAL THOUGHT</b>
	1. Jermy Bentham-Theory of Utility, Law and Reforms.
	2. J.S.Mill-Theory of Liberty and Representative Government.

<b>UNIT-V :</b>	<b>MARXIST POLITICAL THOUGHT</b>
	1. Karl Marx-Dialectical Materialism, Theory of Surplus Value and Class Struggle.
	2. Antonio Gramsci-Hegemony and Civil Society.



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Core papers

Political Science



**THIRD YEAR; SEMESTER – V**  
**B.A. POLITICAL SCIENCE**  
**PAPER-V: INDIAN POLITICAL THOUGHT**

Unit-1: Traditions of Ancient Indian Political Thought

1. Sources and features of Ancient Indian Political Thought
2. Manu: Social laws
3. Kautilya: Theory of the State

Unit-2: Renaissance Thought

1. Rammohun Roy: Religious and Social Reform
2. Pandita Ramabai: Gender

Unit-3: Early Nationalism

1. Dadabai Naoroji: Drain Theory and Poverty
2. Ranade M G: The Role of the State and Religious Reform

Unit-4: Religious Nationalism

1. Savarkar V D: Hindutva or Hindu Cultural Nationalism
2. Mohammed Iqbal: Islamic Communitarian Nationalism

Unit-5: Democratic Egalitarianism

1. Gandhi-Swaraj and Satyagraha
2. Jawaharlal Nehru- Democratic Socialism
3. Dr. Ambedkar B R – Annihilation of Caste System
4. M.N.Roy: Radical Humanism

**Reference books:**

1. Pantham Thomas and Kenneth Deutsch(Ed)(1986)  
Political thought in modern India, Sage, New Delhi
2. Bidyut Chakrabarty and Rajendra Kumar Pandey (2009) modern Indian political thought, Sage, New Delhi
3. Gurpreet Mahajan (2013), India: Political ideas and making of a democratic discourse, zed book, London
4. Partha Chatterjee (1986) nationalist thought and the colonial world: A derivative disclosure, zed books, London
5. Bhikhu Parekh (1999) colonialism, tradition and reform Sage, New Delhi
6. Bhikhu Parekh(1989) Gandhi's political philosophy, Macmillan, London



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**THIRD YEAR; SEMESTER – V  
B.A. POLITICAL SCIENCE  
PAPER-VI: WESTERN POLITICAL THOUGHT**

Unit-1: Classical Western Political Thought

1. Plato: Theory of Forms, Critique of Democracy, Justice
2. Aristotle: Citizenship, State, Justice, Virtue

Unit-2: Early Medieval to the Beginning of Modern Thought

1. St. Augustine: Earthly City and Heavenly City, Evil, Freewill, Moral Action
2. Machiavelli, Statecraft, Virtue, Fortuna

Unit-3: Liberal Thought

1. Thomas Hobbes: Human nature, Social Contract, liberty, State
2. John Locke: Natural Rights, Consent, Social Contract, State
3. Rousseau: Social institutions and Moral Man, Equality, liberty and General Will

Unit-4: Liberal Democratic Thought

1. Jeremy Bentham: Utilitarianism
2. John Stuart Mill: Individual liberty, Representative Government

Unit-5: Philosophical Idealism and its critique

1. Hegel: Individual Freedom, Civil Society, State
2. Karl Marx: Alienation, Surplus Value, Materialist Conception of History, State

**Reference books**

1. Shefali Jha (2010) Western Political Thought from Plato to Karl Marx, Pearson, New Delhi
2. Boucher D and Kelly P (Eds) (2009) Political Thinkers from Socrates to the Present, Oxford University press, oxford
3. Coleman J (2000) A History of Modern Political Thought: From Ancient Greece to early Christianity, Blackwell publishers, oxford
4. Macpherson C B (1962) The Political Theory of Possessiveness Individualism, Oxford University press, oxford
5. Hampshire-monk I (2001) A History of Modern Political Thought: Major Political Thinkers from Hobbes to Marx, Blackwell publishers, oxford



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Core papers

Political Science

**THIRD YEAR; SEMESTER –VI  
B.A. POLITICAL SCIENCE**

**PAPER-VII: PRINCIPLES OF PUBLIC ADMINISTRATION**

Unit-1: Nature of Public Administration

1. Meaning, Nature and Scope of Public Administration
2. Significance of Public Administration
3. Public and Private Administration

Unit-2: Administrative Theories

1. Classical Theory-Henry Fayol
2. Human Relations theory-Elton Mayo
3. Rational Decision making theory-Herbert Simon

Unit-3: Principles of Organization

1. Hierarchy- Span of control-Unity of command
2. Decision Making-Communication
3. Co-ordination-leadership

Unit-4: Structure of organization

1. Chief Executive-Types and Functions
2. Department-Bases of Departmentalization
3. Line and Staff Agencies

Unit-5: Theories of Motivation

1. Meaning and importance of Motivation
2. Hierarchy of needs theory; Abraham Maslow
3. Theories of X and Y; Douglas Mc Gregor

**Reference books:**

1. Pardhasaradhi (Eds) (2011) Public Administration; Concepts, Theories and Principles, Telugu Academy, Hyderabad
2. R.kSapru (2014) 3<sup>rd</sup> Edition, Administrative Theories and Management Thought, PHI learning Pvt Ltd, New Delhi.
3. Prasad D R, Prasad V S.(Eds) (2010),Administrative Thinkers, Sterling Publishers, NewDelhi.



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Core papers

Political Science

**THIRD YEAR; SEMESTER – VI**  
**B.A. POLITICAL SCIENCE**

(Cluster Elective)

**PAPER: VIII-A1: INTERNATIONAL RELATIONS**

Unit- I: Basic Concepts of International Relations

1. Meaning, Nature and Scope of International Relations
2. (a). Balance of power (b). National interests  
(c). Collective Security (d). Diplomacy

Unit-II: Approaches to the study of International Relations

1. Idealism – Woodrow Wilson
2. Classical Realism – Hans Morgenthau
3. Neo – realism – Kenneth Waltz

Unit-III: Phases of International Relations (1914-1945)

1. Causes for the First World War
2. Causes for the Second World War

Unit-IV: Phases of International Relations (1945 onwards)

1. Origins of First Cold War
2. Rise and Fall of Détente
3. Origins and the End of Second Cold War

Unit-V: International Organisation

1. The role of UNO in the protection of International Peace
2. Problems of the Third World : Struggle for New International Economic Order

**Reference Books:**

1. Jackson, R and Sorensan Y, Introduction to International Relations; Theories and approaches, New York, OUP, 2008.
2. Baylis, J and Smith, S (Eds), The Globalization of World Politics; An Introduction to International Relations, Oxford, OUP,2011
3. Aneek Chatterjee, International Relations Today; Concepts and Applications, New Delhi, Pearson Education, 2008.
4. E.H. Carr. International relations between the two world Wars, London, Palgrave Macmillan, 2004.





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Core papers

Political Science

THIRD YEAR; SEMESTER –VI

B.A. POLITICAL SCIENCE

**PAPER:VIII-A2: INDIAN FOREIGN POLICY**



Unit- I: Evolution of Indian Foreign of Policy

1. Determinants of Indian Foreign of Policy
2. Continuity and change in Indian Foreign Policy

Unit-II: Non-Alignment and UNO

1. The role of India in the Non-Alignment Movement
2. Relevance of Non-Aligned Movement in the Contemporary World
3. Role of India in the UNO in protection of International Peace

Unit-III: India's Relation with USA and China

1. Indo- US Relations: Pre- Cold War Era, Post- Cold War Era
2. India – China Relations: Pre- Cold War Era, Post- Cold War Era

Unit-IV: India and her Neighbours

1. Indo- Pakistan Relations
2. India's role in South Asian Association of Regions Cooperation (SAARC)

**Reference Books:**

1. David Scott (Ed), Handbook of India's International Relations, London, Routledge,2011
2. Ganguly, S (Ed), India as an Emerging Power Portland, Franck class, 2003
3. Pant, H, Contemporary Debates in Indian Foreign and Security Policy, London, Palgrave Macmillian,2008
4. Tellis, A and Mirski, S (Eds), Crux of Asia; China, India, and the Emerging global Order, Washington, Carnegie endowment for international peace,2013
5. Muni, S.D, India's Foreign Policy Delhi CUP, 2009
6. Alyssa Ayres and Raja Mohan, C (Eds), Power Realignment in Asia: China, India and the United States, New Delhi, Sage, 2002.
7. Appadorai, A, Domestic roots of Indian Foreign Policy, New Delhi, OUP,1971 Dutt, V.P, India's Foreign Policy in a Changing World, New Delhi,NBT,2011



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Core papers

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**THIRD YEAR; SEMESTER – VI  
B.A. POLITICAL SCIENCE  
PAPER: VIII-A3 : CONTEMPORARY GLOBAL ISSUES**

Unit- I: Conceptions of Globalization

1. Economic Conception of Globalization
2. Political Conception of Globalization

Unit-II: Anchors of Global Political Economy

1. International Monetary Fund – Nature, Role and Functions
2. World Bank-Nature, Role and Functions
3. World Trade Organization: Origin, Nature and role in the context of Globalization

Unit-III: Nation State and Globalization

1. The role of Nation State in the context of Globalization
2. Consequences of Globalization – Rise of Inequalities within and across Nations

Unit-IV: Contemporary Global issues

1. Ecological Issues: International Agreements On Climate Change
2. International Terrorism: Non- State Actors and State Terrorism

**Reference Books:**

1. Ritzer, G., Globalization: A Basic Text, Sussex: Wiley- Black well,2009
2. Streger, M., Globalization: A Very Short Introduction, Oxford, OUP,2013
3. Heywood, A., Global Politics, New York, Palgrave Macmillian,2011
4. Held, D et.al, Global Transformations; Politics, Economics and culture California, Stanford University Press,1999
5. J. Volger, 'Environmental Issues' in J. Baylis, S. Smith an owens, P(Eds) Globalization of world politics, New York, Palgrave,2011



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Core papers

Economics



**SEMESTER – I :: COURSE - I  
MICRO ECONOMIC ANALYSIS**

**Module-1: Economic Analysis and Methodology**

Scarcity and Choice as fundamental problems of economics - Production Possibilities Curve - Micro and Macro Analysis - Micro economic analysis – Scope and Importance – inductive and deductive methods- Principles of Microeconomics : Allocation of Resources - Optimization, Equilibrium and Marginal analysis -Rationality Principle the concept of Welfare.

**Module -2: Theory of Consumption**

Concept of Demand -Factors determining demand - Law of Demand - reasons and exceptions - Elasticity of Demand -Cardinal and Ordinal utility - Indifference Curve analysis : Properties of Indifference curves, Indifference Curve Map -Marginal Rate of Substitution - Budget Line - Changes -Consumer Equilibrium under Indifference Curve Analysis – Consumers' Surplus.

**Module -3: Theory of Production**

Concept and Objectives of Firm - Production Function: Cobb- Douglas Production Function -Law of Variable Proportions -Laws of Returns to Scale - Economies of large scale - Concepts of Cost - Total, Average and Marginal Costs - Law of Supply - Concept of Revenue : Total, Average and Marginal Revenues - Relation between Average and Marginal Revenues and elasticity of Supply

**Module-4: Theory of Exchange**

Concepts of Market: Criteria for Classification of Markets - Perfect Competition– Conditions, Price and Output determination ; Monopoly : Conditions, Price and Output Determination - Price Discrimination; Monopolistic Competition - Assumptions - Price and output determination - Selling Costs ; Oligopoly -Types- Kinky demand curve and Price rigidity.

**Module - 5:**

**Theory of Distribution The concepts of Functional and Personal Distribution of Income - Marginal Productivity Theory of Distribution - Modern Theory of Distribution -Concept of Rent - Ricardian Theory of Rent – Marshall's concepts of Economic Rent and Quasi Rent; Theories of Wage Determination: Subsistence Theory and Standard of Living Theory - Modern Theory of Wages; Classical Theory of Interest -Loanable Funds Theory of Interest -Liquidity Preference Theory of Interest; Theories of Profit: Risk and Uncertainty, Dynamic and Innovations Theories**



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Core papers

Economics

SEMESTER – 2:: COURSE –2

MACROECONOMIC ANALYSIS

**Module - 1: National Income**

Macroeconomics - Definition, Scope and Importance - Difference between Micro economic and Macro economic Analyses – Circular Flow of Income -National Income: Definitions, Concepts, Measurement of National Income - Difficulties - Importance - Concept of Green Accounting

**Module -2: Theory of Employment**

Classical Theory of Employment - Say's Law of Markets - Criticism -Keynesian Theory of Employment - Applicability to Developing countries- Consumption Function - Keynes' Psychological Law of Consumption - Average and Marginal Propensity to Consume - Factors determining Consumption Function - Brief Review of Relative, Life Cycle and Permanent Income Hypotheses- Investment Function: Marginal Efficiency of Capital -Multiplier and Accelerator.

**Module – 3: Money and Banking**

Definitions of Money - Concepts of Money, Liquidity and Finance - Money Illusion - Gresham's Law - RBI classification of Money - Theories of Money: Fisher and Cambridge (Marshall, Pigou, Robertson and Keynes equations) - Banking - Definition and types of Banking - Commercial Banks - Functions -Recent Trends in Banking - Mergers and Acquisitions - Central Bank - Functions - Control of Credit by Central Bank - NBFCs- Factors contributing to their Growth and their Role

#### **Module – 4: Inflation and Trade Cycles**

Inflation: Concepts of Inflation, deflation, reflation and stagflation - Phillip's Curve - Measurement of Inflation - CPI and WPI -Types of Inflation - Causes and Consequences of Inflation -Measures to Control Inflation. Trade Cycles: Phases of a Trade Cycle -Causes and Measures to control Trade Cycles

#### **Module -5: Finance and Insurance**

Financial Assets and Financial Instruments - Financial Markets - Functions of Money Market - Functions of Capital Market - Stock Market - Exchanges – Indices: Sensex and Nifty - Concept of Insurance -Types and Importance of Insurance.

#### **Reference Books:**

1. Dillard. D., *The Economics of John Maynard Keynes*, Cross by Lockwood and sons, London
2. M. C. Vaish - *Macroeconomic Theory*, Vikas Publishing House, New Delhi.
3. S. B Guptha - *Monetary Economics*, S. Chand & Co, Delhi
4. P. N. Chopra, *Macroeconomics*, Kalyani Publishers, Ludhiana, 2014
5. D. M. Mithani, *Macro Economic Analysis and Policy*, Oxford and IBH,



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**SEMESTER – 3:: COURSE – 3  
DEVELOPMENT ECONOMICS**

**Module - 1: Economic Growth and Development**

Economic Development as a Branch of Study of Economics – Scope and Importance - Distinction between Economic Growth and Economic Development -Measures of Economic Development and their limitations - Economy and Environment : Concepts of sustainable development and inclusive growth

**Module -2: Modern Economic Growth**

Characteristics of Underdeveloped Countries - World Bank and IMF Classification of countries - Modern economic growth – Kuznets' Six Characteristics -Obstacles to economic development - Vicious Circle of Poverty and cumulative causation -Factors of economic growth: Economic and Non-economic - Capital Formation – Foreign and Domestic capital, Debt and Disinvestment.

**Module-3: Theories of Development and Underdevelopment**

Classical Theory: Adam Smith, Ricardo and Malthus -Marxian Theory - Schumpeter Theory -Rostow's Stages of Economic Growth -Harrod-Domar two sector model -Solow's Model and Robinson's Golden Age

**Module – 4: Strategies of Economic Development**

Strategies of Economic Development – Big Push -Balanced Growth -Unbalanced Growth - Mahalanobis Model - Agriculture vs Industry -Capital Intensive Technology vs Labour Intensive Technology -Role of Infrastructure in Economic Development

**Module - 5: Institutions and Economic Development**

Role of State in Economic Development -Role of Markets - Market Failure and Regulation



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Economics



**SEMESTER – 4 :: COURSE – 4**

**ECONOMIC DEVELOPMENT- INDIA AND ANDHRA PRADESH**

**Module – 1 Basic Features**

Basic characteristics of Indian Economy as a developing economy – Economic development since independence - Objectives and achievements of planning – Planning Commission/NITIAyog and their approaches to economic development - India's Rank in Global Human Development Index .

**Module 2 National Income and Demography**

Trends in National income - Demographic trends - Poverty and Inequalities – Occupational Structure and Unemployment - Various Schemes of employment generation and eradication of poverty – Issues in Rural Development and Urban Development –Intra-state and Inter-state Labour Migration. Problems of Migrant Labour in unorganized sector.

**Module – 3 Agricultural and Industrial Developments**

Indian Agriculture – Agricultural Strategy and Agricultural Policy – Agrarian Crisis and land reforms – Agricultural credit – Minimum Support Prices -Malnutrition and Food Security - Indian Industry - Recent Industrial Policy – Make-in India – Start-up and Stand-up programmes – SEZs and Industrial Corridors - Economic Reforms and their impact - Economic initiatives by government of India during COVID - Atmanirbhar Bharat package.

**Module –4 Indian Public Finance**

Centre, States financial relations - Indian Tax System and Recent changes – GST and its impact on Commerce and Industry – Recommendations of 15<sup>th</sup> Finance Commission – Public Expenditure and Public Debt - Fiscal Policy and Budgetary Trends

**Module- 5 Andhra Pradesh Economy**

Basic characteristics of Andhra Pradesh Economy – Impact of State bifurcation on AP Agriculture – New challenges to industry and commerce - New initiatives for the development of infrastructure – Power and Transport - Information Technology and e-governance – Urbanization and smart cities – Skill development and employment –Social welfare programmes.



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2021-22

Core papers

Economics

COURSE– 5(Semester - IV)

STATISTICAL METHODS FOR ECONOMICS



**Module – 1: Nature and Definition of Statistics**

Introduction to Statistics – Definition, scope, importance and limitations of Statistics –  
Primary and Secondary data- Census and Sampling techniques and their merits and demerits

**Module – 2: Diagrammatic Analysis**

Collection of data - Schedule and questionnaire – Frequency distribution – Tabulation –  
diagram and graphic presentation of data – Histogram, Frequency Polygon, Cumulative  
Frequency Curves - Bar Diagrams and Pie Diagram

**Module – 3: Measures of Central Tendency and Dispersion**

Measures of Central Tendency and Dispersion - Types of averages- Arithmetic Mean,  
Geometric Mean, Harmonic Mean – Median – Mode – Dispersion - Range, Quartile Deviation,  
Mean Deviation, Standard Deviation- Coefficient of Variation.

**Module – 4: Correlation and Regression**

Correlation and Regression - Meaning, Definition and uses of Correlation- Types of  
Correlation- Karl Pearson's Correlation coefficient - Spearman's Rank Correlation- Regression  
Equations - utility of regression analysis – Demand forecasting.

**Module – 5: Time Series and Index Numbers**

Time Series and Index Numbers: Definition and components of Time Series – Measurement of  
Time Series – Moving Average and the Least Squares Method – Index Numbers - Concepts of  
Price and Quantity Relatives – Laspeyres's, Paasche's and Fisher's Ideal Index Numbers – Uses  
and Limitations of Index Numbers.



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Core papers

B. A. ECONOMICS

III Year B. A. Programme (UG) Courses – Under CBCS

Semester – V

Paper – V (Core Paper)

Paper V : CONTEMPORARY INDIAN ECONOMY

**Module-I:**

**Characteristics of India as a developing Economy- Demographic Features of India- Population Dividend- Occupational Structure in India- Trends in the growth of India's National Income.**

**Module-II:**

**Tax Reforms and GST- tax Revenue and its devolution to states – Public Debt Redemption Methods- Brief outline of Globalization and its impact on Indian Economy.**

**Module-III:**

**Magnitude of poverty in India- Unemployment and its dimensions- Major schemes of rural and urban development- Objectives and achievements of Planning in India- Balanced Regional Development- NITI Ayog.**

**Module- IV:**

**Indian Agriculture- Importance of agriculture in India –Factors determining agriculture productivity- Land use and Cropping Pattern in India- Agriculture Infrastructure- Rural Credit- Micro Finance- Self Help Groups- Agriculture price policy- Agriculture Insurance- Food Security.**

**Module-V:**

**Industrial polices, 1956, 1991 – Growth and problems of small scale industries in India -Make In India -Foreign direct Investment. Foreign Exchange Management Act (FEMA)- SEZs- Disinvestment Policy in India- Growing importance of Service Sector in India – Banking, Insurance, IT, Education and health.**

**References:**

- 1. Dhingra I.C., Indian Economy, Sultan Chand, 2014**
- 2. RuddarDutt and K.P.M. Sundaram- Indian Economy, SultanChand,2015**
- 3. S.K. Misra& V.K. Puri-Indian Economy, Himalaya Publishing House, 2015**
- 4. G.Omkarnath-Economics- A Premier of India, Orient Blacksman,2012**
- 5. Telugu Academy Publications**
- 6. Dr. S.G.K. Murthy, Indian Economy – GitamUniversity**



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Core papers

B. A. ECONOMICS

III Year B. A. Programme (UG) Courses – Under CBCS

Semester – V

Paper – VI (Core Paper)

**PAPER VI : QUANTITATIVE TECHNIQUES**

**(Mathematical derivations and proofs are not required. Only applications)**

Quantitative Methods

Unit-I: Introduction: Meaning- Definition- Function- Importance and Limitations of Statistics. Collection of Data- Primary and Secondary Data- Schedule and Questionnaire- Diagram and Graphic Presentation of Data (One dimensional and frequency curves).

Unit: I: Measures of Central Tendency: Definition, Objectives and Characteristics of Measures of Central Tendency- Types of Averages- Arithmetic Mean, Geometric Mean, Harmonic Mean- Mean- Mode- Properties of Averages.

Unit-III: Measures of Dispersion: Definition, Objectives of Dispersion- Range- Quartile Deviation- Mean Deviation- Standard Deviation- Coefficient of variation.

Unit-IV: Measures of correlation and Regression: Meaning, Definition and Uses of correlation- Types of Correlation- Karl Pearson's Correlation Coefficient- Spearman's Rank Correlation- Probable Error- Meaning. Utility of Regression Analysis- comparison between Correlation and Regression.

Unit V: Matrix: Definition- Examples- types of Matrices- matrix Addition- Multiplication- Determinant of Matrices- Minors- Co-Factors- Inverse of a Matrix.

REFERENCES:

Sivayya K.V. and Satya rao, Business Mathematics, SarathiPublication,Guntur.

Sancheti and Kapoor V.K., Business Mathematics, Sulthan Chand & Sons, NewDelhi.

D N Elhance, Fundamentals of Statistics, Kithab Mahal, Allahabad.

Gupta SC, Fundamentals of Business Statistics, Sulthan Chand & Sons, NewDelhi.

Aggarwal, Business Statistics, Kalyani Publishers Hyderabad.

Reddy CR, Business Statistics, Deep & DeepPublications.

S.P. Gupta & V.K. Kapoor, Fundamentals of mathematical Statistics, S. Ch



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**Core papers**

**B. A. ECONOMICS**

**III Year B. A. Programme (UG) Courses – Under CBCS**

**Semester – VI**

**Paper VII -- AGRICULTURAL ECONOMICS**

Module-1

Nature and Scope of Agricultural Economics. Factors affecting agricultural development: technological, institutional and general. Interdependence between agriculture and industry.

Module-2

Concept of production function : input-output and product relationship in farm production.

Module-3

Growth and productivity trends in Indian agriculture with special reference to Andhra Pradesh. Agrarian reforms and their role in economic development.

Module-4

Systems of farming, farm size and productivity relationship in Indian agriculture with special reference to Andhra Pradesh- New agriculture strategy and Green revolution : and its Impact

Module-5

Emerging trends in production, processing, marketing and exports; policy controls and regulations relating to industrial sector with specific reference to agro-industries in agri-business enterprises.

**RECOMMENDED / REFERENCE BOOKS**

Sadhu An, Singh Amarjit and Singh Jasbir (2014), Fundamentals of Agricultural Economics, Himalaya Publishing House, Delhi

Lekhi RK and Singh Joginder, Agricultural Economics, Kalyani Publishers

Bhaduri, A. (1984), The Economic Structure of Backward Agriculture, Macmillan, Delhi.

Bilgrami, S.A.R. (1996), Agricultural Economics, Himalayas publishing house, Delhi.

Dantwala, M.L. et.al (1991), Indian Agricultural Development Since Independence, Oxford & IBH, New Delhi.



**B. A. ECONOMICS**  
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**Paper – VIII-A1 - Agribusiness Environment in Andhra Pradesh**

Module-1

Role of agriculture in development process in Andhra Pradesh vis-à-vis other developed states. Economy wide effects of agriculture in Andhra Pradesh through trickle down effects. Backward and forward linkages of agriculture with rest of economy.

Module-2

Agricultural finance-importance in modern agriculture- performance of agricultural finance in Andhra Pradesh -problems of agricultural finance – Inter linkages of agricultural credit and other input markets and product markets.

Module-3

Dynamics of agriculture-crop (horticulture, field crops), sector-livestock (poultry dairy and fisheries) sector and inter linkages among the sectors. Agribusiness sector in Andhra Pradesh-salient features, constraints, sub sectors of agribusiness-input sector, production sector, processing sector.

Module-4

Growth performance of major agricultural commodities in Andhra Pradesh-production and processing trends in exports and imports of major agricultural commodities.

Module-5

Marketing policy- structure of agri markets – regulated markets – need – activities – structure – APMC act – market legislations – Role of Farmer Groups in the marketing of Agricultural Produce.

References:

Adhikary M. 1986. Economic Environment of Business. S. Chand & Sons.  
Aswathappa K. 1997. Essentials of Business Environment. Himalaya Publ.  
Francis Cherunilam 2003. Business Environment. Himalaya Pub

**B. A. ECONOMICS**  
**III Year B. A. Programme (UG) Courses – Under CBCS Semester – VI**  
**Paper – VIII-A2 - Agricultural outputMarketing**

Module-1

Structure and Model of Agri-Marketing Organizations with functions: Functions of intermediaries, Marketing Practices in Primary and secondary and terminal market, Regulated markets, co-operative marketing.

Module-2

Marketing costs and margins, Marketing Finance. Marketing Structure of Major agricultural commodities, food grains: Rice, and Maize. Cash Crops; Cotton, Oil Seeds, Vegetables and Fruits, Milk, Meat and Poultry products.

Module-3:

Problems and Challenges in Agriculture Marketing - Market Yards - Support prices - Rural Warehousing.

Module-4:

State Intervention in Agricultural Marketing, Role of Various agencies (Andhra Pradesh Agro, MARKEED, State Department, and FCI, Tobacco Board, Cotton Corporation) and its impact on market efficiency. Agriculture PriceCommission.

Module-5:

Inter-regional and international trade in agriculture; emerging scenario of international trade in agricultural commodities; concept of terms of trade and balance of payments,. WTO and Indian agriculture with special reference to Andhra Pradesh .

References:

C.S.G.Krishnamacharyulu& Lalitha Ramakrishnan, “Rural Marketing: Text and Cases”, Pearson Education, NewDelhi.

Awadhesh Kumar Singh &Satyaprakash Pandey, Rural Marketing: Indian Perspective, New Age International Publishers, NewDelhi.

Mamoria, C.B. & Badri Vishal: Agriculture Problems inIndi

Arora, R.C., “Integrated Rural Development”, S. Chand Limited, NewDelhi.

Gopaldaswamy, T.P., “Rural Marketing: Environment, Problems and Strategies, Vikas Publishing House Pvt. Ltd., NewDelhi.

Bedi&Bedi, “Rural Marketing”, Himalaya Publishing House, NewDelhi.

**B. A. ECONOMICS**  
**III Year B. A. Programme (UG) Courses – Under CBCS Semester – VI**  
**Paper – VIII-A3 - Agricultural Input Marketing**

Module-1

Agri input marketing – Meaning and importance – distinctive features of Agri. Input marketing – Distribution channels of agri. Inputs – Private, Government, Co-operative and Joint sector. Agri inputs promotional programme – concepts and techniques.

Module-2

Issues in seed marketing – determinants of seed demand – private sector contribution – public sector support to private sector - Distinctive features of Seed Marketing vis – a – vis other Input Marketing – strengths and weaknesses on Indian seed industry.

Module-3

Fertilizer industry scenario – public, private, co-operative and joint sector role – fertilizer production consumption, and imports – fertilizer marketing characteristics. Biofertilizers – its role and scope – major constraints involved – production level – market level – field level. Marketing network/channels.

Module-4

Pesticide industry – an overview – nature of industry growth – consumption crop wise, area wise – demand and supply – market segmentation.-IPM concept development – biopesticides – its role and scope.

Module-5

Agricultural mechanization – benefits and importance and future priorities – scenario of farm implements and machinery sector – economic advantage of mechanization – contribution of agricultural mechanization – Need for the development of agricultural machinery and implements to suit the local resource endowments.



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2021-22

Core papers

History

**PROGRAMME: THREE-YEAR B.A.**

(With History, Economics and Political Science Disciplines)

**Course Code:**

**Domain Subject: History**

Semester-wise Syllabus under CBCS

I Year B. A. –Semester – I

**Course I: ANCIENT INDIAN HISTORY & CULTURE (from Indus Valley Civilization  
to 13<sup>th</sup> Cen A.D)**

**Learning Outcomes:**

After successful completion of this course, the student will be able to:

- Identify and define various kinds of sources and understand how history books are shaped
- Compare and contrast various stages of progress from IVC to Vedic age and analyze the Jain, Buddhist and Vedic faiths
- Increase the awareness and appreciation of Transition from Territorial States to Emergence of Empires
- Analyze the emergence of the Mauryan and Gupta empires during the “classical age” in India
- Evaluate the key facets of ancient society, polity and culture in South India—the feudalism, and the rise of technology and commerce.
- Critically examine the nature of monarchic rule and develop an comprehensive

**Syllabus:**

- Unit - I Ancient Indian Civilization (from Circa 3000 BC to 6<sup>th</sup> BC): Indus Valley Civilization - Salient Features; Vedic Age - Society, Polity, Economy, Culture during early and later Vedic period
- Unit - II Ancient Indian History & Culture (6<sup>th</sup> Century BC to 2<sup>nd</sup> Century AD): Doctrines and Impact of Jainism and Buddhism; Mauryan Administration, Society, Economy & Culture - Ashoka's Dhamma; Kanishka's Contribution to Indian Culture
- Unit - III History & Culture of South India (2<sup>nd</sup> Century BC to 8<sup>th</sup> Century AD): Sangam Literature; Administration, Society, Economy and Culture under Satavahanas; Cultural contribution of Pallavas
- Unit - IV India from 3<sup>rd</sup> century AD to 8<sup>th</sup> century AD: Administration, Society, Economy, Religion, Art, Literature and Science & Technology under Guptas – Samudragupta; Cultural contribution of Harsha: Arab Conquest of Sind and its Impact
- Unit - V History and Culture of South India (9<sup>th</sup> century AD to 13<sup>th</sup> century AD): Local Self Government of Cholas; Administration, Society, Economy and Culture under Kakatiyas – Rudram Devi



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Core papers

History

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(With History, Economics and Political Science Disciplines)

**Course Code:**

**Domain Subject: History**

Semester-wise Syllabus under CBCS

I Year B. A. – Semester – II

**Course 2: MEDIEVAL INDIAN HISTORY & CULTURE (1206 A.D to 1757 A.D)**

**Learning Outcomes:**

After successful completion of this course, the student will be able to:

- Understand the socio, economic and cultural conditions of medieval India
- Describe the advent of Islam in India and study the traces of political and cultural expansion of Turks & Afghans
- Explain the Administration and art and architecture of Vijayanagar Rulers, Mughals and also analyse the rise of the Marathas and the contribution of Shivaji
- Evaluate the establishment of the British rule in India and understand the dangerous consequences disunity at all levels
- Analyze the emergence of composite culture in Indian
- Visualize where places are in relation to one another through map pointing

**Syllabus:**

Unit - 1 Impact of Turkish Invasions – Balban, Allauddhin Khilji, Md. Bin Tughlaq - Administration, Society, Economy, Religion and Cultural developments under Delhi Sultanate (from 1206 to 1526 AD)

Unit - II Impact of Islam on Indian Society and Culture – Bhakti Movement;  
Administration, Society, Economy, Religion and Cultural developments under

Unit - Emergence of Mughal Empire – Babur – Sur Interregnum - Expansion &  
III Consolidation of Mughal Empire – Akbar, Jahangir, Shah Jahan, Aurangzeb

Unit - Administration, Economy, Society and Cultural Developments under the Mughals  
IV – Disintegration of Mughal Empire - Rise of Marathas under Shivaji

Unit - V Beginning of European Settlements - Anglo- French Struggle.



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Core papers

History

**Course Code:**

**Domain Subject: History**

Semester-wise Syllabus under CBCS

I Year B. A. – Semester – III

**Course 3: MODERN INDIAN HISTORY & CULTURE (1757-1947 A. D.)**

**Learning Outcomes:**

After successful completion of this course, the student will be able to:

- Unearth the true nature of the British rule and its disastrous impact on Indian economy and society
- Gauge the disillusionment of people against the Company's rule even during the early 19th century
- Assess the causes and effects of Reformation movements and also inspire the public to overthrow inequalities of the present day society
- Rise above petty parochial issues after understanding the sacrificial saga of freedom struggle
- Evaluate the undercurrent of communal politics that led to India's partition and identify the enemies of India's integrity and sovereignty
- Visualize where places are in relation to one another through map pointing

**Syllabus:**

- Unit - I Conquest of Bengal by EIC – Battle of Plassey-Policies of Expansion –Warren Hastings, Cornwallis - Subsidiary Alliance & Doctrine of Lapse – Causes & Results of 1857 Revolt – Lytton, Rippon, Curzon
- Unit - II Social, Religious & Self-Respect Movements – Raja Rammohan Roy, Dayananda Saraswathi, Swami Vivekananda, Jyotiba Phule, Narayana Guru,

- Unit - .Causes for the growth of Nationalism - Freedom Struggle from 1885 to 1920:
- III Moderate Phase — Militant Phase: Vande Mataram Movement - Home Rule Movement
- Unit - Freedom Struggle from 1920 to 1947: Gandhiji's Role in the National Movement
- IV – Revolutionary Movement – Subhas Chandra Bose
- Unit - V Muslim League & the Growth of Communalism – Partition of India – Advent of Freedom - Integration of Princely States into Indian Union – Sardar Vallabhai Patel



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Core papers

History

COURSE CODE:

Domain Subject: History

Semester-wise Syllabus under CBCS

II Year B. A. – Semester – IV

**Course 4: HISTORY & CULTURE OF ANDHRA (FROM 1512 TO 1956 AD)**

**Learning Outcomes:**

After successful completion of this course, the student will be able to:

- Interpret social and political and cultural transformation from medieval to modern Andhra
- Relate key historical developments during medieval period occurring in coastal Andhra and Telangana regions and analyze socio - political and economic changes under QutbShahi rulers
- Understand gradual change, or change in certain aspects of society in Andhra, rather than rapid or fundamental changes
- Explain how the English East India Company became the most dominant power and outline the impact of colonial policies on different aspects in Andhra
- Outline the issues related to caste, women, widow remarriage, child marriage, social reforms and the laws and policies of colonial administration towards these issues
- Take pride in the non-violence struggle for Indian Independence and relate the importance of peace in everyday life
- Apply the knowledge of the regional history to understand the regional, linguistic and other cultural aspirations of the present day society
- Visualize where places are in relation to one another through map pointing

**Syllabus:**

Unit - 1 Andhra through 16<sup>th</sup>& 19<sup>th</sup> Centuries AD: Evolution of Composite Culture - The QutbShahis of Golkonda –Administration, Society

&Economy – Literature & Architecture; Advent of European and settlements in Andhra - Occupation of Northern Circars and Ceded Districts – Early revolts against the British

Unit - II Andhra under British rule: Administration – Land Revenue Settlements – Society – Education - Religion – Impact of Industrial Revolution on Economy – Peasantry & Famines – Contribution of Sir Thomas Munroe & C. P. Brown – Impact of 1857 Revolt in Andhra

Unit - III Social Reform & New Literary Movements: KandukuriVeerasingam, RaghupathiVenkataRathnam Naidu, GuruzadaApparao, KomarrajuVenkataLaxmana Rao; New Literary Movements: RayaproluSubbarao, ViswanathaSathyanarayana, GurrarnJashua, BoyiBheemanna, Sri Sri

Unit - IV Freedom Movement in Andhra (1885-1947): Vandemataram Movement– Home Rule Movement in Andhra - Non-Cooperation Movement - AlluriSeetarama Raju &Rampa Revolt (1922-24) - Civil Disobedience Movement – Quit India Movement

Unit - V Movement for separate Andhra State (1953) and AP (1956): Causes – Andhra Maha Sabha –Conflict between Coastal Andhra &Rayalaseema – Sri Bagh Pact – work of various Committees – Martyrdom of PottiSriramulu – Formation of separate Andhra State (1953); Movement for formation of Andhra Pradesh (1956); VisalandhraMahasabha – Role of Communists – States Reorganization Committee – Gentlemen’s



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Core papers

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(With History, Economics and Political Science Disciplines)

**Course Code:**

**Domain Subject: History**

Semester-wise Syllabus under CBCS

I/II Year B. A. – Semester 4

**Course 5: HISTORY OF MODERN WORLD (From 15<sup>th</sup> Cent. AD to 1945 AD)**

**Learning Outcomes:**

After successful completion of this course, the student will be able to:

- Demonstrate advanced factual knowledge of world histories, politics, and cultures
- Assess and appraise the developments in art, literature, and society during the Renaissance and utilize content knowledge of the Reformation and Counter Reformation to make predictions about the evolution of Christianity in Europe and abroad
- Evaluate the causes for the Glorious Revolution and American Revolution and identify the background for the evolution of human rights movement
- Understand the main events of the French Revolution and its significance in the shift in European culture from Enlightenment to Romanticism
- Think how Russia's traditional monarchy was replaced with the world's first Communist state.
- Know how the world wars affected people all over the world and the destruction they caused

**Syllabus:**

- Unit - I Transformation from Medieval to Modern Era – Chief Characteristics;  
Glorious Revolution (1688) – Origin of Parliament Bill of Rights – Results
- Unit - II American Revolution (1776); French Revolution (1789) – Causes, Course and  
Results
- Unit - III Unification of Italy; Unification of Germany
- Unit - IV Communist Revolution in Russia; World War I: Causes – Results of the War –  
Paris Peace Conference; League of Nations
- Unit - V World War II: Causes, Fascism & Nazism – Results; The United Nations  
Organization: Structure, Functions and Challenges



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Core papers

History

B. A. HISTORY

III Year B. A. Programme (UG) Courses – Under CBCS

Semester – V

Paper – V (Core Paper) AGE

**OF RATIONALISM AND HUMANISM THE WORLD**

**BETWEEN 15<sup>TH</sup>& 18<sup>TH</sup> CENTURIES**

*(History of Modern World (1453 – 1821 A.D))*

Unit – I	Feudalism -Geographical Discoveries: Causes – Compass & Maps – Portugal Leads and Western World Follows – Consequences;
Unit – II	The Renaissance Movement: Factors for the Growth of Renaissance – Characteristic Features - Transformation from Medieval to Modern World; Reformation & Counter Reformation Movements: The Background – Protestantism – Spread of the Movement– Counter Reformation– Effects of Reformation
Unit - III	Emergence of Nation States: Contributory Factors - England and other Nation States – Impact due to the Emergence of Nation States ;Age of Revolutions: The Glorious Revolution (1688) – Origin of Parliament – Constitutional Settlement – Bill of Rights – Results.
Unit - IV	Age of Revolutions: The American Revolution (1776) – Opening of New World – Causes – Course – Declaration of Independence, 1776 – Bill of Rights, 1791 – Significance.
Unit – V	Age of Revolutions: The French Revolution (1789) – Causes - Teachings of Philosophers - Course of the Revolution – Results.

References:

1	Burke, Peter, The Renaissance
2	C.J.H. Hayes, Modern Europe up to 1870



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Core papers

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B. A. HISTORY

III Year B. A. Programme (UG) Courses – Under CBCS

Semester – V

Paper – VI (Core Paper)

**HISTORY**

**& CULTURE OF ANDHRA DESA (from 12<sup>th</sup> to 19<sup>th</sup> Century A.D.) (History and Culture of Andhra from Satavahanas to 1857 A.D)**

Unit – I	Andhra during 12 <sup>th</sup> & 13 <sup>th</sup> Centuries A.D.: Kakativas – Origin & its Antecedents – Administration – Social & Economic Life – Industries & Trade - Promotion of Literature and Culture – Architecture & Sculpture – Decline; The Age of Reddy Kingdoms: Patronage to Literature – Trade & Commerce.
Unit – II	Andhra between 14 <sup>th</sup> & 16 <sup>th</sup> Centuries A.D.: Vijayanagara Empire: Polity, Administration, Society & Economy – Sri Krishna Devaraya and his contribution to Andhra Culture – Development of Literature & Architecture – Decline and Downfall.
Unit - III	Andhra through 16 <sup>th</sup> & 17 <sup>th</sup> Centuries A.D.: Evolution of Composite Culture - The OutbShahis of Golkonda – Origin & Decline – Administration, Society & Economy – Literature & Architecture.
Unit - IV	The 18 <sup>th</sup> & 19 <sup>th</sup> Centuries in Andhra: East India Company's Authority over Andhra – Three Carnatic Wars – Occupation of Northern Circars and Ceeded Districts – Early Uprisings – Peasants and Tribal Revolts.
Unit – V	The 18 <sup>th</sup> & 19 <sup>th</sup> Centuries in Andhra: Impact of Company Rule on Andhra – Administration – Land Revenue Settlements – Society – Education - Religion – Impact of Industrial Revolution on Economy – Peasantry & Famines – Contribution of Sir Thomas Munroe, C. P. Brown & Sir Arthur Cotton – Impact of 1857 Revolt in Andhra

References:



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**2021-22**

**Core papers**

**History**

**B. A. HISTORY**

III Year B. A. Programme (UG) Courses – Under CBCS

Semester – VI

**Paper – VII**

**HISTORY OF MODERN EUROPE (from 19<sup>th</sup> Century to 1945 A. D.)**

*(History of Modern World (1821 – 1945))*

Unit – I	Industrial Revolution: Origin, Nature and Impact.
Unit – II	Unification Movements in Italy & Germany and their Impact.
Unit - III	Communist Revolution in Russia – Causes, Course and Results – Impact on World Order.
Unit - IV	World War I: Age of Rivalry in Europe Between 1870 and 1914 – Results of the War – Paris Peace Conference - League of Nations.
Unit – V	World War II: Causes, Fascism & Nazism – Results; The United Nations Organization: Structure, Functions and Challenges.

References:

1	<u>J.A.Hobson</u> , Imperialism: A Study
2	C.D. Hazen, Modern Europe up to 1945
3	<u>H.A.L.Fisher</u> , History of Europe



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2021-22

**Core papers**

**History**

**History**

**HISTORY**

III Year B. A. Programme (UG) Courses – Under CBCS

Semester – VI

**Paper – VIII-A-1 (Cluster Elective Paper –1)**

**CULTURAL TOURISM IN ANDHRA PRADESH**

Unit – I	Concepts of Tourism: Nature – Scope – Definition – Tourists & Excursionists – Domestic & International Tourists.
Unit – II	Types of Tourism: Heritage Tourism – Pilgrimage Tourism - Recreation Tourism – Sports & Adventure Tourism - Advance Tourism – Health Tourism – Environment Tourism.
Unit - III	History and Tourism – Heritage Sites – Definition – Ancient Monuments Preservation Act of 1904, Act of 1958 and Act of 1972 - Archaeological Survey of India – Stage Museums.
Unit - IV	Planning and Development of A.P. Tourism: APTDC – Aims & Objectives – Fairs & Festivals – Andhra Cuisine –Restaurants - Eco Tourism – Beaches & Hill Resorts – Mountaineering – Tourist Places in A.P.
Unit – V	Modalities of Conducting Tourism: Field Work - Visit to a Site – Conduct of



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2021-22

**Core papers**

**History**

B. A. HISTORY

III Year B. A. Programme (UG) Courses – Under CBCS  
Semester – VI

**Paper – VIII-A-2 (Cluster Elective Paper 2) POPULAR  
MOVEMENTS IN ANDHRA DESA (1848 TO 1956 A.D.)**

*(History and Culture of Andhra from 1857 to 2014)*

Unit – I	Social & Self Respect Movements: Social Conditions – <u>Kandukuri Veeresalingam</u> , <u>Raghupathi Venkata Rathnam</u> Naidu, <u>Guruzada Apparao</u> , <u>Komarraju Venkata Laxmana Rao</u> ; New Literary Movements: Causes – <u>Rayaprolu Subbarao</u> , <u>Viswanatha Sathyanarayana</u> , <u>Gurram Jashua</u> , <u>Bovi Bheemanna</u> , <u>Sri Sri</u> – Impact.
Unit – II	Freedom Movement in Andhra (1885-1920): Contributory Factors – <u>Vandemataram</u> Movement – Swadeshi & Boycott programs – Glorious Events at Rajahmundry, Kakinada, Kotappakonda & Tenali – Home Rule Movement in Andhra.
Unit - III	Freedom Movement in Andhra (1920-1947): Non-Cooperation Movement – <u>Chirala Perala Palanadu</u> & <u>Pedanandipadu</u> Activities – <u>Alluri Seetarama Raju</u> & <u>Rampa Revolt (1922-24)</u> – Anti-Simon Commission Movement – Civil Disobedience Movement – Quit India Movement.
Unit -IV	Movement for Separate Andhra State (1953): Causes – <u>Andhra Maha Sabha</u> – <u>Andhra Provincial Congress Committee</u> – <u>Andhra University</u> – Conflict between Coastal Andhra & Rayalaseema – <u>Sri Bagh Pact</u> – Constitution of Committees & their Contribution – <u>Martyrdom of Potti Sriramulu</u> – Formation of separate Andhra State.
Unit-V	Movement for formation of Andhra Pradesh (1956): <u>Visalandhra Mahasabha</u> – Role of Communists – States Reorganization Committee – Gentlemen's Agreement – Formation of Andhra Pradesh.
	References:
1	<u>B. Kesava Narayana</u> , Political and Social Factors in Modern Andhra
2	<u>K. V. Narayana Rao</u> , The Emergence of Andhra Pradesh
3	<u>M. Venkata Rangaiah</u> , The Freedom Struggle in Andhra Pradesh
4	<u>P. R. Rao</u> , History of Modern Andhra
5	<u>Sarojini Regani</u> , Highlights of Freedom Movement
6	<u>Sarojini Regani</u> , □□□□ □□□□□□□□□□ □□□□
7	<u>V. Ramakrishna</u> , Social Reform Movement in Andhra
8	<u>B. Kesava Narayana</u> , Modern Andhra & Hyderabad – 1858 – 1956 A.D., 2016
	<b>Project Work:</b> With the aim of understanding of techniques and methods of research and presentation, students should be encouraged to draft a report on local writers, struggles, human rights movements, different types of social discrimination etc.





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2021-22

**Core papers**

**History**

B. A. HISTORY

III Year B. A. Programme (UG) Courses – Under CBCS

Semester – VI

**Paper – VIII-A-3 (Cluster Elective Paper – 3) CONTEMPORARY  
HISTORY OF ANDHRA PRADESH (1956-2014)**

Unit – I	Socio-Economic Changes in Andhra Pradesh – River Projects & Infrastructural Development – Education & Scientific Progress – Regional Politics – Emergence of <u>Telugu Desam Party</u> .
Unit – II	Growth of Leftist Ideology – Marxist & Radical Literature – <u>Naxalbari Movement</u> – Communist Activities – Electoral Politics – Present Status of Communist Movement.
Unit - III	Dalit Movement – Understanding Untouchability - Education – Literature - Struggle for Identity – Demand for Political Space.
Unit - IV	Early trends towards Bifurcation: <u>Jai Telangana Movement (1969)</u> – <u>Mulki Rules</u> – Legal Battle - <u>Jai Andhra Movement (1972)</u> – Six Point Formula (1973).
Unit – V	Bifurcation of Andhra Pradesh: Power Politics – Economic Discontentment – Riparian Disputes - Unemployment –Foundation of <u>Telangana RastraSamiti</u> – Movements for separate Telangana & unified Andhra Pradesh – Formation of <u>Telangana State (2014)</u>
	References:
	1 <u>Barry Pavier</u> , The Telangana Movement - 1944-51
	2 <u>Chinnavva Suri</u> , Agrarian Movement in Andhra, 1921-71
	3 <u>K. Ramachandra Murthy</u> , Unveiling Telangana State
	4 <u>P.R.Rao</u> , History of Modern Andhra
	5 <u>S. Ratnakar</u> , A Brief History of Telangana & Andhra Pradesh
	6 <u>Sri Krishna Committee Report</u>
	7 <u>Tarimela Nagireddy</u> , India Mortgaged
	8 <u>Y.V. Krishna Rao</u> , Growth of Capitalism in Indian Agriculture: A Case Study
	9 <u>KattiPadmarao</u> , □□□□□□ □
	10 <u>Y. Chinnarao</u> , □□□□ □□□□ □□□□
	11 <u>News Paper Clippings (2001-2014)</u>
	<b>Project Work:</b> Students may be asked to prepare assignments on local caste struggles; regional disparities; aspirations; recent developments etc., through interviews and verifying press reports.



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2021-22

Core papers

Computer Application

**B.Sc Computer Applications & B. A. Computer Applications  
w.e.f. 2020-21**

**COMPUTER FUNDAMENTALS AND OFFICE TOOLS**

Semester	CourseCode	CourseTitle	Hours	Credits
I	CI	COMPUTER FUNDAMENTALS AND OFFICE TOOLS	60	3

**Course Objectives:**

To introduce the fundamental concepts of Computers, Hardware, Software and able to interact with documentation, Powerpoint, and Spreadsheet.

**Course Outcomes:**

1. To learn about Basics of Computers
2. To learn about basics of Hardware Components
3. To learn about basics of Operating System Software
4. To learn about basics of Application System Software
5. To practice handful exercises on Documentation, Spreadsheet, Presentation

**Unit-I: Basics of Computers :**Definition of a Computer - Characteristics and Applications of Computers – Block Diagram of a Digital Computer – Classification of Computers based on size and working – Central Processing Unit – I/O Devices.

**Unit-II:** Primary, Auxiliary and Cache Memory – Memory Devices. Software, Hardware, Firmware and People ware – Definition and Types of Operating System – Functions of an Operating System – MS-DOS – MS Windows – Desktop, Computer, Documents, Pictures, Music, Videos, Recycle Bin, Task Bar – Control Panel.

**Unit-III: MS-Word:** Features of MS-Word – MS-Word Window Components – Creating, Editing, Formatting and Printing of Documents – Headers and Footers – Insert/Draw Tables, Table Auto format –Page Borders and Shading – Inserting Symbols, Shapes, Word Art, Page Numbers, Equations – Spelling and Grammar – Thesaurus – Mail Merge.

**Unit-IV: MS-PowerPoint:** Features of PowerPoint – Creating a Blank Presentation - Creating a Presentation using a Template - Inserting and Deleting Slides in a Presentation – Adding Clip Art/Pictures -Inserting Other Objects, Audio, Video - Resizing and Scaling of an Object – Slide Transition – Custom Animation.

**Unit-V: MS-Excel:** Overview of Excel features – Creating a new worksheet, Selecting cells, Entering and editing Text, Numbers, Formulae, Referencing cells – Inserting Rows/Columns –Changing column widths and row heights, auto format, changing font sizes, colors, shading.



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2021-22

Core papers

**Computer Application**

**Programming in C**

Semester	CourseCode	CourseTitle	Hours	Credits
II	C2	Programming in C	60	3

**CourseObjective:**

This course aims to provide exposure to problem-solving through programming. It introduces the concepts of the C Programming language.

**CourseLearningOutcomes:**

On completing the subject, students will be able to:

1. Analyze a given problem and develop an algorithm to solve the problem.
2. Understand tokens and control structures in C.
3. Understand arrays and strings and implement them.
4. Understand the right way of using functions, pointers, structures and unions in C
5. Develop and test programs written in C.

**UNIT - I:**

**12 Hrs**

**Introduction to Algorithms :**Algorithm - Key features of Algorithms - examples of Algorithms , Flow Charts.

**Introduction to C :** Structure of C Program, Writing the first C Program , Files used in C Program , Compiling and Executing C Programs , Using Comments, Keywords, Identifiers , Basic Data Types in C, Variables , Constants, I/O Statements in C , Operators in C , Type Conversion and Type Casting.

**UNIT - II:**

**16 Hrs**

**Decision Control and Looping Statements:** Introduction to Decision Control Statements , Conditional Branching Statements, Iterative Statements , Nested Loops , Break and Continue Statement, Goto Statement.

**Functions :** Introduction, using functions – Function declaration/ prototype – Function definition function call – return statement – Passing parameters , Recursive functions .

**UNIT - III:**

**16 Hrs**

**Arrays:** Introduction, Declaration of Arrays , Accessing elements of the Array – Storing Values in Array, One dimensional array -declaration,initialization,Accessing one dimensional array,Passing one dimensional array to function, Two dimensional Arrays-

declaration, initialization, Accessing two dimensional arrays, passing two dimensional arrays to functions.

**Strings:** Introduction , String and Character functions, String Operations using String functions- `strcat()` , `strcmp()` , `strcpy()` , `strlen()`.

#### **UNIT - IV:**

**8 Hrs**

**Pointers:** declaring Pointer Variable, Pointer Expressions and Pointer Arithmetic , Passing Arguments to Functions using Pointers, Memory Allocation in C Programs, Drawbacks of Pointers.

#### **UNIT – V:**

**8 Hrs**

**Structures:** Introduction to structures, Arrays of Structures, Nested Structures .

**Union, and Enumerated Data Types:** Introduction to Union – accessing union elements , Enumerated Data Types.

#### **TEXT BOOKS:**

1. Computer Fundamentals and Programming in C by REEMA THAREJA from OXFORD UNIVERSITY PRESS



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2021-22

Core papers

Computer Application

**DATABASEMANAGEMENTSYSTEMS**

Semester	CourseCode	CourseTitle	Hours	Credits
III	C3	DATABASEMANAGEMENT SYSTEMS	60	3

**CourseObjective:**

1. To educate student regarding databases and how to manage databases.
2. To provide knowledge about creating relationships.
3. To provide knowledge about dependencies and relational constraints.
4. To enable student to write various types of queries for handling data.

**CourseLearningOutcomes:**

On completing the subject, students will be able to:

1. Gain knowledge of Database and DBMS.
2. Understand the fundamental concepts of DBMS with special emphasis on relational data model.
3. Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database
4. Model database using ER Diagrams and design database schemas based on the model.
5. Create a small database using SQL.

**UNIT I**

**12Hrs**

**Introduction: Data and Information, Characteristics of the Database Approach:**

Self-Describing Nature of the a Database System, Insulation between Programs and Data, Data Abstraction, Support of Multiple Views of the data, Sharing of Data and multiuser Transaction Processing, Advantages of DBMS, **Data Models, Schemas and Instances:** Categories of Data Models, Schemas, Instances, and Database State, **DBMS Architecture and Data Independence:** The Three-Schema Architecture, Data Independence,

**UNIT II**

**12 Hrs**

**Entity Relationship Model:**

Introduction, Entity types, Entity sets, Attributes and Keys, Entities and Attributes, Entity Types, Entity Sets, Keys and Value Sets, Relationships, Relationship types, Roles, and Structural Constraints, Relationship Types, Sets and Instances, Relationship Degree, Attributes of Relationship Types, Weak Entity Types, ER Diagrams,

**Enhanced Entity-Relationship:**

Subclasses, super classes, and inheritance, Specialization and Generalization, Constraints and characteristics of Specialization and Generalization.

### UNIT III

12 Hrs

#### **The relational data model, Relational Constraints:**

Introduction, Relational Model Concepts, Domains, Attributes, Tuples and Relations, Characteristics of Relations, Relational Model Notation Relational Constraints and Relational Database Schemas:

Domain Constraints, Key Constraints and Constraints on Null, Relational Databases and Relational Database Schemas, Entity Integrity, Referential Integrity and Foreign Keys

#### **Functional Dependencies and normalization for Relational Databases:**

Functional Dependencies, Definition of Functional Dependency, Inference Rules for Functional Dependencies, Equivalence of sets of Functional Dependencies, Minimal Sets of Functional Dependencies

#### **Normal forms based on primary keys:**

Introduction to Normalization, First Normal Form, Second Normal Form, Third Normal Form

### UNIT IV

12 Hrs

#### **The Relational Algebra:**

Basic Relational Algebra Operation, The SELECT Operation, The PROJECT operation, Sequences of Operations and the, RENAME Operation, Set Theoretic Operations, The JOIN Operation, A Complete Set of Relational Algebra Operations, The DIVISION Operation

#### **Additional Relational Operations:**

Aggregate Functions

### UNIT V

12 Hrs

#### **SQL (STRUCTURED QUERY LANGUAGE)**

Data Definition, Constraints and Schema changes in SQL, The CREATE TABLE Command and SQL Data Types and Constraints, The DROP SCHEMA and DROP TABLE Command, The ALTER TABLE Command, The SELECT-FROM-WHERE Structure of SQL Queries WHERE-Clause , Aggregate Functions and Grouping, Insert, Delete, and Update Statements in SQL, The INSERT Command, The DELETE Command

#### **Prescribed Books:**

1. "Fundamentals of Database Systems" by R.Elmasri and S.Navathe
2. "Introduction to Database Management System" AtulKahate PEARSON EDUCATION  
ISBN: 9789332505537
3. "Database System Concepts" by Abraham Silberschatz, Henry Korth, and S. Sudarshan, McGrawhill, 2010.

#### **Reference Books:**

1. "Database Management Systems" by Raghu Ramakrishnan, NcGrawhill,2002
2. "Principles of Database Systems" by J.D.Ullman
3. "An Introduction to Database Systems" by Bipin C Desai
4. "Fundamentals of Relational Database Management Systems" by S.Sumathi, S. Esakkirajan, Springer Publications



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Core papers

**Computer Application**

**Object Oriented Programming using Java**

Semester	CourseCode	CourseTitle	Hours	Credits
IV	C4	Object Oriented Programming using Java	60	3

**CourseObjective:**

To introduce the fundamental concepts of Object-Oriented programming and to design & implement object oriented programming concepts in Java.

**CourseLearningOutcomes:**

On completing the subject, students will be able to:

1. Understand the concept and underlying principles of Object-Oriented Programming, Understand how object-oriented concepts are incorporated into the Java programming language.
2. Implement Object Oriented Programming Concepts (class, constructor, overloading, inheritance, overriding) in java.
3. Create and use interfaces in a Java.
4. Implement Multithreading, exception handling in Java.
5. Create and use packages and applets.

**UNIT-I**

**13 hours**

**FUNDAMENTALS OF OBJECT – ORIENTED PROGRAMMING :**Introduction, Object Oriented paradigm, Basic Concepts of OOP, Benefits of OOP, Applications of OOP, Java features.

**OVERVIEW OF JAVA LANGUAGE:**Simple Java program structure, Java tokens, Implementing a Java Program, Java Virtual Machine, Command line arguments.

**CONSTANTS, VARIABLES & DATATYPES:**Constants, Variables, Data Types, Declaration of Variables, Giving Value to Variables, Getting Value of Variables, Operators in Java.

**UNIT-II**

**12 hours**

**DECISION MAKING & BRANCHING :**

Decision making with if statement- Simple if statement, If - Else statement, Nesting of if- else statements, The else if ladder, The switch statement, The conditional operator.

**LOOPING:**The While statement, The do-while statement, The for statement.

**CLASSES, OBJECTS & METHODS:**Defining a class, Adding variables, Adding methods, Creating objects, Accessing class members, Constructors, Method overloading, Static members.

**12 hours**

**INHERITANCE:**Extending a class, Overriding methods, Final variables and methods, Final classes, Abstract methods and classes.

**ARRAYS, STRINGS :**Arrays, One-dimensional arrays, Two – dimensional arrays, Strings.

**INTERFACES:** Introduction to multiple inheritance, Defining interfaces, Extending interfaces, Implementing interfaces.

#### **UNIT-IV**

**10 hours**

**MULTITHREADED PROGRAMMING:**Creating Threads, Extending the Threads, Stopping and Blocking a Thread, Lifecycle of a Thread, Using Thread Methods.

**MANAGING ERRORS AND EXCEPTIONS:**Types of errors, Compile-time errors, Run-time errors, Exceptions, Exception handling, Multiple Catch Statements, Using finally statement.

#### **UNIT – V**

**13 hours**

**APPLET PROGRAMMING:**Local and remote applets, Applets and Applications, Building Applet code, Applet Life cycle:-Initialization state, Running state, Idle or stopped state, Dead state, Display state.

**PACKAGES:**Java API Packages, Creating Packages, Accessing a Package, Using a Package.

#### **Text Books:**

1. E.Balaguruswamy, Programming with JAVA, A primer, 3e, TATA McGraw-Hill Company.

#### **Reference Books:**

1. Core Java: An Integrated Approach, Authored by Dr. R. NageswaraRao&Kogent Learning SolutionsInc.
2. John R. Hubbard, Programming with Java, Second Edition, Schaum's outline Series, TATA McGraw-Hill Company.
3. Deitel&Deitel. Java TM: How to Program, PHI (2007)
4. Object Oriented Programming Through Java by P. Radha Krishna, Universities Press (2008)

#### **RECOMMENDED CO-CURRICULAR ACTIVITIES:**

(Co-curricular activities shall not promote copying from textbook or from others work and shall encourage self/independent and group learning)



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Core papers

Computer Application

WEB DESIGNING

Semester	CourseCode	CourseTitle	Hours	Credits
IV	C5	WEB DESIGNING	60	3

**Course Objectives:**

To introduce the fundamental concepts of HTML, PHP, MySQL and able to design the web pages using scripting languages.

**Course Outcomes:**

- To learn about Basic tags in Html and CSS
- To learn about the Building Blocks of php, functions.
- To learn about Different types of Arrays.
- To learn about working with Forms, Sessions, Cookies.
- To learn about Interacting with MySQL using PHP.

**Unit-I: Introduction to HTML: 10 hours**

Introduction to HTML, Basic html, Document bodytext, Hyperlinks, Adding more formatting Lists, Tables, Images, Multimedia Objects, Frames, Forms.

**Unit-II: Building blocks of PHP: 10 hours**

Variables, Data Types, Operators and Expressions, Constants. Flow Control Functions in PHP: Switching Flow, Loops, Code Blocks and Browser Output. Working with Functions: Defining Functions, Calling functions, returning the values from User Defined Functions, Variable Scope, Saving State between Function calls with the Static statement, more about arguments.

**Unit-III: Working with Arrays: 13 hours**

Arrays, Creating Arrays, some Array-Related Functions, Working with Objects: Creating Objects, Object Instance. Working with Strings, Dates and Time: Formatting Strings with PHP, Investigating Strings with PHP, Manipulating Strings with PHP, Using Date and Time Functions in PHP

**Unit-IV: Working with Forms: 14 hours**

Creating Forms, Accessing Form - Input with User defined Arrays, Combining HTML and PHP code on a single Page, Redirecting the user, Sending Mail on Form Submission, Working with File Uploads. Working with Cookies and User Sessions: Introducing Cookies, Setting a Cookie with PHP, Session Function Overview, Starting a Session, Working with session variables, passing session IDs in the Query String, Destroying Sessions and Unsettling Variables, Using Sessions in an Environment with Registered Users.

**Unit-V: Interacting with MySQL using PHP:**

13

hours

MySQL Versus MySQL Function, Connecting to MySQL with PHP, Working with MySQL Data. Creating Database Tables, Creating Menu, Creating Record Addition Mechanism, Viewing Records, Creating the Record Deletion Mechanism, Adding Sub-entities to a Record.

**Prescribed Books:**

1. Chris Bates, Web Programming Building Internet Application, Second Edition, Wiley (2007)
2. HeadFirst Servlets and JSP 2<sup>nd</sup> Edition, Bryan Basham, Kathy Sierra
3. Uttam Kumar Roy, Web Technologies from Oxford University Press
3. Julie C. Meloni, PHP MySQL and Apache, SAMSTeachyourself, Pearson Education (2007).
4. Xue Bai Michael Ekedahl, The web warrior guide to Web Programming, Thomson (2006).

**RECOMMENDED CO-CURRICULAR ACTIVITIES:**

(Co-curricular activities shall not promote copying from textbook or from others work and shall encourage self/independent and group learning)

**A. Measurable**

1. Assignments (in writing and doing forms on the aspects of syllabus content and outside the syllabus content. Shall be individual and challenging)
2. Student seminars (on topics of the syllabus and related aspects (individual activity))
3. Quiz (on topics where the content can be compiled by smaller aspects and data (Individuals or groups as teams))



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Core papers

Computer Application

**B|A III YEAR V SEMESTER**

**B PAPER – V: DATABASE MANAGEMENT SYSTEMS**

Database system applications, Database system vs File system, **Views of data:** Data abstraction, Instances and schemas. **Database languages:** DDL, DML. Database users and administrators. Transaction management, **Database system structure:** Storage manager, Query processor.

**UNIT – II:**

**Database design and ER diagrams:** Beyond ER design entities, attributes and entity sets, Relationships and relationship sets, additional features of ER model, Concept design with ER model, Conceptual design for large enterprises.

**Relational model:** Introduction to the relational model, integrity constraint over relations, enforcing integrity constraints, querying relational data, logical database design.

**UNIT – III**

Schema Refinement: decomposition, problems related to decomposition, FDS: Normalization, Basic normal forms and advanced normal forms.

**UNIT – IV**

**Form of basic SQL query:** Examples of basic SQL queries, introduction to nested queries, correlated nested queries set, comparison operators, aggregative operators, null values, comparison using null values, joins. **Views:** Destroying or altering tables and views.

**UNIT – V**

**PL/SQL:** Introduction to PL/SQL, structure of PL/SQL program, variables, constants, operators, conditional statements, constraints, procedures, functions.



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**PAPER – VI-A: ELECTRONIC COMMERCE (ELECTIVE)**

**Unit I**

**Electronic Commerce Environment and Opportunities:** Background, The Electronic Commerce Environment, Electronic Market place Technologies. **Mode of Electronic Commerce:** Electronic Data Interchange, Migration to Open EDI, Electronic Commerce with WWW/Internet, Commerce Net Advocacy, Web Commerce going forward.

**Unit II**

**Approaches to Safe Electronic Commerce:** Secure Transport Protocols, Secure Transactions, Secure Electronic Payment Protocol (SEPP), Secure Electronic transaction (SET), Certificates for authentication Security on Web Servers and Enterprise Networks

**Unit III**

**Electronic Cash and Electronic Payment Schemes:** Internet Monetary Payment & Security Requirements, Payment and Purchase Order Process, On-line Electronic cash. **Internet / Intranet Security Issues and Solution:** The need for Computer Security, Specific Intruder Approaches, Security Strategies, Security Tools, Encryption, Enterprise Networking and Access to the Internet, Antivirus Programs, Security Teams.

**Unit IV**

**Master Card / Visa secure Electronic Transaction:** Introduction, Business Requirements, Concepts, Payments Processing. **E-Mail and Secure E-Mail technologies for Electronic Commerce:** Introduction The Means of Distribution, A Model for Message Handling, E-Mail Handling, Multipurpose Internet Mail Extensions, Message Object Security Services, Comparisons of Security Methods, MIME and Related Facilities for EDI over the Internet.

**Unit V**

**Internet Resources for Commerce Introduction:** Introduction, Technologies for Web Servers, Internet Tools Relevant to Commerce, Internet Applications for Commerce, Internet Charges, Internet Access and Architecture.

**TEXT BOOK**

Web Commerce Technology Handbook, by Daniel Minoli, Emma Minoli, McGraw-Hill



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**PAPER VI-B : CLOUD COMPUTING (ELECTIVE)**

**UNIT I**

**Introduction & Concepts:** Introduction to cloud computing: introduction, characteristics of cloud computing, cloud models, cloud services examples, cloud-based services & applications.

**Cloud Concepts & Technologies:** Virtualization, Load Balancing, Scalability & Elasticity, Deployment, Replication, Monitoring, Software Defined Networking, Networking Function Virtualization, Map Reduce, Identity And Access Management, Service Level Agreements, Billing.

**UNIT II**

**Cloud Services & Platforms:** Compute Services, Storage Services, Database Services, Applications Services, Content Delivery Services, Analytics Services, Deployment & Management Services, Identity & Access Management Services, Open Source Private Cloud Software.

**UNIT III**

**Cloud Application Design:** Introduction, Design Considerations for Cloud Applications, Reference Architecture for Cloud Applications, Cloud Application Design Methodologies, Data Storage Approaches.

**UNIT IV**

**Python Basics:** Introduction, Installing Python, Python Data Types & Data Structures, Control flow, Functions, Modules, Packages, File Handling, Date/Time Operations, Classes 163.

**UNIT V**

**Python for Cloud:** Python for Amazon Web Services, Python for Google Cloud Platform, Python for Windows Azure.

**TEXT BOOK:**

1. Cloud Computing A Hands On Approach By Arshdeep Bahga And Vijay Madisetti  
From University Press.



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**BI YEAR VI SEMESTER  
PAPER – VII  
WEBTECHNOLOGIES**

**UNIT I**

HTML: Basic HTML, Document body, Text, Hyper links, adding more formatting, Lists, Tables using images. More HTML: Multimedia objects, Frames, Forms towards interactive, HTML document heading detail.

**UNIT II**

Cascading Style Sheets: Introduction, using Styles, simple examples, your own styles, properties and values in styles, style sheet, formatting blocks of information, layers.

**UNIT III**

Introduction to JavaScript: What is DHTML, JavaScript, basics, variables, string manipulations, mathematical functions, statements, operators, arrays, functions. Objects in JavaScript: Data and objects in JavaScript, regular expressions, exception handling

**UNIT IV**

DHTML with JavaScript: Data validation, opening a new window, messages and confirmations, the status bar, different frames, rollover buttons, moving images,

**UNIT V**

XML: defining data for web applications, basic XML, document type definition, presenting XML, document object model. Web Services

**TEXT BOOKS**

1. Web Technologies by A A Puntambekar from Technical Publications, Pune

**REFERENCE BOOKS**

1. INTERNET AND WEB TECHNOLOGIES - Raikamal. TMH.
2. TCP/IP PROTOCOL SUITE - Behrouz A. Forouzan. 3rd edition, TMH.



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2021-22

Core papers

Computer Application

CLUSTER ELECTIVE

PAPER- VIII-A1 - DESKTOP PUBLISHING TECHNOLOGIES

UNIT I

**Basics of Desktop Publishing:** what is DTP? – Letterpress Printing – Wooden Types and Metal Types, Hot Metal Types, Printing Photographs - Offset Printing- Gravure – Hardware requirements – Software Requirements – DTP Operator's Arsenal – Test Editors, word Processors, Vector Illustration Applications or drawing Applications, Bitmap Image Editing Application, Page Layout applications - Scanning –Printing –Monitor – briefly Input and Output Devices – Vector graphics and Raster graphics

UNIT II

**Fonts** – Font Styles, Serif and Sans Serif, Dimensions of font , Fixed pitch fonts and proportional spaced fonts, scaling tracking, kerning, leading and ligatures, fonts in your computer, vector fonts and bitmapped fonts - character level and Paragraph level formatting – Drop Caps – Hyphenations – Alignments –Indentation – Single side and Double Side Documents –Headers and Footers – Selecting the text and graphics – Graphic file formats – screen colors (RGB) and Printer colors (CMYK) –Spot colors and Process Colors – Color Separations – Color Half-tone images - Generic Process of Desktop Publishing.

UNIT – III

**PhotoShop7:** Introduction – Parts of Page shop window - Open, Save, Close and Create a Image – Using Toolbox – Tool Options bar – Using layers – Layers palette, adding new layer, Hiding layer, Renaming layer, Remove layer, Merge layer, copy and paste with image  
– Fascinating colors – Color models, Color Picker, Color palette, Swatches Palette, ICC – Inserting text in images – printing images – filters to improve images.

UNIT – IV

**Page Maker7:** Introduction of Page Maker- starting of Page Maker – Creating a new publication in Page Maker – Dialog Boxes Document and setup and Save Publication – Close the publication – Text Blocks- drawing a text block by dragging the Mouse cursor, Empty Text block by a Mouse Click

UNIT V

Fitting text Blocks on a page, Inserting pages while placing Text – Handling Pages – Inserting, Deleting and go to the desired pages – using the Toolbox – Using the Tool Bars – Importing text & Pictures – wrapping text around the pictures – Character level formatting – Opening Multiple Publication windows – Using story editor-Using Styles – Pre-defined styles, new style – Using the Document Master Pages – Sample Publication.

TEXT BOOK

1. Rapidex DTP Course by Shirish Chavan, Unicorn Books Pvt. Ltd., Edition 2005



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Core papers

Computer Application

**CLUSTER ELECTIVE**  
**PAPER –VIII -A2 - MULTIMEDIA SYSTEMS**

**UNIT II**

**What is Multimedia?:** Definition – Where to use Multimedia – Delivering Multimedia  
**Text-** The Power of Meaning – About Fonts and Faces – Using Text in Multimedia-  
Computers and Text – Font Editing and Design Tools – Hyper Media and Hyper Text

**UNIT II**

**Images:** Before you Start to Create – Making Still Images – Color – Image File Formats  
**Sound** – The Power of Sound – Digital Audio – MIDI Audio – MIDI vs Digital Audio –  
Multimedia System Sounds – Audio File Formats.

**UNIT III**

**Video:** Using Video - How Video Works and is Displayed - Digital Video Containers -  
Obtaining Video Clips - Shooting and Editing Video  
**Making Multimedia:** The Stages of a Multimedia Project - What You Need: The  
Intangibles- What You Need: Hardware - What You Need: Software - What You Need:  
Authoring Systems

**UNIT IV**

**Planning and Costing:** The Process of Making Multimedia – Scheduling -Estimating - RFPs  
and Bid Proposals  
**Designing and Producing:** Designing - Producing

**UNIT V**

**The Internet and Multimedia:** Internet History - Internetworking – Multimedia on the Web  
**Designing for the World Wide Web:** Developing for the Web - Text for the Web -Images  
for the Web - Sound for the Web - Animation for the Web - Video for the Web

**TEXT BOOK**

1. Multimedia: Making It Work, Tay Vaughan, 8<sup>th</sup> Edition, Tara Mc-Graw Hill.

**REFERENCE BOOKS**

1. Multimedia Systems, John F.Koegel Buford, Pearson edition, 2003
2. Ranjan Parekh, Principles of Multimedia, TMH, 2006.Engineering Evaluation Software
3. Multimedia: Computing, Communication and applications, Ralf Steinmetz and Klara



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Core papers

Computer Application

**CLUSTER ELECTIVE  
PAPER –VIII –A3 - PHP and My SQL**

**Unit-I: Building blocks of PHP:** Variables, Data Types, Operators and Expressions, Constants.

**Flow Control Functions in PHP:** Switching Flow, Loops, Code Blocks and Browser Output.

**Working with Functions:** Defining Functions, Calling functions, returning the values from User- Defined Functions, Variable Scope, Saving State between Function calls with the Static statement, more about arguments.

**Unit-II: Working with Arrays:** Arrays, Creating Arrays, Some Array-Related Functions.

**Working with Objects:** Creating Objects, Object Instance. **Working with Strings, Dates**

**and Time:** Formatting Strings with PHP, Investigating Strings with PHP, Manipulating Strings with PHP, Using Date and Time Functions in PHP.

**Unit-III: Working with Forms:** Creating Forms, Accessing Form - Input with User defined Arrays, Combining HTML and PHP code on a single Page, Using Hidden Fields to save state, Redirecting the user, Sending Mail on Form Submission, Working with File Uploads.

**Unit-IV: Working with Files and Directories:** Including Files with include(), Validating Files, Creating and Deleting Files, Opening a File for Writing, Reading or Appending, Reading from Files, Writing or Appending to a File, Working with Directories, Open Pipes to and from Process Using popen (), Running Commands with exec(), Running Commands with system () or passthru ().

**Working with Images:** Understanding the Image-Creation Process, Necessary Modifications to PHP, Drawing a New Image, Getting Fancy with Pie Charts, Modifying Existing Images, Image Creation from User Input.

**Unit-V: Interacting with MySQL using PHP:** MySQL Versus MySQLi Functions, Connecting to MySQL with PHP, Working with MySQL Data.

**References:**

1. Julie C. Meloni. PHP MySQL and Apache, SAMS Teach Yourself, Pearson Education (2007).
2. Xue Bai Michael Ekedahl. The Web Warrior Guide to Web Programming, Thomson (2006)



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2021-22

Core papers

Special English

Semester-1

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Paper I – Language and Literature I

Unit 1

1. Brief Survey of the English Language, word Formation, Influences (Latin, French & Scandinavian)
2. Understanding Comprehension
  - A. Of a Literary Prose Passage
  - B. Of a Poem

Unit 2

1. Forms of Poetry
2. Sonnet: On His having arrived at the age of twenty three – John Milton
3. Ode: Ode to the west wind – P. B. Shelley
4. Elegy: Elegy written in a country churchyard – Thomas Gray
5. Ballad: The Solitary Reaper – William Wordsworth

Unit 3

1. Knowledge and Wisdom – Bertrand Russell
2. Florence Nightingale – Lytton Strachey

Unit 4 – Elements / Fiction

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**2021-22**

**Core papers**

**Special English**

**Semester-II**

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**Paper II - Language and Literature II**

**Unit 1**

1. Methods of word Formation
2. Semantics

**Unit 2**

1. Allegory
2. Masque
3. Metaphor
4. Hyperbole
5. Personification
6. Irony
7. Farce
8. Simile

**Unit 3**

**Drama: Macbeth - William Shakespeare**

**Unit 4**

1. Paradise Lost Book II - John Milton
2. The Canonization - John Donne



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2021-22

**Core papers  
Special English**

**Paper III - An Introduction to English Language and Literature III**

**I Unit**

1. History of English Literature
2. Restoration and Augustan Periods (17<sup>th</sup> and 18<sup>th</sup> Centuries)

**II Unit**

**Literary Forms and Terms**

1. Satire
2. Mock-epic
3. Heroic couplet
4. Epistle
5. Heroic tragedy
6. Comedy of manners
7. Genteel Comedy
8. Sentimental Comedy
9. Periodical Essay

**III Unit**

**Poetry**

**Alexander Pope: Extracts from the Rape of the Lock, Canto-1**

**IV Unit**

**Prose**

**John Ruskin: Sesame and Lillie**



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**Core papers  
Special English  
Semester IV**

**Paper IV - An Introduction to English Language and Literature IV**

**I Unit**

1. History of English Literature
2. Restoration and Victorian Periods

**II Unit**

**Literary Forms and Terms**

1. Biography
2. Autobiography
3. Melodrama
4. Historical Novel
5. Sentimental Novel
6. Gothic novel, Regional novel
7. Flat character, Round character
8. Protagonist
9. Antagonist

**III Unit**

**Poetry 1**

John Keats: Ode to a Nightingale

**IV Unit**

**Prose**

Francis Bacon: 1. Of Youth

2. Of Age

3. Of Love

**V Unit**

**Poetry 2**

Robert Browning: The Grammarian's Funeral



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**Core papers**  
**Special English**  
**Semester IV**

**Paper V - An Outline of 20<sup>th</sup> Century Literature**

**Unit 1**

1. History of English Literature
2. Literature in English in 20<sup>th</sup> Century

**Unit 2**

**Literary Forms and Terms**

1. Free Verse
2. Problem Play
3. Well-made play
4. Absurd Drama
5. Kitchen-sink drama
6. Stream of Consciousness Novel
7. Bildungsroman
8. Point of view
9. Setting

**Unit 3 - Poetry**

Philip Larkin: Church Going

**Unit 4 - Prose**

George Orwell: Politics and English Language

**Unit 5 - Drama**

Shakespeare: King Lear



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**Core papers  
Special English  
Semester V**

**Paper V - An Outline of 20<sup>th</sup> Century Literature**

**Unit 1**

1. History of English Literature
2. Literature in English in 20<sup>th</sup> Century

**Unit 2**

**Literary Forms and Terms**

1. Free Verse
2. Problem Play
3. Well-made play
4. Absurd Drama
5. Kitchen-sink drama
6. Stream of Consciousness Novel
7. Bildungsroman
8. Point of view
9. Setting

**Unit 3 - Poetry**

Philip Larkin: Church Going

**Unit 4 - Prose**

George Orwell: Politics and English Language

**Unit 5 - Drama**

Shakespeare: King Lear



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Core papers

Special English

Semester-V

**Paper VI – Glimpses of World Literature**

**Unit 1 - Poetry**

Wole Soyinka: Telephone Conversation

**Unit 2 - Drama**

Girish Karnad: Tale-Danda

**Unit 3 - Novel**

1. Dostoyevsky: Crime and Punishment

2. Ngugi Wa Thiong'o: A Grain of Wheat

**Unit 4 - Short Story**

Nadine Gordimer: My Son's Story



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Core papers

Special English

Semester-VI

Paper VII - A Study of English Language

Unit 1:

Indo-European Family of Languages, Grimm's Law, Verner's Law and the First Sound Shift

Unit 2:

Old English, Middle English, Modern English

Unit 3:

Various Influences on the English Language

Unit 4:

Change of meaning and Word-Formation

Unit 5:

Role of Grammar in Language Development



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Core papers

Special English

Semester-VI

Paper VIII (A) - A Study of Literary Criticism

Unit 1

Aristotle: Poetics

Unit 2

Sir Philip Sidney: Apology for Poetry

Unit 3

John Dryden: An Essay of Dramatic Poesy

Unit 4

William Wordsworth: Preface to Lyrical Ballads

Unit 5

Thomas Stearns Eliot: Tradition and Individual Talent



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**Core papers  
Special English  
Semester-VI**

Paper VIII (B) – American Literature

Unit 1 - Poetry

1. Walt Whitman: O Captain, My Captain
2. Edwin Arlington Robinson: Richard Cory

Unit - Drama

Arthur Miller: Death of a Salesman

Unit - Novel

Ian McEwan: Atonement

Unit - Essay

Ralph Waldo Emerson: Self Reliance



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Core papers

Special English

Semester-VI

Paper VIII (C) - Indian Literature

Unit 1 - Poetry

1. Nissim Ezekiel: The Patriot
2. Toru Dutt: Our Casuarina tree

Unit - Novel

1. Mulk Raj Anand: The Untouchable
2. Jhumpa Lahiri: The Namesake

Unit 3 - Drama

Mahesh Dattani: Final Solutions



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2021-22

Core papers

Computer Application

Semester-wise Syllabus under CBCS(w.e.f. 2020-21 Admitted Batch)

**I Year B Com (CA), Semester- I**

**Discipline: COMPUTER APPLICATIONS**

**Course 1C: Information Technology**

Semester	CourseCode	CourseTitle	Hours	Credits
I	1C	Information Technology	60	3

**Course 1C :Information Technology**

(Five units with each unit having 12 hours of class work)

Unit	Details
<b>I</b>	<b>Introduction:</b>  Computer Definition - Characteristics and Limitations of Computer— Generations of Computer, Classification of Computers, Applications of Computer, Basic Components of PC, Computer Architecture - Primary and Secondary Memories- Input and Output Devices- Operating System- Function of Operating System- Types of Operating System- Languages and its Types
<b>II</b>	<b>MS word:</b> Word Processing – Features-Advantages and Applications- Parts of Word Window- Toolbar-Creating, Saving, Closing, Opening and Editing of a Document-Moving and Copying a Text-Formatting of Text and Paragraph- Bullets and Numbering-Find and Replace - Insertion of objects-Headers and Footers- Page Formatting- Auto Correct- Spelling and Grammar- Mail Merge- Macros
<b>III</b>	<b>MS Excel:</b> Features – Spread Sheet-Workbook – Cell-Parts of a window-Saving, Closing, Opening of a Work Book – Editing – Advantages – Formulas- Types of Function- Templates – Macros – Sorting- Charts – Filtering.
<b>IV</b>	<b>MS Power point:</b> Introduction – Starting – Parts-Creating of Tables- Create Presentation – Templates- Auto Content Wizard-Slide Show-Editing of Presentation-Inserting Objects and charts
<b>V</b>	<b>MS Access:</b>  Orientation to Microsoft Access - Create a Simple Access Database - Working with Table Data - Modify Table Data - Sort and Filter Records - Querying a Database -  Create Basic Queries - Sort and Filter Data in a Query - Perform Calculations in a Query - Create Basic Access Forms - Work with Data on Access Forms - Create a Report - Add Controls to a Report - Format Reports



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**2021-22**

**Core papers**

**Computer Application**

**Course 2C: E- Commerce & Web Designing**

Semester	CourseCode	CourseTitle	Hours	Credits
II	2C	E-Commerce & Web Designing	60	3

Unit	Details
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**I Unit I: Introduction:**

Meaning, Nature, Concepts, Advantages, Disadvantages and reasons for Transacting Online, Types of E-Commerce, e-commerce Business Models (Introduction , Key Elements of a Business Model And Categorizing Major E-Commerce Business Models), Forces Behind e-commerce.

**Technology used in E-commerce:** The dynamics of World Wide Web and Internet (Meaning, EvolutionAnd Features); Designing, Building and Launching e-commerce website (A systematic approach involving decisions regarding selection of hardware, software, outsourcing Vs. in-house development of a website)

**II Unit-II: E-payment System:**

Models and methods of e-payments (Debit Card, Credit Card, Smart Cards, e-money), Digital Signatures (Procedure, Working And Legal Position), Payment Gateways, Online Banking (Meaning, Concepts, Importance, Electronic Fund Transfer, Automated Clearing House, Automated Ledger Posting), Risks Involved in e-payments.

**III Unit-III: On-line Business Transactions:**

Meaning, Purpose, Advantages and Disadvantages of Transacting Online, E-Commerce Applications in Various Industries Like {Banking, Insurance, Payment of Utility Bills, Online Marketing, E-Tailing (Popularity, Benefits, Problems and Features), Online Services (Financial, Travel and Career), Auctions, Online Portal, Online Learning, Publishing and Entertainment} Online Shopping (Amazon, Snap Deal, Alibaba, Flipkart, etc.)

**IV Unit-IV: Website designing**

Designing a home page, HTML document, Anchor tag Hyperlinks, Head and body section, Header Section, Title, Prologue, Links, Colorful Pages, Comment, Body Section, Heading Horizontal Ruler, Paragraph, Tabs, Images And Pictures, Lists and Their Types, Nested Lists, Table Handling.

**V Unit V: Advanced Website Designing:**

Frames: Frameset Definition, Frame Definition, Nested Framesets, Forms and Form Elements. DHTML and Style Sheets: Defining Styles, elements of Styles, linking a style sheet to a HTML Document, Inline Styles, External Style Sheets, Internal Style Sheets & Multiple Style Sheets.



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Core papers

Computer Application

**Course 3C: Programming with C & C++**

(Five units with each unit having 12 hours of class work)

Semester	CourseCode	CourseTitle	Hours	Credits
III	3C	Programming with C & C++	60	3

**Course 3C: Programming with C & C++**

Unit	Details
<b>I</b>	<b>Introduction and Control Structures:</b> History of 'C' - Structure of C program – C character set, Tokens, Constants, Variables, Keywords, Identifiers – C data types - C operators - Standard I/O in C - Applying if and Switch Statements
<b>II</b>	<b>Loops And Arrays:</b> Use of While, Do While and For Loops - Use of Break and Continue Statements - Array Notation and Representation - Manipulating Array Elements - Using Multi Dimensional Arrays
<b>III</b>	<b>Strings and Functions:</b> Declaration and Initialization of String Variables - String Handling Functions -Defining Functions - Function Call - Call By Value, Call By Reference – Recursion
<b>IV</b>	<b>Classes and Objects</b> Introduction to OOP and its basic features - C++ program structure - Classes and objects - Friend Functions-Constructor – Types of constructors – Destructors.
<b>V</b>	<b>Inheritance:</b> Inheritance - Types of Inheritance -Types of derivation- Public – Private - Protected Hierarchical Inheritance - Multilevel Inheritance – Multiple Inheritance - Hybrid Inheritance



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Core papers

Computer Application



**Course 4F: Database Management System**

(Five units with each unit having 12 hours of class work)

Semester	CourseCode	CourseTitle	Hours	Credits
IV	4F	Database Management System	60	3

**Course 4F: Database Management System**

Unit	Details
<b>I</b>	<b>Overview of Database Management System</b> Introduction, Data and Information, Database, Database Management System, Objectives of DBMS, Evolution of Database Management System, Classification of Database Management System.
<b>II</b>	<b>File-Based System</b> File Based System. Drawbacks of File-Based System, DBMS Approach, Advantage of DBMS, Data Models, Components of Database System, Database Architecture, DBMS Vendors and their products.
<b>III</b>	<b>Entity-Relationship Model:</b> Introduction, The Building Blocks of an Entity-Relationship, Classification of Entity Set, Attribute Classification, Relationship Degree, Relationship Classification, Generalization and Specialization, Aggregation and Composition, CODD's Rules, Relational Data Model, Concept of Relational Integrity.
<b>IV</b>	<b>Structured Query Language</b> Introduction, History of SQL Standards, Commands in SQL, Data types in SQL, Data Definition Language (DDL), Selection Operation Projection Operation, Aggregate Functions, Data Manipulation Language, Table Modification, Table Truncation, Imposition of Constraints, Set Operations.
<b>V</b>	<b>PL/SQL:</b> Introduction, Structure of PL/SQL, PL/SQL Language Elements, Data Types, Control Structure, Steps to Create a PL/SQL Program, Iterative Control Cursors, Steps to Create a Cursor, Procedure, Functions, Packages, Exceptions Handling, Database Triggers, Types of triggers.



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Core papers

Computer Application



**Web Technology**

**Unit-I**

**HTML:** Basic HTML, Document body, Text, Hyper links, adding more formatting, Lists, Tables using images. **More HTML:** Multimedia objects, Frames, Forms towards interactive, HTML document heading detail.

**Unit-II**

**Cascading Style Sheets:** Introduction, using Styles, simple examples, your own styles, properties and values in styles, style sheet, formatting blocks of information, layers.

**Unit-III**

**Introduction to JavaScript:** What is DHTML, JavaScript, basics, variables, string manipulations, mathematical functions, statements, operators, arrays, functions. **Objects in JavaScript:** Data and objects in JavaScript, regular expressions, exception handling.

**Unit-IV**

**DHTML with JavaScript:** Data validation, opening a new window, messages and confirmations, the status bar, different frames, rollover buttons, moving images.

**Unit-V**

**XML:** defining data for web applications, basic XML, document type definition, presenting XML, document object model. Web Services.

**Text Books:**

1. Web Technology, Chris Bates, Wiley publications

**Reference books:**

1. Uttam Kumar Roy, Web Technologies, Oxford University Press.
2. Black Book HTML 5.0
3. Complete reference HTML 5.0
4. Web Technology, PHI Publications.



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Core papers

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**E-COMMERCE**

**Unit-I**

**Electronic Commerce Environment and Opportunities:** Background, The Electronic Commerce Environment, Electronic Market place Technologies. **Mode of Electronic Commerce:** Electronic Data Interchange, Migration to Open EDI, Electronic Commerce with WWW/Internet, Commerce Net Advocacy, Web Commerce going forward.

**Unit-II**

**Approaches to Safe Electronic Commerce:** Secure Transport Protocols, Secure Transactions, Secure Electronic Payment Protocol (SEPP), Secure Electronic transaction (SET), Certificates for authentication Security on Web Servers and Enterprise Networks.

**Unit-III**

**Electronic Cash and Electronic Payment Schemes:** Internet Monetary Payment & Security Requirements, Payment and Purchase Order Process, On-line Electronic cash. **Internet / Intranet Security Issues and Solution:** The need for Computer Security, Specific Intruder Approaches, Security Strategies, Security Tools, Encryption, Enterprise Networking and Access to the Internet, Antivirus Programs, Security Teams.

**Unit-IV**

**Master Card / Visa secure Electronic Transaction:** Introduction, Business Requirements, Concepts, Payments Processing. **E-Mail and Secure E-Mail technologies for Electronic Commerce:** Introduction The Means of Distribution, A Model for Message Handling, E-Mail Handling, Multipurpose Internet Mail Extensions, Message Object Security Services, Comparisons of Security Methods, MIME and Related Facilities for EDI over the Internet.

**Unit-V**

**Internet Resources for Commerce Introduction:** Introduction, Technologies for Web Servers, Internet Tools Relevant to Commerce, Internet Applications for Commerce, Internet Charges, Internet Access and Architecture.



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Core papers

Computer Application

PHP and My SQL

**Unit-I: Building blocks of PHP:** Variables, Data Types, Operators and Expressions, Constants.

**Flow Control Functions in PHP:** Switching Flow, Loops, Code Blocks and Browser Output. **Working with Functions:** Defining Functions, Calling functions, returning the values from User- Defined Functions, Variable Scope, Saving State between Function calls with the Static statement, more about arguments.

**Unit-II: Working with Arrays:** Arrays, Creating Arrays, Some Array-Related Functions. **Working with Objects:** Creating Objects, Object Instance. **Working with Strings, Dates and Time:** Formatting Strings with PHP, Investigating Strings with PHP, Manipulating Strings with PHP, Using Date and Time Functions in PHP.

**Unit-III: Working with Forms:** Creating Forms, Accessing Form - Input with User defined Arrays, Combining HTML and PHP code on a single Page, Using Hidden Fields to save state, Redirecting the user, Sending Mail on Form Submission, Working with File Uploads.

**Unit-IV: Working with Files and Directories:** Including Files with include(), Validating Files, Creating and Deleting Files, Opening a File for Writing, Reading or Appending, Reading from Files, Writing or Appending to a File, Working with Directories, Open Pipes to and from Process Using popen (), Running Commands with exec(), Running Commands with system () or passthru () .

**Working with Images:** Understanding the Image-Creation Process, Necessary Modifications to PHP, Drawing a New Image, Getting Fancy with Pie Charts, Modifying Existing Images, Image Creation from User Input.

**Unit-V: Interacting with MySQL using PHP:** MySQL Versus MySQLi Functions, Connecting to MySQL with PHP, Working with MySQL Data.

## References:

1. Julie C. Meloni, PHP MySQL and Apache, SAMS Teach Yourself, Pearson Education (2007).
2. Xue Bai Michael Ekedahl, The Web Warrior Guide to Web Programming, Thomson (2006)





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2021-22

Core papers

Commerce



**PROGRAMME: THREE-YEAR B Com**

(General and Computer Applications)

**Course Code:**

**Domain Subject: Commerce**

Semester-wise Syllabus under CBCS

(w.e.f. 2020-21 Admitted Batch)

I Year B Com (Gen & CA)–Semester – I

**CourseIA: Fundamentals of Accounting**

**Learning Outcomes:**

At the end of the course, the student will able to

- Identify transactions and events that need to be recorded in the books of accounts.
- Equip with the knowledge of accounting process and preparation of final accounts of sole trader.
- Develop the skill of recording financial transactions and preparation of reports in accordance with GAAP.
- Analyze the difference between cash book and pass book in terms of balance and make reconciliation.
- Critically examine the balance sheets of a sole trader for different accounting periods.
- Design new accounting formulas & principles for business organisations.

**Syllabus:**

**Unit-I – Introduction**

Need for Accounting – Definition – Objectives, – Accounting Concepts and Conventions – GAAP - Accounting Cycle - Classification of Accounts and its Rules – BookKeeping and Accounting - Double Entry Book-Keeping - Journalizing - Posting to Ledgers, Balancing of Ledger Accounts (including Problems).

**Unit-II: Subsidiary Books:**

Types of Subsidiary Books - Cash Book, Three-column Cash Book- Petty Cash Book (including Problems).

**Unit-III: Trial Balance and Rectification of Errors:**

Preparation of Trial balance - Errors – Meaning – Types of Errors – Rectification of Errors – Suspense Account (including Problems)

**Unit-IV: Bank Reconciliation Statement:**

Need for Bank Reconciliation - Reasons for Difference between Cash Book and Pass Book Balances- Preparation of Bank Reconciliation Statement - Problems on both Favourable and Unfavourable Balance (including Problems).

**Unit -V: Final Accounts:**

Preparation of Final Accounts: Trading account – Profit and Loss account – Balance Sheet – Final Accounts with Adjustments (including Problems).



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I Year B Com (Gen & CA) – Semester – I

**Course 1B: Business Organization and Management**

**Learning Outcomes:**

At the end of the course, the student will be able to

- Understand different forms of business organizations.
- Comprehend the nature of Joint Stock Company and formalities to promote a Company.
- Describe the Social Responsibility of Business towards the society.
- Critically examine the various organizations of the business firms and judge the best among them.
- Design and plan to register a business firm. Prepare different documents to register a company at his own.
- Articulate new models of business organizations.

**Syllabus:**

**Unit-I –Introduction Concepts of Business, Trade, Industry and Commerce:** Business – Meaning, Definition, Features and Functions of Business - Trade Classification – Aids to Trade – Industry Classification and Commerce - Factors Influencing the Choice of Suitable form of Organisation

**Unit –II– Forms of Business Organizations:** Features, Merits and Demerits of Sole Proprietorship and Partnership Business - Features Merits and Demerits of Joint Stock Companies - Public Sector Enterprises (PSEs) - Multinational Corporations (MNCs)- Differences between Private Limited Public Limited Company

**Unit-III -Company Incorporation:** Preparation of Important Documents for Incorporation of Company - Certificate of Incorporation and Certificate of Commencement of Business - Contents of Memorandum and Articles of Association - Contents of Prospectus

**Unit-IV- Management:** Meaning Characteristics - Fayol's 14 Principles of Management - Administration Vs Management - Levels of Management

**Unit-V-Functions of Management:** Different Functions of Management - Meaning – Definition – Characteristics Merits and Demerits of Planning - Principles of Organisation – Line and staff of Organisation



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I Year B Com (Gen & CA) – Semester – I

**Course 1C: Business Environment**

**Learning Outcomes:**

At the end of the course, the student will able to;

- Understand the concept of business environment.
- Define Internal and External elements affecting business environment.
- Explain the economic trends and its effect on Government policies.
- Critically examine the recent developments in economic and business policies of the Government.
- Evaluate and judge the best business policies in Indian business environment.
- Develop the new ideas for creating good business environment.

**SYLLABUS:**

**Unit-I: Overview of Business Environment:** Business Environment – Meaning – Characteristics – Scope -Macro and Micro Dimensions of Business Environment - Environmental Analysis.

**Unit – II: Economic Environment:** Economic Environment – Nature of the Economy – Structure of Economy – Economic Policies & Planning the Economic Condition – NITI Ayog – National Development Council – Five Year Plans

**Unit–III: Economic Policies:** Economic Reforms and New Economic Policy – New Industrial Policy – Competition Law – Fiscal Policy – Objectives and Limitations – Monetary Policy and RBI

**Unit – IV:Social, Political and Legal Environment:** Concept of Social Responsibility of Business towards Stakeholders - Demonetisation, GST and their Impact - Political Stability - Legal Changes.

**Unit–V:Global Environment :**Globalization – Meaning – Role of WTO – WTO Functions - IBRD– Trade Blocks, BRICS, SAARC, ASEAN in Globalisation



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I Year B Com (Gen & CA)– Semester – II

**Course 2A: Financial Accounting**

**Learning Outcomes:**

At the end of the course the student will be able to;

- Understand the concept of consignment and learn the accounting treatment of the various aspects of consignment.
- Analyze the accounting process and preparation of accounts in consignment and joint venture.
- Distinguish Joint Venture and Partnership and to learn the methods of maintaining records under Joint Venture.
- Determine the useful life and value of the depreciable assets and maintenance of Reserves in business entities.
- Design an accounting system for different models of businesses at his own using the principles of existing accounting system.

## **Syllabus**

**Unit-I: Depreciation:** Meaning and Causes of Depreciation - Methods of Depreciation: Straight Line – Written Down Value – Annuity and Depletion Method (including Problems).

**Unit-II: Provisions and Reserves:** Meaning – Provision vs. Reserve – Preparation of Bad Debts Account – Provision for Bad and Doubtful Debts – Provision for Discount on Debtors – Provision for Discount on Creditors - Repairs and Renewals Reserve A/c (including Problems).

**Unit-III: Bills of Exchange:** Meaning of Bill – Features of Bill – Parties in the Bill – Discounting of Bill – Renewal of Bill – Entries in the Books of Drawer and Drawee (including Problems).

**Unit-IV: Consignment Accounts:** Consignment - Features - Proforma Invoice - Account Sales – Del-credere Commission - Accounting Treatment in the Books of Consigner and Consignee - Valuation of Closing Stock - Normal and Abnormal Losses (including Problems).

**Unit-V: Joint Venture Accounts:** Joint Venture - Features - Difference between Joint-Venture and Consignment – Accounting Procedure – Methods of Keeping Records – One Vendor Keeps the Accounts and Separate Set off Books Methods (including Problems).



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I Year B Com (Gen & CA)– Semester – II

**Course 2B: Business Economics**

**Learning Outcomes:**

At the end of the course, the student will able to;

- Describe the nature of economics in dealing with the issues of scarcity of resources.
- Analyze supply and demand analysis and its impact on consumer behaviour.
- Evaluate the factors, such as production and costs affecting firms behaviour.
- Recognize market failure and the role of government in dealing with those failures.
- Use economic analysis to evaluate controversial issues and policies.
- Apply economic models for managerial problems, identify their relationships, and formulate the decision making tools to be applied for business.

**Syllabus**

**Unit-I: Introduction:** Meaning and Definitions of Business Economics - Nature and Scope of Business Economics -Micro and Macro Economics and their Interface.

**Unit-II: Demand Analysis:** Meaning and Definition of Demand – Determinants to Demand –Demand Function -Law of Demand – Demand Curve – Exceptions to Law of Demand - Elasticity of Demand – Measurements of Price Elasticity of Demand

**Unit – III: Production, Cost and Revenue Analysis:** Concept of Production Function – Law of Variable Proportion -Law of Returns to Scale - Classification of Costs -Break Even Analysis - Advantages

**Unit-IV: Market Structure:** Concept of Market – Classification of Markets -Perfect Competition – Characteristics – Equilibrium Price -Monopoly – Characteristics – Equilibrium Under Monopoly.

**Unit-V: National Income:**Meaning – Definition – Measurements of National Income - Concepts of National Income -Components of National Income-Problems in Measuring National Income



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I Year B Com (Gen)– Semester – II

**Course 2C:Banking Theory and Practice**

**Learning Outcomes:**

At the end of the course, the student will able to;

- Understand the basic concepts of banks and functions of commercial banks.
- Demonstrate an awareness of law and practice in a banking context.
- Engage in critical analysis of the practice of banking law.
- Organize information as it relates to the regulation of banking products and services.
- Critically examine the current scenario of Indian Banking system.
- Formulate the procedure for better service to the customers from various banking innovations.

**Syllabus:**

**Unit-I: Introduction:**

Meaning & Definition of Bank – Functions of Commercial Banks – Credit Creation with Examples - Kinds of Banks – Central Banking Vs. Commercial Banking.

**Unit-II: Banking Systems:**

Unit Banking, Branch Banking, Investment Banking - Innovations in Banking – E banking - Online and Offshore Banking, Internet Banking - Anywhere Banking - ATMs – RTGS-NEFT – Mobile Banking

**Unit-III: Types of Banks:**

Indigenous Banking - Cooperative Banks, Regional Rural Banks, SIDBI, NABARD - EXIM bank

**Unit-IV: Banker and Customer:**

Meaning and Definition of Banker and Customer – Types of Customers – General Relationship and Special Relationship between Banker and Customer - KYC Norms.

**Unit-V: Collecting Banker and Paying Banker:**

Concepts - Duties & Responsibilities of Collecting Banker – Holder for Value – Holder in Due Course – Statutory Protection to Collecting Banker - Responsibilities of Paying Banker - Payment Gateways.



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Semester-wise Syllabus under CBCS

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II Year B Com (Gen &CA)– Semester – III

**Course 3A:Advanced Accounting**

**Learning Outcomes:**

At the end of the course, the student will able to;

- Understand the concept of Non-profit organisations and its accounting process
- Comprehend the concept of single-entry system and preparation of statement of affairs
- Familiarize with the legal formalities at the time of dissolution of the firm
- Prepare financial statements for partnership firm on dissolution of the firm.
- Employ critical thinking skills to understand the difference between the dissolution of the firm and dissolution of partnership

**Syllabus**

**Unit-I:Accounting for Non Profit Organisations:** Non Profit Entities- Meaning - Features of Non-Profit Entities –Provisions as per Sec 8 - Accounting Process- Preparation of Accounting Records - Receipts and Payments Account- Income and Expenditure Account - Preparation of Balance Sheet (including problems).

**Unit-II: Single Entry System:** Features – Differences between Single Entry and Double Entry – Disadvantages of Single Entry- Ascertainment of Profit and Preparation of Statement of Affairs (including Problems).

**Unit-III:Hire Purchase System:**Features –Difference between Hire Purchase and Instalment Purchase Systems - Accounting Treatment in the Books of Hire Purchaser and Hire Vendor - Default and Repossession (including Problems).

**Unit-IV: Partnership Accounts-I:** Meaning – Partnership Deed - Fixed and Fluctuating Capitals-Accounting Treatment of Goodwill - Admission and Retirement of a Partner(including problems).

**Unit-V: Partnership Accounts-II:**Dissolution of a Partnership Firm – Application of Garner v/s Murray Rule in India – Insolvency of one or more Partners (including problems).



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II Year B Com (Gen & CA)– Semester – III

**Course 3B: Business Statistics**

**Learning Outcomes:**

At the end of the course, the student will able to;

- Understand the importance of Statistics in real life
- Formulate complete, concise, and correct mathematical proofs.
- Frame problems using multiple mathematical and statistical tools, measuring relationships by using standard techniques.
- Build and assess data-based models.
- Learn and apply the statistical tools in day life.
- Create quantitative models to solve real world problems in appropriate contexts.

**Syllabus:**

**Unit 1: Introduction to Statistics:** Definition – Importance, Characteristics and Limitations of Statistics -Classification and Tabulation – Frequency Distribution Table -Diagrams and Graphic Presentation of Data (including problems)

**Unit 2: Measures of Central Tendency:** Types of Averages – Qualities of Good Average - Mean, Median, Mode, and Median based Averages-Geometric Mean – Harmonic Mean(including problems)

**Unit 3: Measures of Dispersion:** Meaning and Properties of Dispersion – Absolute and Relative Measures - Types of Dispersion-Range - Quartile Deviation (Semi – Inter Quartile Range) -Mean Deviation - Standard Deviation - Coefficient of Variation. (including problems)

**Unit 4: Skewness and Kurtosis:** Measures of Skewness: Absolute and Relative Measures- Co-efficient of Skewness: Karl Pearson's, Bowley's and Kelly's - Kurtosis: Meso kurtosis, Platy kurtosis and Leptokurtosis (including problems)

**Unit 5: Measures of Relation:** Meaning and use of Correlation – Types of Correlation - Karlpearson's Correlation Coefficient - Probable Error-Spearman's Rank-Correlation (including problems)



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(w.e.f. 2020-21 Admitted Batch)

II Year B Com (Gen)– Semester – III

**Course 3C:Marketing**

**Learning Outcomes:**

At the end of the course, the student will able to;

- Develop an idea about marketing and marketing environment.
- Understand the consumer behaviour and market segmentation process.
- Comprehend the product life cycle and product line decisions.
- Know the process of packaging and labeling to attract the customers.
- Formulate new marketing strategies for a specific new product.
- Develop new product line and sales promotion techniques for a given product.
- Design and develop new advertisements to given products.

**Syllabus:**

**Unit-I: Introduction:** Concepts of Marketing: Need, Wants and Demand - Marketing Concepts – Marketing Mix - 4 P's of Marketing – Marketing Environment.

**Unit-II: Consumer Behaviour and Market Segmentation:** Buying Decision Process – Stages – Buying Behaviour – Market Segmentation – Bases of Segmentation - Selecting Segments – Advantages of Segmentation.

**Unit-III: Product Management:** Product Classification – Levels of Product - Product Life Cycle - New Products, Product Mix and Product Line Decisions - Design, Branding, Packaging and Labelling.

**Unit-IV: Pricing Decision:** Factors Influencing Price – Determination of Price - Pricing Strategies: Skimming and Penetration Pricing.

**Unit-V: Promotion and Distribution:** Promotion Mix - Advertising - Sales promotion - Publicity – Public Relations - Personal Selling and Direct Marketing - Distribution Channels – Online Marketing



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(w.e.f. 2020-21 Admitted Batch)

II Year B Com (Gen & CA)– Semester – IV

**Course 4A:Corporate Accounting**

**Learning Outcomes:**

At the end of the course, the student will able to;

- Understand the Accounting treatment of Share Capital and aware of process of book building.
- Demonstrate the procedure for issue of bonus shares and buyback of shares.
- Comprehend the important provisions of Companies Act, 2013 and prepare final accounts of a company with Adjustments.
- Participate in the preparation of consolidated accounts for a corporate group.
- Understand analysis of complex issues, formulation of well-reasoned arguments and reaching better conclusions.
- Communicate accounting policy choices with reference to relevant laws and accounting standards.

**SYLLABUS:**

**Unit-I:**

**Accounting for Share Capital:** Kinds of Shares – Types of Preference Shares – Issue of Shares at Par, Discount and Premium - Forfeiture and Reissue of Shares (including problems).

**Unit-II:**

**Issue and Redemption of Debentures and Issue of Bonus Shares:** Accounting Treatment for Debentures Issued and Repayable at Par, Discount and Premium -Issue of Bonus Shares - Buyback of Shares - (including problems).

**Unit-III:**

**Valuation of Goodwill:** Need and Methods - Average Profit Method, Super Profits Method – Capitalization Method and Annuity Method (Including problems).

**Unit –IV:**

**Valuation Shares:** Need for Valuation - Methods of Valuation - Net Assets Method, Yield Basis Method, Fair Value Method (including problems).

**UNIT – V:**

**Company Final Accounts:** Provisions of the Companies Act, 2013 - Preparation of Final Accounts – Adjustments Relating to Preparation of Final Accounts – Profit and Loss Account and Balance Sheet – (including problems with simple adjustments).



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II Year B Com (Gen & CA)– Semester – IV

**Course 4B: Cost and Management Accounting**

**Learning Outcomes:**

At the end of the course, the student will able to;

- Understand various costing methods and management techniques.
- Apply Cost and Management accounting methods for both manufacturing and service industry.
- Prepare cost sheet, quotations, and tenders to organization for different works.
- Analyze cost-volume-profit techniques to determine optimal managerial decisions.
- Compare and contrast the financial statements of firms and interpret the results.
- Prepare analysis of various special decisions, using relevant management techniques.

**SYLLABUS:**

**UNIT-I: Introduction:**

Cost Accounting: Definition – Features – Objectives – Functions – Scope – Advantages and Limitations - Management Accounting: Features – Objectives – Functions – Elements of Cost - Preparation of Cost Sheet (including problems)

**UNIT-II: Material and Labour Cost:**

Techniques of Inventory Control – Valuation of Material Issues: FIFO - LIFO - Simple and Weighted Average Methods

Labour: Direct and Indirect Labour Cost – Methods of Payment of Wages- Incentive Schemes -Time Rate Method, Piece Rate Method, Halsey, Rowan Methods and Taylor Methodsonly(including problems)

**UNIT-III: Job Costing and Batch Costing:**

Definition and Features of Job Costing – Economic Batch Quantity (EBQ) – Preparation of Job Cost Sheet – Problems on Job Cost Sheet and Batch Costing(including problems)

**UNIT-IV: Financial Statement Analysis and Interpretation:**

Financial Statements - Features, Limitations. Need, Meaning, Objectives, and Process of Financial Statement Analysis- Comparative Analysis – Common Size Analysis and Trend Analysis (including problems)

**UNIT-V: Marginal Costing:**

Meaning and Features of Marginal Costing – Contribution –Profit Volume Ratio- Break Even Point – Margin of Safety – Estimation of Profit and Estimation of Sales(including problems)



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II Year B Com (Gen& CA)– Semester – IV

**Course 4C:Income Tax**

**Learning Outcomes:**

At the end of the course, the student will able to;

- Acquire the complete knowledge of the tax evasion, tax avoidance and tax planning.
- Understand the provisions and compute income tax for various sources.
- Grasp amendments made from time to time in Finance Act.
- Compute total income and define tax complicacies and structure.
- Prepare and File IT returns of individual at his own.

**Syllabus:**

**Unit-I: Introduction:** Income Tax Act-1961 - Basic Concepts: Income, Person, Assessee - Assessment Year, Previous Year, Rates of Tax, Agricultural Income, Residential Status of Individual - Incidence of Tax – Incomes Exempt from Tax (theory only).

**Unit-II: Income from Salaries:** Basis of Charge, Tax Treatment of Different Types of Salaries Allowances, Perquisites, Profits in Lieu of Salary, Deductions from Salary Income, Computation of Salary Income (including problems).

**Unit-III: Income from House Property and Profits and Gains from Business:** Annual Value, Let-out/Self Occupied/Deemed to be Let-out house -Deductions from Annual Value - Computation of Income from House Property

Definition of Business and Profession – Procedure for Computation of Income from Business – Revenue and Capital Nature of Incomes and Expenses – Allowable Expenses – Expenses Expressly Disallowed – Computation (including problems).

**Unit-IV: Income from Capital Gains - Income from Other Sources:** Meaning of Capital Asset – Types – Procedure for Computation of Long-term and Short-term Capital Gains/Losses

Meaning of Other Sources - General Incomes – Specific Incomes – Computation (including problems).

**Unit-V: Computation of Total Income of an Individual:** Deductions under Section 80 - Computation of Total Income (Simple problems).



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II Year B Com (Gen & CA)– Semester – IV

**Course 4D:Business Law**

**Learning Outcomes:**

At the end of the course, the student will able to;

- Understand the legal environment of business and laws of business.
- Highlight the security aspects in the present cyber-crime scenario.
- Apply basic legal knowledge to business transactions.
- Understand the various provisions of Company Law.
- Engage critical thinking to predict outcomes and recommend appropriate action on issues relating to business associations and legal issues.
- Integrate concept of business law with foreign trade.

**Syllabus:**

**Unit-I: Contract:**

Meaning and Definition of Contract - Essential Elements of Valid Contract -Valid, Void and Voidable Contracts - Indian Contract Act, 1872

**Unit-II: Offer, Acceptance and Consideration:**

Definition of Valid Offer, Acceptance and Consideration - Essential Elements of a Valid Offer, Acceptance and Consideration.

**Unit-III: Capacity of the Parties and Contingent Contract:**

Rules Regarding to Minors Contracts - Rules Relating to Contingent Contracts - Different Modes of Discharge of Contracts - Rules Relating to Remedies to Breach of Contract.

**Unit-IV: Sale of Goods Act 1930 and Consumer Protection Act 2019:**

Contract of Sale - Sale and Agreement to Sell - Implied Conditions and Warranties - Rights of Unpaid Vendor- Definition of Consumer - Person - Goods - Service - Consumer Dispute - Consumer Protection Councils - Consumer Dispute Redressal Mechanism

**Unit-V: Cyber Law:**

Overview and Need for Cyber Law - Contract Procedures - Digital Signature – Safety Mechanisms.



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**Course 4E: Auditing**

**Learning Outcomes:**

At the end of the course, the student will able to;

- Understanding the meaning and necessity of audit in modern era
- Comprehend the role of auditor in avoiding the corporate frauds
- Identify the steps involved in performing audit process
- Determine the appropriate audit report for a given audit situation
- Apply auditing practices to different types of business entities
- Plan an audit by considering concepts of evidence, risk and materiality

**SYLLABUS:**

**Unit-I: Introduction:** Meaning – Objectives – Importance of Auditing – Characteristics - Book Keeping vs Auditing - Accounting vs Auditing – Role of Auditor in Checking Corporate Frauds.

**Unit-II: Types of Audit:** Based on Ownership, Time and Objective - Independent, Financial, Internal, Cost, Tax, Government, Secretarial Audits

**Unit-III: Planning of Audit:** Steps to be taken at the Commencement of a New Audit – Audit Programme - Audit Note Book– Audit Working Papers - Audit Evidence - Internal Check, Internal Audit and Internal Control.

**Unit-IV: Vouching and Investigation:** Definition and Importance of Vouching – Objectives of Vouching -Vouching of Cash and Trading Transactions – Investigation - Auditing vs. Investigation

**Unit-V: Company Audit and Auditors Report:** Auditor's Qualifications – Appointment and Reappointment – Rights, Duties, Liabilities and Disqualifications - Audit Report: Contents –Preparation - Relevant Provisions of Companies Act, 2013.



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2021-22

Core papers

**PROGRAMME: THREE-YEAR B COM**

(General and Computer Applications)

**Course Code:**

**Domain Subject: Commerce**

Semester-wise Syllabus under CBCS

(w.e.f. 2020-21 Admitted Batch)

II Year B Com (Gen)– Semester – IV

**Course 4F: Goods and Service Taxes**

**Learning Outcomes:**

At the end of the course, the student will be able to;

- Understand the basic principles underlying the Indirect Taxation Statutes.
- Examine the method of tax credit. Input and Output Tax credit and Cross Utilisation of Input Tax Credit.
- Identify and analyze the procedural aspects under different applicable statutes related to GST.
- Compute the assessable value of transactions related to goods and services for levy and determination of duty liability.
- Develop various GST Returns and reports for business transactions in Tally.

**Syllabus:**

**Unit I:** Introduction: Overview of GST - Concepts –Taxes Subsumed under GST – Components of GST- GST Council- Advantages of GST-GST Registration.

**Unit II:** GST Principles –Vijay Kelkar Sha Committee Recommendations - Comprehensive Structure of GST Model in India: Single, Dual GST – GST Rates - Taxes Exempted from GST- Taxes and Duties outside the purview of GST- Taxation of Services

**Unit-III:** Tax Invoice- Bill of Supply-Transactions Covered under GST-Composition Scheme- Reverse Charge Mechanism- Composite Supply -Mixed Supply.

**Unit-IV:** Time of Supply of Goods & Services: Value of Supply - Input Tax Credit - Distribution of Credit -Matching of Input Tax Credit - Availability of Credit in Special Circumstances- Cross utilization of ITC between the Central GST and the State GST.

**Unit-V:GST Returns:** Regular Monthly Filing Returns-Composition Quarterly Filing Returns-GSTR-1, GSTR-2, GSTR 2A, GSTR-3, GSTR 3B -Annual Returns GSTR-9, GSTR 9A, GSTR 9B& GSTR 9C - Records to be Maintained under GST



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Core papers

Semester - V

**5. PERSONAL FINANCE**

**Unit-I: Investment:** Assessment of Income –Objectives of Investment–Factors affecting selection of investment–Time value of money –Future value of investment and annuity –Present value of cash flows and outflows.

**Unit-II: Investment Alternatives:** Real Estate, Gold, Shares, Bonds, Govt. Securities, Insurance Policies, Mutual Funds, Post Office Saving Schemes, Public Provident Fund, etc.

**Unit-III: Security Valuation:** Concepts of Return and Risk–Systematic and Nonsystematic risk -Risk-return tradeoff –Equity valuation.

**Unit-IV: Bond Valuation:** Bond return and valuation – Yield to maturity – Bond value theorem.

**Unit-V: Personal Finance Planning:** Objectives – Process – Implementation and Implications – Case studies.

**References:**

- 1.Punithavathy Pandian, Security Analysis & Portfolio Management, Vikas Publishers, New Delhi.
- 2.Yassaswy, Personal and Tax Planning, Vision Books, New Delhi.
3. A.N. Shanbag, In the Wonderland of Investment, Popular Prakashan, Bombay.
4. V.N.S.Raman, Investment Principles and Techniques, Vikas Publishing House, New Delhi.
5. Ankit Gala & Khushboo Gala, Investment Planning, Buzzing Stock Publishing.





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Core papers

**DSC 2E 5.2 ADVANCED ACCOUNTING**

**Unit –I: Self Balancing System:** Meaning, Advantages of Self Balancing System – Preparation of sales ledger adjustment account, purchase ledger adjustment account and General ledger adjustment account. **(Problems only)**

**Unit-II: Royalty**

Royalties-Preparation of Minimum rent Account, Royalties Account, Short workings Account and Land Lord Account. **(Problems only)**

**Unit-III: Branch Accounts**

Branch Accounts- Dependent Branch Features- Books of Accounts, Methods of Accounting of dependent branches- Debtors system, stock and Debtor system . **(Problems only)**

**Unit IV: Internal Reconstruction:** Meaning – Reasons and Factors for Reconstruction Procedure for Capital reduction – Preparation of post reconstruction balance sheet and capital reduction account.(Excluding surrenders of shares) **(Problems only)**

**Unit V: Liquidation:** Meaning – Liquidation expenses – Liquidators remunerations – Preparation of Liquidators final statement of account. **(Problems only)**

**References:**

1. Principles and Practice of Accounting R.L Gupta & V.K Gupta Sulthan Chand & Sons.
2. Accountancy-1 Tulasian Tata Mcgraw Hill co
3. Accountancy-1 S.P.Jain K.L Narang Kalyani Publishers
4. Financial Accountancy-Dr V.K.Goyal Excel books
5. Introduction to Accountancy-T.S Grewal S.Chand and Co
6. Accountancy- 1- Haneef and Mukherjee Tata Mcgraw Hill Co
7. Advanced Accountancy- Arunjanadam Himalaya publishers
8. Advanced Accountancy – 1- S.NMaheswari & v.L Maheswari Vikash Publishing Co



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Core papers



**DSC 3E 5.3 Commercial Geography**

**Unit –I: The Earth:** Internal structure of the Earth – Latitude – Longitude – Realms of the Earth – Evolution of the Earth – Environmental pollution - Global Warming - Measures to be taken to protect the Earth.

**Unit -II: India – Agriculture:** Land Use - Soils - Major crops – Food and Non-food Crops – Importance of Agriculture – Problems in Agriculture – Agriculture Development.

**Unit -III: India – Forestry:** Forests – Status of Forests in Andhra Pradesh – Forest (Conservation) Act, 1980 – Compensatory Afforestation Fund (CAF) Bill, 2015 - Forest Rights Act, 2006 and its Relevance – Need for protection of Forestry.

**Unit -IV: India – Minerals and Mining:** Minerals – Renewable and non Renewable – Use of Minerals – Mines – Coal, Barites, etc. – Singareni Coal mines and Mangampeta Barites - District-wise Profile.

**Unit-V: India – Water Resources – Rivers:** Water resources - Rationality and equitable use of water – Protection measures - Rivers - Perennial and peninsular Rivers - Interlinking of Rivers - Experience of India and Andhra Pradesh.

**References:**

1. Shabiar Ahmad; Quazi ,Natural Resource Consumption and Environment Management, APH Publishing Corporation.
2. Tarachand, Economic and Commercial Geography of India, Vikas Publishing House.
3. Dr. S. Sankaran, Commercial Geography, Margam Publications, Chennai.
4. C. B. Memoria, Commercial Geography, Lal Agarwal & Co.
5. C. B. Memoria, Economic and Commercial Geography, Lal Agarwal & Co.
6. Vinod N. Patel, Commercial Geography, Oxford Book Company



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**Core papers**

**Cluster Elective -1: E-Commerce**

**DSC 4E 5.4 e-Commerce**

**Unit-I: e-Commerce:** Features of Electronic Commerce - Distinction between e-Commerce and e-Business - Types of Business Models: B2B, B2C, C2C - Benefits and Limitations of e-Commerce - Apps.

**Unit-II: e-Business Applications:** Integration and e-Business suits - ERP, e-SCM, e-CRM - Methods and benefits of e-Payment Systems –e-Marketing – Applications and issues

**Unit-III: e-Business on different Fields:** e-Tourism – e-Recruitment – e- Real Estate – e-Stock Market – e-Music/Movies - e-Publishing and e-Books.

**Unit-IV: Concept of Online Education:** Process - Methods - e-Content development and Deliveries - Major technologies used in e-Education - Online Testing - Methods - Future Trends.

**Unit-V: Mobile Commerce:** Ticketing - Me-Seva; Government and Consumer Services – e-Retailing - e-Groceries – Security challenges - Case Studies.

**References:**

1. Turban E. Lee J., King D. and Chung H.M: Electronic commerce-a Managerial Perspective, Prentice-Hall International, Inc.
2. Bhatia V., E-commerce, Khanna Book Pub. Co. (P) Ltd., Delhi.
3. Daniel Amor, E Business R (Evolution), Pearson Education.
4. Krishnamurthy, E-Commerce Management, Vikas Publishing House.
5. David Whiteley, E-Commerce: Strategy, Technologies and Applications, Tata McGraw Hill.
6. P. T. Joseph, E-Commerce: A Managerial Perspectives, Tata McGraw Hill.



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Core papers

**DSC 5E 5.5 Business Networks**

**Unit-I: Business Forms:** Interrelation among Stakeholders – Business and Government – Business and Society: Social Network and Facebook.

**Unit-II: Business Networking through ICT:** Basic concepts – Uses and Application of Business Networks – Different Layers of Business Networks – Internet and Business Networks – Network Security.

**Unit-III: Business Networking Systems and Devices:** Communication Satellites – Servers – Cloud Computing – Sharing – Spectrum – Commercial issues.

**Unit-IV: Customer Relationship Management:** Establishing Network connection with customers – Forward and Backward Integration – Customer Data Base – Creation and Maintenance – Legal and Ethical Issues.

**Unit-V: Business Analytics:** Master Data Management – Data Warehousing and Mining – Data Integration – OLTP and OLAP.

**References:**

1. Jerry, FitzGerald and Alan Dennis, Business Data Communications and Networking, John Wiley & Sons.
2. Tanenbaum, A. S., Computer Networks, Pearson Education.
3. David A Stamper, Business Data Communications. Addison Wesley.
4. Business Analytics – Methods, Models and Decisions, James R. Evans, Prentice Hall.
5. Business Analytics - An Application Focus, Purba Halady Rao, PHI learning
6. R.N Prasad and Seema Acharya, Fundamentals of Business Analytics, Wiley India.

5.6: Project work



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2021-22

**Core papers**

Cluster Elective – 2: Banking and Financial Services

**DSC 4E 5.4: Central Banking**

**Unit-I: Introduction :** Evolution and Functions of Central Bank –Development of Central Banks in Developed and Developing countries – Trends in Central Bank Functions.

**Unit-II: Central banking in India :** Reserve Bank of India – Constitution and Governance, Recent Developments, RBI Act. – Interface between RBI and Banks.

**Unit-III: Monetary and Credit Policies :** Monetary policy statements of RBI – CRR – SLR –Repo Rates – Reverse Repo Rates – Currency in circulation – Credit control measures.

**Unit-IV: Inflation and price control by RBI :** Intervention mechanisms – Exchange rate stability – Rupee value – Controlling measures.

**Unit-V: Supervision and Regulation :** Supervision of Banks – Basle Norms, Prudential Norms, Effect of liberalization and Globalization – Checking of money laundering and frauds.

**References :**

1. Reserve Bank of India Publication, Functions and Working of the RBI
2. Vasant Desai, Central Banking and Economic Development, Himalaya Publishing.
3. S.Panandikar, Banking in India, Orient Longman.
4. Reserve Bank of India Publication, Report on Trends and Progress of Banking in India.
5. Annual Reports of Reserve Bank of India.
6. Rita Swami, Indian Banking System, International Publishing House Pt.Ltd.
7. S.V.Joshi, C.P.Rodrigues and Azhar Khan, Indian Banking System, MacMillan Publishing.



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**Core papers**

**DSC 5E 5.5: Rural and Farm Credit**

**Unit-I: Rural Credit :** Objectives and Significance of Rural credit – Classification of rural credit – General Credit Card (GCC) – Financial Inclusion – Rupay card.

**Unit-II : Rural Credit Agencies :** Institutional and Non-institutional Agencies for financing agriculture and Rural Development – Self Help Groups (SHG) – Financial for Rural Industries.

**Unit-III : Farm Credit :** Scope – Importance of farm credit – Principles of Farm Credit – Cost of Credit – Types – Problems and remedial measures – Kisan Credit Card (KCC) Scheme.

**Unit-IV : Sources of Farm Credit :** Cooperative Credit : PACS – APCOB – NABARD –Lead Bank Scheme – Role of Commercial and Regional Rural Banks – Problems of recovery and over dues.

**Unit-V : Farm Credit Analysis :** Eligibility Conditions – Analysis of 3 R's (Return, Repayment Capacity and Risk –bearing Capacity) – Analysis of 3 C's of Credit (Character, Capacity and Capital) – Crop index reflecting use and farm credit – Rural Credit Survey Reports.

**References :**

1. National Bank of Agricultural and Rural Development (NABARD) Annual report.
2. Economy Survey, Government of India.
3. Rural Development, Sundaram I.S., Himalaya Publishing House, Mumbai.
4. Rural Credit in India. C.S Rayudu, Mittal Publications.
5. Farm Credit and Co-operative in India, Tiruloati V., Naidu. V T Naidu, Vora & Co.Pub Ltd

**5.6 : Project work**



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Core papers

SEMESTER VI

**6. TALLY**

**Unit-I: Fundamentals of Tally ERP 9:** Features - Start Tally, Create and Alter a Company - Creating Single Group/Multiple Groups, Display, Deleting Groups - Ledger: Creating Single Ledger / Multiple Ledgers.

**Unit-II: Create Accounting Masters in Tally ERP 9** - Chart of Accounts - Creating Single and Multiple charts, Displaying and Altering charts – Walkthrough for creating Chart of Accounts – Back-up of data and Restoring - Tally Audit Features.

**Unit-III: Creating Inventory Master:** Creating Stock Groups, Displaying, Deleting, Altering - Creating Stock Unit of Measure, Displaying and Deleting Unit Measures - Creating, Altering, Displaying, Deleting Stock items - Creating Godowns and Allocation of stock.

**Unit-IV: Voucher Entry:** Contra Entry, Payments, Receipts, Journals, Purchases, Sales, Debit and Credit Notes, Reversing Journal Voucher, Purchase and Sales Orders, Rejections, Delivery and Receipt Notes, Physical Stock Voucher - Invoicing.

**Unit-V: Generating Reports:** Trial Balance, Balance Sheet, Profit & Loss A/c, Cash Book, Bank Book - Inventory Books and Registers - Exception Reports - Negative Stock, Negative Ledgers - Practice Exercises.

**References:**

1. Tally 9 in Simple Steps, Kogent Solutions Inc., John Wiley & Sons.
2. Tally 9.0 (English Edition), (Google eBook) Computer World
3. Tally ERP 9 Made Simple Basic Financial Accounting by BPB Publisher.
4. Tally ERP 9 For Real Time Accounting by Avichi Krishnan



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Core papers

### DSC IF 6.1 GOODS & SERVICE TAX FUNDAMENTALS

**Unit I: Introduction:** Overview of GST - Concepts – Limitations of VAT – Need for Tax Reforms - Justification for introduction of GST - Shortcomings and advantages at the Central Level and State Level on introduction of GST- Process of Introduction of GST - Constitutional Amendments.

**Unit II: GST: Principles – Models of GST:** Austrian, Canadian, Kelkar-Shah – Bagchi-Poddar -Comprehensive structure of GST model in India: Single, Dual GST–Transactions covered under GST.

**Unit-III: Taxes and Duties:** Subsumed under GST - Taxes and Duties outside the purview of GST: Tax on items containing Alcohol – Tax on Petroleum products -Tax on Tobacco products - Taxation of Services

**Unit-IV: Inter-State Goods and Services Tax:** Major advantages of IGST Model –Interstate Goods and Service Tax: Transactions within a State under GST – Interstate Transactions under GST - Illustrations.

**Unit-V: Time of Supply of Goods & Services:** Value of Supply - Input Tax Credit –Distribution of Credit -Matching of Input Tax Credit - Availability of credit in special circumstances- Cross utilization of ITC between the Central GST and the State GST.

#### References:

1. Goods and Services Tax in India – Notifications on different dates.
2. GST Bill 2012.
3. Background Material on Model GST Law, Sahitya Bhawan Publications, Hospital Road, Agra - 282 003.
4. The Central Goods and Services Tax Act, 2017, NO. 12 OF 2017 Published by Authority,



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Core papers

**DSC 2F 6.2 AUDITING**

**Unit-I: Auditing:** Meaning – Objectives – Importance of Auditing – Auditing as a Vigil Mechanism – Role of Auditor in checking corporate frauds.

**Unit-II: Types of Audit:** Based on Ownership and time - Independent, Financial, Internal, Cost, Tax, Government, Secretarial audits.

**Unit-III: Planning of Audit:** Steps to be taken at the commencement of a new audit - Audit programme - Audit note book - Internal check, internal audit and internal control.

**Unit-IV: Vouching and Investigation:** Vouching of cash and trading transactions - Investigation, Auditing vs. Investigation

**Unit-V: Company Audit and Auditors Report:** Auditor's Qualifications – Appointment and Reappointment – Rights, duties, liabilities and disqualifications - Audit report: Contents – Preparation - Relevant Provisions of Companies Act, 2013.

**References:**

1. S.Vengadamani, "Practical Auditing", Margham Publications, Chennai.
2. Ghatalia, "Principles of Auditing", Allied Publishers Pvt. Ltd., New Delhi.
3. Pradeesh Kumar, Baldev Sachdeva & Jagwant Singh, "Auditing Theory and Practice, Kalyani Publications, Ludhiana.
4. N.D. Kapoor, "Auditing", S. Chand, New Delhi.



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Core papers

### DSC 3F 6.3 MANAGEMENT ACCOUNTING

**Unit–I: Management Accounting:** Interface with Financial Accounting and Cost Accounting  
- Financial Statement analysis and interpretation: Comparative analysis – Common size analysis and trend analysis (including problems).

**Unit–II: Ratio Analysis:** Classification, Importance and limitations - Analysis and interpretation of Accounting ratios - Liquidity, profitability, activity and solvency ratios (including problems).

**Unit–III: Fund Flow Statement:** Concept of fund: Preparation of funds flow statement. Uses and limitations of funds flow analysis (including problems).

**Unit–IV: Cash Flow Statement:** Concept of cash flow – Preparation of cash flow statement - Uses and limitations of cash flow analysis (including problems).

**Unit–V: Standard Cost:** Material variance only (including Problems).

#### References:

1. S.N. Maheswari, A Textbook of Accounting for Management, S. Chand Publishing, New Delhi.
2. I.M Pandey, "Management Accounting", Vikas Publishing House, New Delhi,
3. Shashi K. Gupta & R.K. Sharma, "Management Accounting: Principles and Practice", Kalyani Publishers, Ludhiana.



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2021-22

Core papers

CLUSTER ELECTIVE -1

DSC 4F 6.4: e-PAYMENTS SYSTEM

**Unit-I: e-Cash and Virtual Money:** Electronic Data Interchange (EDI) - NEFT/RTGS/Electronic Payment modes - Foundations of e-Cash and Issues; Security, Anonymity, Untraceability. Virtual currencies, Bitcoin.

**Unit-II: Automated Clearing and Settlement:** Process of Real Time Gross Settlement System - Net Settlement -ATM Networks - Fedwire, CHIPS and SWIFT.

**Unit-III: e-Payment Security and Digital Signature:** Cryptographic Methods - Hash functions - Public/Private Key methods: RSA - Digital Signatures - Certification Process - Digital identity Documents and Remote Authentication.

**Unit-IV: Mobile Payments:** Wireless payments, Digital Wallets, Google Wallet – Obopay - Security Challenges.

**Unit-V: Electronic Invoice and Payment System:** Electronic Statement Delivery - EIPP providers  
- Biller service providers - Customer service providers - Reconciliation through Bank -Invoice Paper elimination - Scan-based trading (SBT).

**References:**

1. Domonique Rambure and Alec Nacamuli. "Payment Systems: From the Salt Mines to the Board Room", Palgrave MacMillan.
2. Weidong Kou, "Payment Technologies for E-Commerce". Springer, Germany.
3. Donal O'Mahony, Michael Peirce and Hitesh Tewari, "Electronic Payment Systems", Artech House, Inc.
4. M. H. Sherif, Protocols for Secure Electronic Commerce, Boca Raton, Fla, CRC Press.



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**Core papers**

▲ **DSC 5F 6.5 SOCIAL MEDIA AND e-MARKETING**

**Unit-I: Social Media:** Career in Social Media Marketing - Strategic Marketing - Social media Planning process - Campaigns (tactics and results).

**Unit-II: Social Consumers:** Social media marketing segments - Digital consumers - Digital communities - Online communities - Strong & Weak Ties - Social Community - Social Publishing.

**Unit-III: Social Media Sites:** Face book - Twitter - LinkedIn - YouTube and their Operations - Datamining and Social Media - Role of Social Media in Marketing Research - Social Media and Privacy/Ethics.

**Unit-IV: e-Marketing:** Objectives, Online Advertising - Distribution in e-Marketing, Lead Generation Platform - Customer Service mechanism - Relationship Building medium.

**Unit-V: Methods of e-Marketing:** Advertising Techniques, Selling Methods, Sales Promotion - Public Relations - Sponsorship, Merchandising, Teleconferencing - Chatting.

**References:**

1. Chaffey, D., e-Marketing Excellence: Planning and Optimizing Your Digital Marketing, Burlington: Elsevier.
2. Hanson, W. A. & Kalyanam, K., Internet Marketing & e-Commerce, Thomson Southwestern, Mason, Ohio.
3. Harris, L., Marketing the e-Business, Hoboken: Taylor & Francis.
4. Krishnamurthy, S., Contemporary research in e-Marketing, Hershey, PA: Idea Group Publication.
5. Stephen Dann & Susan Dann, E-Marketing: Theory and Application, Macmillan, New York.
6. Seth Godin, E-Marketing, Berkley Publishing Group.
7. Irvine Clarke & Theresa B. Flaherty Advances in Electronic Marketing, Idea Group Publishing, Hershey.

6.6 PROJECT WORK \_\_\_\_\_



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2021-22

**Core papers**

**Cluster Elective – 2 : Banking and Financial Services**  
**DSC 4F 6.4: Financial Services**

**Unit-I : Financial Services :** Role of Financial Services – Banking and Non Banking Companies – Activities of Non Banking Finance Companies – Fund Based Activities – Fee Based Activities.

**Unit-II : Merchant Banking Services :** Scope and importance of merchant banking services – Venture Capital – Securitization – Demat Services – Commercial Paper.

**Unit-III : Leasing and Hire – Purchase :** Types of Lease, Documentation and Legal aspects – Fixation of Rentals and Evaluation – Hire Purchasing – Securitization of debts – House Finance.

**Unit-IV : Credit Rating :** Purpose – Types – Credit Rating Symbols – Agencies : CRISIL and CARE – Equity Assessment vs Grading – Mutual funds.

**Unit-V : Other Financial Services :** Factoring and Forfeiting – Procedural and financial aspects – Installment System – Credit Cards – Central Depository Systems : NSDL, CSDL.

**References :**

1. B.Santhanam, Financial Services, Margham Publication, Chennai.
2. M.Y.Khan, Financial Services, Tata McGraw – Hill, New Delhi.
3. Machendra Raja, Financial Services, S.Chand Publishers, New Delhi.
4. V.A.Aydhani, Marketing of Financial Services
5. Machiraji, “Indian Financial System”, Vikas Publishers.
6. Sandeep Goel, Financial Services, PH1 Learning.
7. I.M.Bhole, Financial Institutions and Markets, Tata McGraw Hill.
8. SEBI Guidelines, Bharat Publications, New Delhi.
9. E.Gordon & H.Natarajan, Capital Market in India, Himalaya publishing Hous



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**Core papers**

**DSC 5F 6.5 : Marketing of Financial Services**

**Unit-I : Difference between Goods and Services :** Managing Service Counters – Integrated Service Management – Service Elements.

**Unit-II : Constructing Service Environment :** Managing People for service Advantage – Service Quality and Productivity – Customer Loyalty.

**Unit-III : Pricing and Promotion Strategies :** Pricing strategies – Promotion strategies – B2B Marketing – Marketing Planning and Control for services.

**Unit-IV : Distributing Services :** Cost and Revenue Management – Approaches for providing services – Channels for Service provision – Designing and managing Service Process.

**Unit-V : Retail Financial Services :** Investment services – Insurance services – Credit Services – Institutional Financial Services – Marketing practices in select Financial Service Firms.

**References :**

1. Aradhani “Marketing of Financial Services “ Himalaya Publications.
2. Sinha and Saho, Services Marketing, Himalaya Publishing House.
3. Reddy Appanaiah, Anil Kumar and Nirmala, Services Marketing, Himalaya Publishing.
4. Shajahan Services Marketing, Himalaya Publishing House.
5. Christopher lovelock, Services Marketing, Pearson Education Aisa.
6. Helen Woodroffe – Services Marketing, MCMillan India Ltd.
7. S.M.Jha Services Marketing, New Delhi Himalaya Publishing House.
8. Valarie A. Zeithmal & Mary JoBitner, Services Marketing, New Delhi, Tata McGraw Hill

**6.6 : Project work |**



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2021-22

**Core papers**

B.A/B.Sc., STATISTICS (WM) CBCS REVISED SYLLABUS 2020-21  
Semester – I (CBCS With Maths Combination Common to BA/BSc)  
**Paper - I: Descriptive Statistics**

**UNIT-I**

**Introduction to Statistics:** Importance of Statistics. Scope of Statistics in different fields. Concepts of primary and secondary data. Diagrammatic and graphical representation of data: Histogram, frequency polygon, Ogives, Pie. Measures of Central Tendency: Mean, Median, Mode, Geometric Mean and Harmonic Mean. Median and Mode through graph.

**UNIT-II**

**Measures of Dispersion:** Range, Quartile Deviation, Mean Deviation and Standard Deviation, Variance. Central and Non-Central moments and their interrelationship. Sheppard's correction for moments. Skewness and kurtosis.

**UNIT-III**

**Curve fitting:** Bi- variate data, Principle of least squares, fitting of degree polynomial. Fitting of straight line, Fitting of Second degree polynomial or parabola, Fitting of power curve and exponential curves.

**Correlation:** Meaning, Types of Correlation, Measures of Correlation: Scatter diagram, Karl Pearson's Coefficient of Correlation, Rank Correlation Coefficient (with and without ties), Bi-variate frequency distribution, correlation coefficient for bi-variate data and simple problems. Concept of multiple and partial correlation coefficients (three variables only ) and properties

**UNIT-IV**

**Regression :** Concept of Regression, Linear Regression: Regression lines, Regression coefficients and it's properties, Regressions lines for bi-variate data and simple problems. Correlation vs regression.

**UNIT-V**

**Attributes :** Notations, Class, Order of class frequencies, Ultimate class frequencies, Consistency of data, Conditions for consistency of data for 2 and 3 attributes only , Independence of attributes , Association of attributes and its measures, Relationship between association and colligation of attributes, Contingency table: Square contingency, Mean square contingency, Coefficient of mean square contingency, Tschuprow's coefficient of contingency.

**Text Books:**

1. V.K.Kapoor and S.C.Gupta: Fundamentals of Mathematical Statistics, Sultan Chand &



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2021-22

### Core papers

B.A/B.Sc., STATISTICS (WM) CBCS REVISED SYLLABUS 2020-21

Semester – II (CBCS With Maths Combination Common to BA/BSc)

Paper - II: Probability Theory and Distributions

#### UNIT-I

**Introduction to Probability:** Basic Concepts of Probability, random experiments, trial, outcome, sample space, event, mutually exclusive and exhaustive events, equally likely and favourable outcomes. Mathematical, Statistical, axiomatic definitions of probability. Conditional Probability and independence of events, Addition and multiplication theorems of probability for 2 and for n events. Boole's inequality and Baye's theorem and its applications in real life problems.

#### UNIT-II

**Random variable:** Definition of random variable, discrete and continuous random variables, functions of random variable. Probability mass function. Probability density function, Distribution function and its properties. For given pmf, pdf calculation of moments, coefficient of skewness and kurtosis. Bivariate random variable - meaning, joint, marginal and conditional Distributions, independence of random variables and simple problems.

#### UNIT-III

**Mathematical expectation :** Mathematical expectation of a random variable and function of a random variable. Moments and covariance using mathematical expectation with examples. Addition and Multiplication theorems on expectation. Definitions of M.G.F, C.G.F, P.G.F, C.F and their properties. Chebyshev and Cauchy - Schwartz inequalities.

#### UNIT-IV

**Discrete Distributions:** Binomial, Poisson, Negative Binomial, Geometric distributions: Definitions, means, variances, M.G.F, C.F, C.G.F, P.G.F, additive property if exists. Poisson approximation to Binomial distribution. Hyper-geometric distribution: Definition, mean and variance.

#### UNIT - V

**Continuous Distributions:** Rectangular, Exponential, Gamma, Beta Distributions: mean, variance, M.G.F, C.G.F, C.F. **Normal Distribution:** Definition, Importance, Properties, M.G.F, CF, additive property.

#### Text Books:

1. V.K.Kapoor and S.C.Gupta: Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi.
- 2 BA/BSc I year statistics - descriptive statistics, probability distribution - Telugu Academy - Dr M.Jaganmohan Rao, Dr N.Srinivasa Rao, Dr P.Tirupathi Rao, Smt.D.Vijayalakshmi.
3. K.V.S. Sarma: Statistics Made Simple: Do it yourself on PC. PHI

#### Reference books:



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2021-22

**Core papers**

**B.A/B.Sc., STATISTICS (WM) CBCS REVISED SYLLABUS 2020-21**  
Semester – III (CBCS With Maths Combination Common to BA/BSc)  
**Paper - III: Statistical Inference**

**UNIT-I**

**Concepts:** Population, Sample, Parameter, statistic, Sampling distribution, Standard error. convergence in probability and convergence in distribution, law of large numbers, central limit theorem (statements only). Student's t- distribution, F – Distribution,  $\chi^2$ - Distribution: Definitions, properties and their applications.

**UNIT-II**

**Theory of estimation:** Estimation of a parameter, criteria of a good estimator – unbiasedness, consistency, efficiency, & sufficiency and. Statement of Neyman's factorization theorem. Estimation of parameters by the method of moments and maximum likelihood (M.L), properties of MLE's. Binomial, Poisson & Normal Population parameters estimate by MLE method. Confidence Intervals.

**UNIT-III**

**Testing of Hypothesis:** Concepts of statistical hypotheses, null and alternative hypothesis, critical region, two types of errors, level of significance and power of a test. One and two tailed tests. Neyman-Pearson's lemma. Examples in case of Binomial, Poisson, Exponential and Normal distributions.

**UNIT – IV**

**Large sample Tests:** large sample test for single mean and difference of two means, confidence intervals for mean(s). Large sample test for single proportion, difference of proportions. standard deviation(s) and correlation coefficient(s).

**Small Sample tests:** t-test for single mean, difference of means and paired t-test.  $\chi^2$ -test for goodness of fit and independence of attributes. F-test for equality of variances.

**UNIT – V**

**Non-parametric tests-** their advantages and disadvantages, comparison with parametric tests. Measurement scale- nominal, ordinal, interval and ratio. One sample runs test, sign test and Wilcoxon-signed rank tests (single and paired samples). Two independent sample tests: Median test, Wilcoxon – Mann-Whitney U test, Wald Wolfowitz's runs test.



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**Core papers**

**B.A./B.Sc., STATISTICS (WM) CBCS REVISED SYLLABUS 2020-21**  
**Semester – IV (CBCS With Maths Combination Common to BA/BSc)**  
**Paper IV: Sampling Techniques and Designs of Experiments**

**UNIT I**

**Simple Random Sampling** (with and without replacement): Notations and terminology, various probabilities of selection. Random numbers tables and its uses. Methods of selecting simple random sample, lottery method, method based on random numbers. Estimates of population total, mean and their variances and standard errors, determination of sample size, simple random sampling of attributes.

**UNIT II**

**Stratified random sampling:** Stratified random sampling, Advantages and Disadvantages of Stratified Random sampling, Estimation of population mean, and its variance. Stratified random sampling with proportional and optimum allocations. Comparison between proportional and optimum allocations with SRSWOR.

**Systematic sampling:** Systematic sampling definition when  $N = nk$  and merits and demerits of systematic sampling - estimate of mean and its variance. Comparison of systematic sampling with Stratified and SRSWOR.

**UNIT III**

**Analysis of variance :** Analysis of variance(ANOVA) –Definition and assumptions. One-way with equal and unequal classification, Two way classification.

**Design of Experiments:** Definition, Principles of design of experiments, CRD: Layout, advantages and disadvantage and Statistical analysis of Completely Randomized Design (C.R.D).

**UNIT IV**

Randomized Block Design (R.B.D) and Latin Square Design (L.S.D) with their layouts and Analysis, Missing plot technique in RBD and LSD. Efficiency RBD over CRD, Efficiency of LSD over RBD and CRD.

**UNIT V**

**Factorial experiments** – Main effects and interaction effects of  $2^2$  and  $2^3$  factorial experiments and their Statistical analysis. Yates procedure to find factorial effect totals.



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**Core papers**

B.A/B.Sc., STATISTICS (WM) CBCS REVISED SYLLABUS 2020-21  
Semester – II to IV (CBCS With Maths Combination Common to BA/BSc)

**Paper V: Applied Statistics**

**UNIT I**

**Time Series:** Time Series and its components with illustrations, additive, multiplicative models. Trend: Estimation of trend by free hand curve method, method of semi averages. Determination of trend by least squares (Linear trend, parabolic trend only), moving averages method.

**UNIT II**

**Seasonal Component:** Determination of seasonal indices by simple averages method, ratio to moving average, Ratio to trend and Link relative methods, Deseasonalization.

**UNIT III**

**Growth curves:** Modified exponential curve, Logistic curve and Grompertz curve, fitting of growth curves by the method of three selected points and partial sums. Detrending. Effect of elimination of trend on other components of the time series

**UNIT IV**

**Index numbers:** Concept, construction, problems involved in the construction of index numbers, uses and limitations. Simple and weighted index numbers. Laspayer's, Paasche's and Fisher's index numbers, Criterion of a good index number, Fisher's ideal index numbers. Cost of living index number and wholesale price index number.

**UNIT V**

**Vital Statistics:** Introduction, definition and uses of vital statistics, sources of vital statistics. Measures of different Mortality and Fertility rates, Measurement of population growth. Life tables: construction and uses of life tables.

**Text Books:**

1. Fundamentals of applied statistics : VK Kapoor and SC Gupta.
2. BA/BSc III year paper - III Statistics - applied statistics - Telugu academy by prof.K.Srinivasa Rao, Dr D.Giri. Dr A.Anand, Dr V.Papaiah Sastry.

**Reference Books:**

3. Anuvarthita Sankhya Sastram - Telugu Academy.
4. Mukopadhyay, P (2011). Applied Statistics, 2<sup>nd</sup> ed. Revised reprint, Books and Allied Pvt. Ltd.
5. Brockwell, P.J. and Devis, R.A. (2003). Introduction to Time Series Analysis. Springer.



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**Core papers**

**STATISTICS SYLLABUS**

Semester – V (CBCS With Maths Combination Common to BA/BSc)

**Paper - V: SAMPLING THEORY and DESIGN OF EXPERIMENTS**

No. of Hours/week : 04

credits 3

**UNIT – I**

**Sampling Theory:** Principal steps in sample surveys - census versus sample survey, sampling and non- sampling errors, advantages of sampling over census and limitations of sampling. Types of sampling: Subjective, probability and mixed sampling methods.

**UNIT – II**

**Simple Random Sampling:** Simple random sampling, selection procedure of simple random sampling, Advantages and Disadvantages of simple random sampling. Estimation of population mean, population total and variance of these estimates by Simple random sampling with and without replacement. Comparison between SRSWR and SRSWOR.

**UNIT – III**

**Stratified random sampling:** Stratified random sampling, Advantages and Disadvantages of Stratified Random sampling, Estimation of population mean, and its variance. Stratified random sampling with proportional and optimum allocations. Comparison between proportional and optimum allocations with SRSWOR.

**Systematic sampling:** Systematic sampling definition when  $N = nk$  and merits and demerits of systematic sampling - estimate of mean and its variance. Comparison of systematic sampling with Stratified and SRSWOR.

**UNIT – IV**

**Analysis of variance:** Analysis of variance(ANOVA) –Definition and assumptions. One-way with equal and unequal classification, Two way classification.

**Design of Experiments:** Definition, Principles of design of experiments, CRD: Layout, advantages and disadvantage and Statistical analysis of Completely Randomized Design (C.R.D).

**UNIT – V**

Randomized Block Design (R.B.D) and Latin Square Design (L.S.D) with their layouts and Analysis, Missing plot technique in RBD and LSD. Efficiency RBD over CRD, Efficiency of LSD over RBD and CRD. Factorial experiments – Main effects and interaction effects of  $2^2$  and  $2^3$  factorial experiments and their Statistical analysis. Yates procedure to find factorial effect totals.

**Text Books:**

1. Telugu Academy BA/BSc III year paper - III Statistics - applied statistics - Telugu academy by Prof K. Srinivasa Rao, Dr D.Giri, Dr A. Anand, Dr V.Papaiah Sastry.



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2021-22

Core papers

**STATISTICS SYLLABUS**

Semester – V (CBCS With Maths Combination Common to BA/BSc)

**Paper – VI : Statistical Quality Control and Reliability**

No. of Hours/week :04

credits 3

**UNIT – I**

**Statistical Quality Control:** Definition, Importance of SQC in industry. Causes of variation-chance and assignable causes, Process and Product control, Importance of Normal distribution and  $3\sigma$  control limits, specification limits and Natural tolerance limits.

**UNIT – II**

**Shewart** control charts – Variable Control Charts- and R-chart, and S- chart. Attribute type of charts - np- **chart**(No. of defectives), p- **chart**(Proportion of defectives) with fixed and variable sample size and C-Chart(No. of defects per unit), its applications.

**UNIT – III**

**Acceptance sampling plans:** Definition, Types of Accepting sampling plans, Merits and demerits of Acceptance sampling plans, applications, Concept of, AQL and LTPD, Producers risk and Consumer's risk. AOQ and AOQL curves, **OC**, ASN, and ATI curves.

**UNIT – IV**

Single and Double sampling plans for attributes and derivation of their OC and ASN functions. Design of single and double sampling plans for attributes.

▲ **UNIT – V**

**Reliability:** Meaning and concept of reliability, Reliability measures –Failure Density, Failure Rate or Hazard function, Probability of Failure, Mean Time to **Failure**(MITF), Mean Time Between Failures(MTBF), Exponential distribution as life model, its memory- less property.

**List of reference books :**

1. Fundamentals of Applied Statistics. By V.K.Kapoor and S.C.Gupta , Sultan Chand.
2. Reliability and life testing by S.K.Sinha. Wiley Eastern
3. Statistical Quality Control by R.C.Gupta
4. B.A/B.Sc III Year Paper-IV Statistics- applied Statistics- Telugu Academic by Prof.K.Srinivasa Rao, Dr.D. Giri, Dr.A.Anand, Dr. V.Papaiah Sastry
5. B.A/B.Sc Statistics Paper-IV Statistics, Quality, Reliability and OR by DVLN Jogiraju, C.Srikala, Palnati Sudarsan.



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2021-22

**Core papers**

**STATISTICS MODEL QUESTION PAPER**

Semester – VI (CBCS With Maths Combination Common to BA/BSc)

Paper – VII: ECONOMIC STATISTICS

No. of Hours/week : 04

credits 3

**UNIT-I**

**Time Series:** Time Series and its components with illustrations, additive, multiplicative models. Determination of trend by least squares (Linear trend, parabolic trend only), moving averages method. Determination of seasonal indices by simple averages method, ratio to moving average, Ratio to trend and Link relative methods.

**UNIT-II**

**Growth curves:** Modified exponential curve, Logistic curve and Gompertz curve, fitting of growth curves by the method of three selected points and partial sums.

**UNIT-III**

**Index numbers:** Concept, construction, problems involved in the construction of index numbers, uses and limitations. Simple and weighted index numbers. Laspeyres's, Paasche's and Fisher's index numbers, Criterion of a good index number, Fisher's ideal index numbers. Fixed and chain base index

numbers. Cost of living index number and wholesale price index number. Base shifting, splicing and deflation of index numbers.

**UNIT-IV**

**Official Statistics:** Functions and organization of CSO and NSSO. Agricultural Statistics, area and yield statistics. National income and computation, utility and difficulties in estimation of national income.

**UNIT-V**

**Vital Statistics:** Introduction, definition and uses of vital statistics, sources of vital statistics. Mortality rates: Crude death rate(CDR), Specific death rate(SDR), standardized death rate(STDR). Fertility rates: crude birth rate(CBR), age specific fertility rate(ASFR), general fertility rate(GFR), total fertility rate(TFR). Measurement of population growth: crude rate of natural increase and pearl's vital index, Gross reproduction rate(GRR) and net reproduction rate(NRR). Life tables: construction and uses of life tables and abridged life tables.

**Text Books:**

1. Fundamentals of applied statistics : VK Kapoor and SC Gupta.
2. BA/BSc III year paper - III Statistics - applied statistics - Telugu academy by prof K Srinivasa Rao, Dr D.Giri, Dr A.Anand, Dr V.Papaiiah Sastry.

**Reference Books:**

3. Indian Official statistics - MR Saluja.



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2021-22

**Core papers**

**STATISTICS SYLLABUS**

Semester – VI (CBCS With Maths Combination Common to BA/BSc)  
Paper – VIII(A1): OR and Applications of Linear Programming Problem

No. of Hours/week : 04

Credits: 3

**UNIT-I**

**Basics of OR and Linear Programming Problem:** Introduction of OR, Definition, characteristics, scope, applications and limitations of OR. Formulation of linear programming of problems (LPP), Convex sets, Basic feasible solutions, Graphical solution of linear programming problems. Alternative solutions, Unbounded solutions, Non existing feasible solutions by Graphical method.

**UNIT-II**

**Simplex Method :** General formulation of LP Problems and Matrix form of LP problems, Slack variable, Surplus variable, unrestricted Variable, Standard form of LPP, Canonical form of LPP. Introduction to simplex method, Definitions and notations, Computational procedure of simplex algorithm. Artificial variable technique, Big-M method and Two-phase simplex method, Degeneracy in LPP and method to resolve degeneracy. Alternative solutions, Unbounded solutions, Non existing feasible solutions and Solution of simultaneous equations by Simplex method.

**UNIT-III**

**Duality in Linear Programming and Dual Simplex Method :** Introduction, Definition of Dual Problems, General rules for converting any primal into its Dual, Economic interpretation of duality, Relation between the solution of Primal and Dual problem, Using duality to solve primal problem. Dual Simplex Method.

**UNIT-IV**

**Transportation problem :** Introduction, Mathematical formulation of Transportation problem, Tabular representation, Definitions, Initial Basic feasible solution of Transportation problem- North-west corner rule, Lowest cost entry method, Vogel's approximation method. Method of finding optimal solution-Modi method(U-V method). Degeneracy in transportation problems, Resolution of degeneracy, Unbalanced transportation problem.

**Assignment problem:** Introduction, Mathematical formulation of Assignment problem, Reduction theorem(statement only), Hungarian Method for solving Assignment problem, Unbalanced Assignment problem. The Traveling salesman problem, Formulation of Traveling salesman problem as an Assignment problem and Solution procedure.

**UNIT-V**

**Sequencing problem:** Introduction, assumptions of sequencing problem, Johnson's algorithm for n jobs on two machines problem- problems with n-jobs on two machines, algorithm for n jobs on three machines problem- problems with n- jobs on three machines, algorithm for n jobs on k machines problem, problems with n-jobs on k-machines. Graphical method for two jobs on k- machines.

**Reference Books:**

1. S.D. Sharma, Operations Research, Kedar Nath Ram Nath & Co, Meerut.
2. Kanti Swarup, P.K.Gupta, Manmohn, Operations Research, Sultan Chand and sons, New Delhi.



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2021-22

**Core papers**

**STATISTICS SYLLABUS**

**Semester – VI (CBCS With Maths Combination Common to BA/BSc)**

**Paper – VIII(A2) : Numerical Methods**

No. of Hours/week : 04

Credits 3

**UNIT-I**

Definitions of Forward difference operator( $\Delta$ ), Backward difference operator( $\nabla$ ), Shift or Extension(displacement) operator (E), Central Differences operator( $\mu$ ), Differentiation operator(D), Mean value operator ( Symbolic relations between operators, properties of difference and shift operators, fundamental theorem on finite differences and simple problems.

**UNIT-II**

**Interpolation with equal intervals:** Concept of interpolation and extrapolation, assumptions and uses of interpolation, difference tables, methods of interpolation with equal intervals - Newton's formula for forward and backward interpolation, Central differences, Gauss forward and backward, Sterling, Bessel's and Lalace-Everett's Formulae,

**UNIT-III**

**Interpolation with unequal intervals:** Divided differences and their properties. Methods of interpolation with unequal intervals – Newton's Divided difference formula and Lagrange's formula. Inverse interpolation- Lagrange's formula.

**UNIT-IV**

**Numerical Differentiation:** Introduction to Numerical differentiation. Determination of First and Second order derivatives for the given data using Newton's forward and backward, Gauss forward and backward, Sterling, Bessel's and Newton's Divided difference formula.

**UNIT-V**

**Numerical Integration:** Introduction to numerical integration, General Quadrature formula for equidistant ordinates, Trapezoidal rule, Simpson's 1/3 rd, Simpson's 3/8 th rule and Weddle's rule.

Books Recommended:

1. H.C. Saxena, Finite Differences and Numerical Analysis, S. Chand and Company, NewDelhi.
2. P.P.Gupta, G.S.Malik and Sanjay Gupta, Calculus of Finite Differences and Numerical Analysis, Krishna Prakashan Media(P) Ltd., Meerut(UP), India.
3. S.Ranganatham, M.V.S.S.N Prasad, V.Ramesh Babu, S.Chand & Company Ltd.
4. S. S. Sastry, Introductory Methods Numerical Analysis, Prentice- Hall of India.
5. C.F. Gerald and P. O. Wheatley, Applied Numerical Analysis, Addison- Wesley, 1998.



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2021-22

**Core papers**

**STATISTICS SYLLABUS**

Semester – VI (CBCS With Maths Combination Common to BA/BSc)

Paper – VIII(A3) : Econometric Methods

No. of Hours/week : 04

Credits :3

**UNIT-I**

**Basic Econometrics:** Nature of econometrics and economic data, concept of econometrics, steps in empirical economic analysis, econometric model, importance of measurement in economics, the structure of econometric data, cross section, pooled cross section, time series and paired data, simple regression models, two variable linear regression model, assumptions estimations of parameters.

**UNIT-II**

**Models and Estimations:** Gauss marcoff theorem, OLS estimations, partial and multiple correlations coefficients. The general linear model assumptions, estimation and properties of estimators, BLUEs, and tests of significance of estimators, R square and ANOVA.

**UNIT-III**

**Problems in OLS Estimators:** Nature, test, consequences and remedial steps of problems of heteroscedasticity; Multicollinearity and Auto-correlation; Problems of specification error; Errors of measurement.

**UNIT-IV**

**Regressions with Qualitative Independent Variables:** Dummy variable technique — Testing structural stability of regression models comparing two regressions, interaction effects, seasonal analysis.

**UNIT-V**

**Regressions with Qualitative Independent Variables:** Piecewise linear regression, use of dummy variables, regression with dummy dependent variables; The LPM, Logit, Probit and Tobit models — Applications.

**BASIC READING LIST**

1. Amemiya. T. (1985), Advanced Econometrics, Harvard University Press, Cambridge, Mass.
2. Baltagi. B.H. (1998), Econometrics, Springer, New York.



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2021-22

Core papers

**CBCS PATTERN FOR MICROBIOLOGY**



**B.Sc MICROBIOLOGY (CBCS) REVISED SYLLABUS - 2020**

**MBT- I: INTRODUCTION TO MICROBIOLOGY AND MICROBIAL DIVERSITY**

**TOTAL HOURS: 48**

**CREDITS: 4**

**UNIT-I:**

**No. of hours: 10**

History and developments in microbiology. Contributions of Anton von Leeuwenhoek, Edward Jenner, Louis Pasteur, Robert Koch, Ivanowsky. Importance and applications of microbiology. Classification of microorganisms- Whittaker's five kingdom classification, Bergey's Manual of Systematic Bacteriology. General characteristics of Bacteria, Archaea, Mycoplasmas, Cyanobacteria, Fungi, Algae, Protozoa and viruses.

**UNIT-II:**

**No. of hours: 10**

Methods of sterilization: Physical methods – Dry heat, moist heat, radiation methods, filtration methods, Chemical sterilization and disinfection methods .

Microbial cultures: Concept of pure culture, Methods of pure culture isolation, pure culture (streak plate, pour plate and spread plate), single cell isolation methods. Preservation of microbial cultures: subculturing, overlaying cultures- mineral oils, lyophilization, and culture storage at low temperature.

**UNIT-III:**

**No. of hours: 8**

Staining Techniques - Simple and Differential staining techniques.

Principles of microscopy - Bright field and Electron microscopy (SEM and TEM).

Microbial culture media-Natural basal media, differential media, enriched media enrichment media, selective and transport media, anaerobic culture media.

**UNIT-IV:**

**No. of hours: 10**

Microbial growth: Principles of growth, Kinetics of growth, measurement of growth:

Microbial growth: Principles of growth, Kinetics of growth, measurement of growth:  
(Direct methods: viable plate counts, membrane filtration). Indirect methods( Metabolic activity

– measurements of DNA, Protein, Microscopic counts,) electronic counters, most probable number; Batch and continuous Synchronous and Diauxic growth, Types of cultures-stock,.  
Reproduction in bacteria and spore formation.

**UNIT-V:**

**No. of hours: 10**

Cell structure of micro organisms- Cell wall of bacteria (Gram positive and gram negative) and Cell wall of fungi and yeasts- Morphology and chemical composition of bacteria, Actinomycetes, Cell wall lacking bacteria (Mycoplasma, Chlamydiae). Economic importance of algae and fungi.  
SCP.



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Core papers

**B.Sc MICROBIOLOGY (CBCS) REVISED SYLLABUS – 2020**

**MBT – II: MICROBIAL PHYSIOLOGY AND BIOCHEMISTRY**

**TOTAL HOURS: 48**

**CREDITS: 4**

**UNIT-I:**

**No. of hours: 8**

Microbial nutrition: Classification of micro organisms based on nutrients (carbon, nitrogen, other energy and electron sources). Autotrophs, heterotrophs, mixotrophs, Phototrophs (Photosynthetic pigments) .

**UNIT-II:**

**No. of hours: 10**

Aerobic respiration - Glycolysis, HMP path way, ED path way, TCA cycle, Electron transport, oxidative and substrate level phosphorylation. Kreb'scycle, glyoxylatecycle, hexose monophosphate (HMP) shunt, gluconeogenesis.

Anaerobic respiration Fermentation, Biochemical mechanisms of lacticacid, ethanol, butanol and citricacid fermentations. Nitrate and sulphate respiration. Outlines of oxygenic and anoxy genic photosynthesis in bacteria.

**UNIT – III:**

**No. of hours: 10**

General charecters , outline classification of Carbohydrates (Mono,Di and Polysaccharides), Lipids- General charecters–Triglycerides, phospholipids, glycolipids and waxes.

General characters, classification, structure and function of amino acids, Characterization of proteins and classification (primary, secondary, tertiary and quaternary), denaturation of proteins, hydrolysis, protein sequencing methods.

**UNIT – IV:**

**No. of hours: 10**

Nucleic acid types, base composition, nucleosides, nucleotides, Structure and functions of DNA (Types of DNA i.e. B, C, D and Z) and RNA (types i.e. m-RNA, r-RNA, t-RNA), Chargaff principles, Denaturation, renaturation and hybridization-  $cot^{1/2}$  values.

**UNIT- V**

**No. of hours: 10**

Structure, Nomenclature and classification of Enzymes, Kinetics (Michaelis – Menten equation), Factors effecting on enzyme activity ( $P^H$ , temperature, concentration) catalised reactions (Lock & Key, Induced Fit). Co-enzymes, co-factors.



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**Core papers**

**B.Sc MICROBIOLOGY (CBCS) REVISED SYLLABUS – 2020**  
**MBT – III: MEDICAL MICROBIOLOGY AND IMMUNOLOGY**

**TOTAL HOURS: 48**

**CREDITS: 4**

**UNIT- I:**

**No. of hours: 8**

Normal flora of human body. Host pathogen interactions: infection, invasion, pathogen, pathogenicity, virulence and opportunistic infection. General account on nosocomial infection. General principles of diagnostic microbiology- collection, transport and processing of clinical samples. General methods of laboratory diagnosis - cultural, biochemical, serological and molecular methods.

**UNIT- II:**

**No. of hours: 10**

General account on microbial diseases -causative agent, pathogenesis, epidemiology, diagnosis, prevention and control.

Bacterial diseases - Tuberculosis and Typhoid

Fungal diseases – Candidiasis, Aspergillosis, Yeast

Protozoal diseases – Malaria, Filaria & Diseases spread by House Fly.

Viral Diseases - Hepatitis- A & C and AIDS.

**UNIT- III:**

**No. of hours: 10**

Description and pathology of diseases caused by Aspergillus, Penicillium. Description and pathology of diseases caused by hemoflagellates; *Leishmania donovani*, *L.tropica*, *Trypanosoma gambiense*. Principles of chemotherapy, Antibacterial drugs – Penicillin, Antifungal drugs – Nystatin, Antiviral agents – Robovirin, Drug resistance in bacteria.

**UNIT- IV:**

**No. of hours: 10**

Types of immunity - innate and acquired; active and passive; humoral and cell-mediated immunity.

Primary and secondary organs of immune system - Thymus, Bursa fabricus, bone marrow, spleen and lymph nodes.

Cells of immune system – structure and functions of B and T lymphocytes, null cells, monocytes, macrophages, neutrophils, basophils and eosinophils.

**UNIT – V:**

**No. of hours: 10**

Antigens - types, chemical nature, antigenic determinants, haptens. Factors affecting antigenicity.

Antibodies - basic structure, types, properties and functions of immunoglobulins.

Types of antigen-antibody reactions - Agglutinations, Precipitation, Neutralization, complement fixation, blood groups.

Labeled antibody based techniques - ELISA, RIA and Immuno fluorescence. Polyclonal and monoclonal antibodies - production and applications.

Concept of Hypersensitivity and Autoimmunity. Hybridoma technology.



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**Core papers**

**B.Sc MICROBIOLOGY (CBCS) REVISED SYLLABUS - 2020**

**MBT – IV INDUSTRIAL MICROBIOLOGY**

**UNIT – I**

**No. of hours: 7**

Microorganisms of industrial importance –History,introduction and general characters of yeasts (*Saccharomyces cerevisiae*), moulds (*Aspergillus niger*) bacteria (*E.coli*), actinomycetes (*Streptomyces griseus*). Industrially important Primary and secondary microbial metabolites. Screening techniques. Techniques involved in strain improvement.

**UNIT – II**

**No.of hours: 10**

Fermentation and fermenter: concept and discovery of fermentation. Fermenter: its parts and function. Types of fermenter – batch, continuous and fed batch.

Types of fermentation processes – solid state, liquid state, batch, fed-batch, continuous.

Basic concepts of Design of fermenter.

Ingredients of Fermentation media.

Downstream processing - filtration, centrifugation, cell disruption, solvent extraction.

**UNIT – III**

**No.of hours: 8**

Microorganisms involved in Pharma and therapeutic enzymes. Enzymes used in detergents, textiles and leather industries. Production of amylases and Proteases. Production of therapeutic enzymes. Role of microorganisms in bioleaching and textile industry.

**UNIT – IV**

**No.of hours: 7**

Industrial microorganisms: cell growth, microbial growth kinetics, factors affecting growth, basic nutrition, principles of production media, components of media, chemical composition of media.

Bioreactors: basic structure of bioreactor, types of bioreactors, kinetics and methodology of batch and continuous bioreactors. Sterilization of bioreactors: fibrous filter sterilization. Aeration and agitation: agitation in shake flask and tube rollers.

**UNIT – V**

**No.of hour: 7**

Microbial production and applications of Industrial products: Citric acid, Ethanol, Penicillin, Glutamic acid, and vitamin B12, Single cell proteins, Production of bacterial and viral vaccines.



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Core papers

**B.Sc MICROBIOLOGY (CBCS) REVISED SYLLABUS - 2020**  
**MBT – V: MOLECULAR BIOLOGY AND MICROBIAL GENETICS**

**TOTAL HOURS: 48**

**CREDITS: 4**

**UNIT-I**

**No. of hours: 8**

DNA and RNA as genetic material. Structure and organization of prokaryotic DNA. Watson and Crick model of DNA. Extra chromosomal genetic elements - Plasmids and transposons. Replication of DNA - Semi conservative mechanism, Enzymes involved in replication.

**UNIT-II**

**No. of hours: 10**

Mutations - spontaneous and induced, base pair changes, frame shifts, deletions, inversions, tandem duplications, insertions.

Mutagens - Physical and Chemical mutagens.

Outlines of DNA damage and repair mechanisms.

**UNIT-III**

**No. of hours: 10**

Modern concept of gene Cistron, Recon and Muton. One gene one enzyme and one gene one polypeptide hypotheses.

Types of RNA and their functions, poly and mono cistronic m-RNA.

Genetic code – genetic code, the decoding system, codon- anticodon interaction.

Structure of ribosomes.

Bacterial recombination – Bacterial transformation, Bacterial conjugation, Transduction– Generalized and specialized transductions.

**UNIT-IV**

**No. of hours: 10**

**Transcription:** Introduction- Basic features of RNA synthesis, *E.coli* RNA polymerase, Classes of RNA molecules, processing of tRNA and rRNA and m-RNA. Transcription in Eukaryotes, Eukaryotic rRNA genes, formation of eukaryotic tRNA molecules, RNA Polymerases of eukaryotes. **Translation:** Outline of Translation. Protein Synthesis, Complex Translation units, Inhibitors and Modifiers of protein synthesis, Protein Synthesis in Eukaryotes.

**UNIT-V**

**No. of hours: 8**

Gene regulation- structural, constitutive, regulatory, clustered genes and the control of gene expression. Regulation of gene expression in bacteria - operon concepts - Negative and positive control of the Lac Operon, trp operon.



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Core papers

**B.Sc MICROBIOLOGY (CBCS) SYLLABUS  
THIRD YEAR – SEMESTER- V**

**PAPER-V : ENVIRONMENTAL & AGRICULTURAL MICROBIOLOGY**

**TOTAL HOURS: 36**

**CREDITS: 3**

**UNIT - I No. of hours: 8**

Terrestrial Environment: Soil profile and soil microflora Aquatic Environment: Microflora of fresh water and marine habitats Atmosphere: Aeromicroflora and dispersal of microbes Extreme Habitats: Extremophiles: Microbes thriving at high & low temperatures, pH, high hydrostatic & osmotic pressures, salinity, & low nutrient levels.

**UNIT – II No. of hours: 8**

Role of microorganisms in nutrient cycling (Carbon, nitrogen, phosphorus). Treatment and safety of drinking (potable) water, methods to detect potability of water samples: (a) standard qualitative procedure: presumptive test/MPN test, confirmed and completed tests for faecal coliforms (b) Membrane filter technique Microbial interactions – mutualism, commensalism, antagonism, competition, parasitism, predation.

**UNIT – III No. of hours: 6**

Outlines of Solid Waste management: Sources and types of solid waste, Methods of solid waste disposal (composting and sanitary landfill). Liquid waste management: Composition and strength of sewage (BOD and COD), Primary, secondary (oxidation ponds, trickling filter, activated sludge process and septic tank) and tertiary sewage treatment.

**UNIT – IV No. of hours: 7**

Plant Growth Promoting Microorganisms - Mycorrhizae, Rhizobia, Azospirillum, Azotobacter, Frankia, phosphate-solubilizers and Cyanobacteria. Outlines of biological nitrogen fixation (symbiotic, non-symbiotic). Biofertilizers - Rhizobium.

**UNIT – V No. of hours: 7**

Concept of disease in plants. Symptoms of plant diseases caused by fungi, bacteria, and viruses. Plant diseases - groundnut rust, Citrus canker and tomato leaf curl. Principles of plant disease control.

**PRACTICAL-V : ENVIRONMENTAL & AGRICULTURAL MICROBIOLOGY**

**TOTAL HOURS: 36**

**CREDITS: 2**

1. Analysis of soil – pH, Moisture content and water holding capacity.



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▲ B.Sc MICROBIOLOGY (CBCS) SYLLABUS

THIRD YEAR – SEMESTER -V

PAPER-VI A: MICROBIAL DIAGNOSIS IN HEALTH CLINICS (ELECTIVE)

TOTAL HOURS: 36

CREDITS: 3

**UNIT- I No. of hours: 8**

Bacterial, Viral, Fungal and Protozoan Diseases of various human body systems, Disease associated clinical samples for diagnosis.

**UNIT- II No. of hours: 8**

Collection of clinical samples (oral cavity, throat, skin, blood, CSF, urine and faeces) and precautions required. Method of transport of clinical samples to laboratory and storage.

**UNIT- III No. of hours: 8**

Examination of sample by staining - Gram stain, Ziehl-Neelson staining for tuberculosis, Giemsa-stained thin blood film for malaria Preparation and use of culture media - Blood agar, Chocolate agar, Lowenstein-Jensen medium, MacConkey agar, Distinct colony properties of various bacterial pathogens.

**UNIT- IV No. of hours: 6**

Serological Methods - Agglutination, ELISA, immunofluorescence, Nucleic acid based methods - PCR, Nucleic acid probes. Typhoid, Dengue and HIV, Swine flu.

**UNIT- V No. of hours: 6**

Importance, Determination of resistance/sensitivity of bacteria using disc diffusion method, Determination of minimal inhibitory concentration (MIC) of an antibiotic by serial double dilution method

**PRACTICAL-VI A: MICROBIAL DIAGNOSIS IN HEALTH CLINICS**

**TOTAL HOURS: 36**

**CREDITS: 2**

1. Collection transport and processing of clinical specimens (Blood, Urine, Stool and Sputum).  
Receipts, Labeling, recording and dispatching clinical specimens.
2. Isolation of bacteria in pure culture and Antibiotic sensitivity.



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**B.Sc MICROBIOLOGY (CBCS) SYLLABUS  
THIRD YEAR – SEMESTER- V**

**PAPER-VI B: MICROBIAL BIOTECHNOLOGY (ELECTIVE)**

**TOTAL HOURS: 36**

**CREDITS: 3**

**UNIT- I No. of Hours: 8**

Microbial biotechnology: Scope and its applications in human therapeutics, agriculture (Biofertilizers, PGPR, Mycorrhizae), environmental, and food technology. Genetically engineered microbes for industrial application: Bacteria and yeast

**UNIT- II No. of Hours: 7**

Recombinant microbial production processes in pharmaceutical industries - Streptokinase, recombinant vaccines (Hepatitis B vaccine). Microbial polysaccharides, polyesters and bioplastics. Microbial production of bio-pesticides Microbial biosensors

**UNIT- III No. of Hours: 10**

Microbial based transformation of steroids and sterols. Bio-catalytic processes and their industrial applications: Production of high fructose syrup and production of cocoa butter substitute. Immobilization methods and their application: Whole cell immobilization

**UNIT- IV No. of Hours: 7**

Bio-ethanol and bio-diesel production: commercial production from lignocellulosic waste and algal biomass. Biogas production: Methane and hydrogen production using microbial culture. Microorganisms in bioremediation: Degradation of xenobiotics. Mineral recovery, removal of heavy metals from aqueous effluents.

**UNIT- V No. of Hours: 4**

Outlines of Intellectual Property Rights: Patents, Copyrights, Trademarks

**PRACTICAL-VI B: MICROBIAL BIOTECHNOLOGY**

**TOTAL HOURS: 36**

**CREDITS: 2**

1. Yeast cell immobilization in calcium alginate gels



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**B.Sc MICROBIOLOGY (CBCS) SYLLABUS**

**THIRD YEAR – SEMESTER- VI**

**PAPER-VII: FOOD AND INDUSTRIAL MICROBIOLOGY**

**TOTAL HOURS: 36**

**CREDITS: 3**

**UNIT- I No. of hours: 8**

Intrinsic and extrinsic parameters that affect microbial growth in food Microbial spoilage of food - fruits, vegetables, milk, meat, egg, bread and canned foods Food intoxication (botulism). Food-borne diseases (salmonellosis) and their detection.

▲ **UNIT – II No. of hours: 7**

Principles of food preservation - Physical and chemical methods. Fermented Dairy foods – cheese and yogurt. Microorganisms as food – SCP, edible mushrooms (white button, oyster and paddy straw). Probiotics and their benefits.

**UNIT – III No. of hours: 6**

Microorganisms of industrial importance – yeasts, moulds, bacteria, actinomycetes. Isolation and Screening of industrially-important microorganisms. Outlines of strain improvement.

**UNIT – IV No. of hours: 8**

Types of fermentation processes – solid state, liquid state, batch, fed-batch, continuous. Design of fermenter. Ingredients of Fermentation media Downstream processing - filtration, centrifugation, cell disruption, solvent extraction.

**UNIT – V No. of hours: 7**

Microbial production of Industrial products - Citric acid, Ethanol, amylases, penicillin, glutamic acid and vitamin B12.

**PRACTICAL-VII: FOOD AND INDUSTRIAL MICROBIOLOGY**



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Core papers

**B.Sc MICROBIOLOGY (CBCS) SYLLABUS**  
**THIRD YEAR – SEMESTER-VI**  
**CLUSTER ELECTIVE**

**PAPER-VIII-A1: COMPUTATIONAL METHODS AND BIOINFORMATICS**

**UNIT-1**

A) Definition of statics, population and universe, the sample and population, statistical inference. Parameters and statistics. Internal data: Construction of histograms & interpretation. The normal distribution of mean, mode, median and standard deviation representing the normal curve, comparisons of means and variance.

B) Proportion data: examples of proportion data (MPN, sterility testing of medicines, animal toxicity, therapeutic, infection and immunization studies), Chi - square test, goodness of fit.

C) Count data: Examples of count data (bacteria cell count, radioactivity count, colony and plaque count) statistical treatment to count data:- Poisson distribution, standard error confidence limits of counts. (20hrs)

**UNIT-II**

A). Analysis of variance: Analysis of co-variance: introduction, procedure, t-Test and F-Test for multiple comparisons.

B) Correlation and regression and line fitting through graph points, standard curves, correlation, linear regression, MLR, multi-collinearity, standard curves and interpolation of unknown Y - values (15hrs)

**UNIT-III**

A) Computer fundamentals - organization and working of computers Basic definitions - hard ware and soft ware film ware, Program flowchart computer architecture fundamentals-internals, externals net work peripherals.

B) Introduction to windows 2000: Desktop files and folders: simple operations like creation deletion, moving, copying files or folders using window explorer. Searching files and folders and other simple operations.

**UNIT-IV**

A) Word processing: opening, creating and saving documents, Typing, navigating, selecting, editing and sorting, checking spelling and grammar formatting - changing appearance of page - importing graphics, working with tables, documents printing. Basis of power point

B) Use of internet and working systems.

C) Microbiology applications of special software.

**UNIT-V**

A) Bioinformatics: Definition concept scope and relevance of bioinformatics Applications nbr genomics, proteomics, os databases molecular modeling drug designing, gene therapy, structure and functional relationship of biomolecules and other application of bioinformatics .

B) Sequence analysis: Concepts, importance and alignment methods, comparative, multiple sequence alignments, and scoring methods.

C) Phylogenetic Analysis - concept evolution of p. trees gene predictions -methods tools(GRAIL Genlang gene tindu procrutes Gene panges Prot pred:- methods for knowing & unknowing folds modelling and drug designing.



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Core papers

**B.Sc MICROBIOLOGY (CBCS) SYLLABUS**

**THIRD YEAR – SEMESTER-VI**

**PAPER-VIII-A2 : BIOFERTILIZERS AND BIOPESTICIDES**

**TOTAL HOURS: 36**

**CREDITS: 3**

**UNIT – I No of Hours: 10**

General account of the microbes used as biofertilizers for various crop plants and their advantages over chemical fertilizers. Symbiotic N<sub>2</sub> fixers: *Rhizobium* - Isolation, characteristics, types, inoculum production and field application, legume/pulses plants *Frankia* from non-legumes and characterization. Cyanobacteria from *Azolla*, characterization, mass multiplication, Role in rice cultivation, Crop response, field application.

**UNIT – II No of Hours: 6**

Free living *Azospirillum*, *Azotobacter* - isolation, characteristics, mass inoculum production and field application.

**UNIT – III No of Hours: 6**

Phosphate solubilizing microbes - Isolation, characterization, mass inoculum production, field application

**UNIT – IV No of Hours: 7**

Importance of mycorrhizal inoculum, types of mycorrhizae and associated plants, Mass inoculum production of VAM, field applications of Ectomycorrhizae and VAM.

**UNIT – V No of Hours: 7**

General account of microbes used as bioinsecticides and their advantages over synthetic pesticides. *Bacillus thuringiensis* - production, Field applications. Viruses – NPV cultivation and field applications.

**PRACTICAL-VIII-A2: BIOFERTILIZERS AND BIOPESTICIDES**

**TOTAL HOURS: 36**

**CREDITS: 2**

1. Isolation of *Rhizobium* from root nodules.
3. Isolation of phosphate solubilizers from soil
4. Staining and observation of VAM
3. A visit to biofertilizer production unit.

**SUGGESTED READINGS**

- Agarwal SK (2005) **Advanced Environmental Biotechnology**, APH publication.  
Kannaiyan, S. (2003). **Bioetchnology of Biofertilizers**, CHIPS, Texas.  
Mahendra K. Rai (2005). **Hand book of Microbial biofertilizers**, The Haworth Press, Inc. New York.  
Reddy, S.M. et. al. (2002). **Bioinoculants for sustainable agriculture and forestry**, Scientific Publishers.



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**Core papers**

**B.Sc MICROBIOLOGY (CBCS) SYLLABUS  
THIRD YEAR – SEMESTER- VI  
PAPER-VIII-A3: MICROBIAL QUALITY CONTROL IN FOOD AND  
PHARMACEUTICAL INDUSTRIES**

**TOTAL HOURS: 36**

**CREDITS: 3**

**UNIT – I No. of Hours: 8**

Good laboratory practices - Good microbiological practices. Biosafety cabinets – Working of biosafety cabinets, using protective clothing, specification for BSL-1, BSL-2, BSL-3. Discarding biohazardous waste – Methodology of Disinfection, Autoclaving & Incineration

**UNIT – II No. of Hours: 8**

Culture and microscopic methods - Standard plate count, Most probable numbers, Direct microscopic counts, Biochemical and immunological methods: Limulus lysate test for endotoxin, gel diffusion, sterility testing for pharmaceutical products

**UNIT – III No. of Hours: 8**

Molecular methods - Nucleic acid probes, PCR based detection, biosensors.

**UNIT – IV No. of Hours: 8**

Enrichment culture technique, Detection of specific microorganisms - on XLD agar, *Salmonella Shigella* Agar, Manitol salt agar, EMB agar, McConkey Agar, Saboraud Agar Ascertaining microbial quality of milk by MBRT, Rapid detection methods of microbiological quality of milk at milk collection centres (COB, 10 min Resazurin assay).


**UNIT – V No. of Hours: 4**

Hazard analysis of critical control point (HACCP) - Principles, flow diagrams, limitations  
Microbial Standards for Different Foods and Water – BIS standards for common foods and drinking water.

**PRACTICAL-VIII-A3: MICROBIAL QUALITY CONTROL IN FOOD AND  
PHARMACEUTICAL INDUSTRIES**

**TOTAL HOURS: 36**

**CREDITS: 2**

1. Microbiological laboratory safety- General rules & Regulations.
2. Sterility tests for Instruments – Autoclave & Hot Air Oven
3. Disinfection of selected instruments & Equipments
4. Sterility of Air and its relationship to Laboratory & Hospital sepsis.
5. Sterility testing of Microbiological media
6. Sterility testing of Pharmaceutical products –Antibiotics, Vaccines & fluids
7. Standard qualitative analysis of water.
8. Quantitative analysis of water – Membrane filter method
9. Analysis of food samples for Mycotoxins 



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2021-22

Core papers

Major Domain Subject: **BIO-CHEMISTRY**  
**SEMESTER-I**

Course: **Biomolecules**  
Code: **BCH-1**

**60 HRS**  
**(5 periods/week)**

**Unit - I: Biophysical Concepts** **12 hours**

Water as biological solvent, Buffers, measurement of pH, electrodes, Biological relevance of pH, pKa value, analysis of drinking water and pond water, Total dissolved salts (TDS), BOD, COD, soil analysis (texture, organic matter, elements), Electrical conductivity.

**Unit - II: Carbohydrates** **12 hours**

Carbohydrates: Classification, monosaccharides, D and L designation, open chain and cyclic structures, epimers and anomers, mutarotation, reactions of carbohydrates (due to functional groups - hydroxyl, aldehyde and ketone). Amino sugars, Glycosides. Structure and biological importance of disaccharides (sucrose, lactose, maltose, isomaltose, trehalose), trisaccharides (raffinose, melezitose), structural polysaccharides (cellulose, chitin, pectin) and storage polysaccharides (starch, inulin, glycogen). Glycosaminoglycans, Bacterial cell wall polysaccharides. Outlines of glycoproteins, glycolipids and blood group substances.

**Unit – III: Lipids** **12 hours**

Lipids: Classification, saturated and unsaturated fatty acids, structure and properties of fats and oils (acid, saponification and iodine values, rancidity). General properties and structures of phospholipids. Prostaglandins- structure, types and biological role. Lipoproteins- types and functions, Biomembranes-formation of micelles, bilayers, vesicles, liposomes. Membrane composition and organization - Fluid mosaic model.

**Unit-IV: Amino Acids and Proteins** **12 hours**

Amino Acids: Classification, structure, stereochemistry, chemical reactions of amino acids due to carbonyl and amino groups. Titration curve of glycine and pK values. Essential and nonessential amino acids, non-protein amino acids. Peptide bond - nature and conformation. Naturally occurring peptides - glutathione, enkephalin.

**Unit-V: Nucleic acids and porphyrins****12 hours**

Types of RNA and DNA. Structure of purines and pyrimidines, nucleosides, nucleotides. Stability and formation of phosphodiester linkages. Effect of acids, alkali and nucleases on DNA and RNA. Structure of Nucleic acids- Watson-Crick DNA double helix structure, denaturation and renaturation kinetics of nucleic acids-,  $T_m$ -values and their significance, cot curves and their significance.

Structure of porphyrins: Identification of Porphyrins, Protoporphyrin, porphobilinogen properties, Structure of metalloporphyrins–Heme, cytochromes and chlorophylls.

**I Semester Practicals: Qualitative Analysis**

1. Preparation of buffers (acidic, neutral and alkaline) and determination of pH.
2. Qualitative identification of carbohydrates- glucose, fructose, ribose/xylose, maltose, sucrose, lactose, starch/glycogen.
3. Qualitative identification of amino acids- histidine, tyrosine, tryptophan, cysteine, arginine.
4. Qualitative identification of lipids- solubility, saponification, acrolein test, Salkowski test, Lieberman-Burchard test.
5. Preparation of Osazones and their identification.
6. Absorption maxima of colored substances- p-Nitrophenol, Methyl orange.
7. Absorption spectra of protein-BSA, nucleic acids-Calf thymus DNA.



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Core papers

Major Domain Subject: BIO-CHEMISTRY

SEMESTER-II

Course: Analytical techniques

Code: BCH-II

60 HRS

(5 periods/week)

**Unit-I: Cell homogenization and centrifugation**

**12 hours**

Methods of tissue homogenization: (Potter-Elvehjem, mechanical blender, sonicator and enzymatic). Centrifugation techniques, principles and applications- differential, density gradient. Ultra-centrifugation- preparative and analytical.

**Unit-II: Chromatographic techniques**

**12 hours**

Types of chromatographic techniques, Principle and applications - Paper chromatography- solvents, Rf value, applications; Thin layer chromatography- principle, choice of adsorbent and solvent, Rf value, applications; Gel filtration, Ion- exchange- principle, resins, action of resins, experimental techniques, applications, separation of metal ions; Affinity chromatography.

**Unit-III: Spectroscopy and tracer techniques**

**12 hours**

Electromagnetic radiation, Beer-Lambert's law.

Colorimetry and Spectrophotometry, spectrofluorimetry, flame photometry. Tracer techniques: Radio isotopes, units of radio activity, half life,  $\beta$  and  $\gamma$ - emitters, use of radioactive isotopes in biology, ELISA, RIA.

**Unit-IV: Electrophoresis**

**12 hours**

Electrophoresis- principles and applications of paper, polyacrylamide (native and SDS) and agarose gel electrophoresis, isoelectric focusing, immune-electrophoresis-types and applications.

**Unit-V: Microbial techniques:****12 hours**

Microscopy: Basic principles of light microscopy, phase contrast, electron microscope and fluorescent microscope and their applications.

Preparation of different growth media, isolation and culturing and preservation of microbes, Gram's

staining- Gram positive and Gram negative bacteria, motility and sporulation, Sterilization techniques-Physical methods, chemical methods, radiation methods, ultrasonic and. Antibiotic resistance.

**Practical BCP- 201 :****Biochemical Techniques****List of Experiments:**

1. Isolation of RNA and DNA from tissue/culture.
2. Qualitative Identification of DNA, RNA and Nitrogen Bases
3. Isolation of egg albumin from egg white.
4. Isolation of cholesterol from egg yolk.
5. Isolation of starch from potatoes.
6. Isolation of casein from milk.
7. Separation of amino acids by paper chromatography.
8. Determination of exchange capacity of resin by titrimetry.
9. Separation of serum proteins by paper electrophoresis.

**Recommended books:**

1. Principles and Techniques of practical Biochemistry. Eds. Williams and Wilson.
2. Techniques in Molecular biology Ed. Walker & Gastra, Croom Helm, 1983.
3. Principles of instrumental analysis, 2nd Ed, Holt-Sanders, 1980.
4. An introduction to spectroscopy for Biochemistry. Ed. Brown S.N., Academic press



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Major Domain Subject: BIO-CHEMISTRY

Semester-III

Course: Enzymology, Bioenergetics and Intermediary Metabolism

Code: BCH-III

60 HRS  
(5 periods/week)

**Unit-I: Enzymology**

**12 hours**

Introduction to Biocatalysis, differences between chemical and biological catalysis. Nomenclature and classification of enzymes. Definition of holo-enzyme, apo-enzyme, coenzyme, cofactor. Active site, Enzyme specificity. Principles of energy of activation, transition state. Interaction between enzyme and substrate-lock and key, induced fit models. Fundamentals of enzyme assay, enzyme units. Outlines of mechanism of enzyme action, factors affecting enzyme activity. Commercial application of enzymes.

**Unit- II: Bioenergetics and Biological oxidation**

**12 hours**

Bioenergetics: Thermodynamic principles – Chemical equilibria; free energy, enthalpy (H), entropy (S). Free energy change in biological transformations in living systems; High energy compounds. Energy, change, oxidation-reduction reactions. Organization of electron carriers and enzymes in mitochondria. Classes of electron-transferring enzymes, inhibitors of electron transport. Oxidative phosphorylation. Uncouplers and inhibitors of oxidative phosphorylation. Mechanism of oxidative phosphorylation.

**Unit-III: Carbohydrate Metabolism.**

**12 hours**

Concept of anabolism and catabolism. Glycolytic pathway, energy yield. Fate of pyruvate-formation of lactate and ethanol, Citric acid cycle, regulation, energy yield, amphipathic role. Anaplerotic reactions. Glycogenolysis and glycogenesis. Pentose phosphate pathway. Gluconeogenesis. Photosynthesis- Light and Dark reactions, Calvin cycle, C<sub>4</sub> Pathway. Disorders of carbohydrate metabolism- Diabetes Mellitus.

**Unit-IV: Lipid Metabolism****12 hours**

Catabolism of fatty acids ( $\beta$ - oxidation) with even and odd number of carbon atoms, Ketogenesis, *DE NOVO* synthesis of fatty acids, elongation of fatty acids in mitochondria and microsomes, Biosynthesis and degradation of triacylglycerol and lecithin. Biosynthesis of cholesterol. Disorders of lipid metabolism.

**Unit-V: Metabolism of Amino acids****12 hours**

General reactions of amino acid metabolism- transamination, decarboxylation and deamination, Urea cycle and regulation, Catabolism of carbon skeleton of amino acids- glycolytic and ketogenic amino acids. Metabolism of glycine, serine, aspartic acid, methionine, phenylalanine and leucine. Biosynthesis of creatine. Inborn errors of aromatic and branched chain amino acid metabolism.



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2021-22

Core papers

Major Domain Subject: BIO-CHEMISTRY

SEMESTER-IV

Course: Physiology, Nutritional and Clinical Biochemistry

Code: BCH-IV

60 HRS

(5 periods/week)

**Unit-I: Digestion and Blood**

12hours

Digestion and absorption of carbohydrates, lipids and proteins. Role of enzymes and gastrointestinal hormones in digestion. Composition of blood, Blood groups, coagulation of blood and disorders of blood coagulation (haemophilia). Hemoglobin and transport of gases in blood (oxygen and CO<sub>2</sub>). Types of anemias, haemoglobinopathies-sickle cell anemia.

**Unit-II: Nervous system and excretory system**

12hours

Introduction to nervous system, general organization of nervous system, Neurons-structure, types, properties and functions; Neurotransmitters, Cerebrospinal fluid-composition and functions, Reflex-types and properties.

Introduction to excretory system. Organization of kidney, Structure and functions of nephron, Urine formation, Role of kidneys in maintaining acid-base and electrolyte balance in the body.

**Unit III: Endocrinology**

12 hour

Endocrinology- organization of endocrine system. Classification of hormones. Outlines of chemistry, physiological role and disorders of hormones of thyroid, parathyroid, pituitary and hypothalamus. Introduction of gastrointestinal hormones. Mechanism of hormonal action- signal transduction pathways for glucocorticoids and insulin. Adrenalin, estrogen and progesterone.

**Unit- IV: Nutritional Biochemistry****12hours**

Balanced diet. Calorific values of foods and their determination by bomb calorimeter. BMR and factors affecting it. Specific dynamic action of foods. Energy requirements and recommended dietary allowance (RDA) for children, adults, pregnant and lactating women. Sources of complete and incomplete proteins. Biological value of proteins. Malnutrition- Kwashiorkar, Marasmus and PEM.

Vitamins- sources, structure, biochemical roles, deficiency disorders of water- and fat-soluble vitamins. Introduction to nutraceutical and functional foods. Bulk and trace elements-Ca, Mg, Fe, I, Cu, Mo, Zn, Se and F.

**Unit- V: Clinical Biochemistry****12hours**

Plasma proteins in health and disease. Liver diseases-jaundice. Liver function tests-conjugated and total bilirubin in serum, albumin: globulin ratio, Serum enzymes in liver diseases-SGOT, SGPT, GGT,CPK, Acid and alkaline phosphatases. Serum lipids and lipoproteins. Normal and abnormal constituents of urine. Renal function tests-Blood urea, creatinine, GFR, creatinine clearance. GTT and gastric and pancreatic function test

**Practical – BCH-401: Nutritional and Clinical Biochemistry 45 HRS****(3 periods/week)****List of Experiments:**

1. Estimation of calcium by titrimetry
2. Estimation of iron by Wong's method.
3. Estimation of vitamin C by 2, 6 -dichlorophenol indophenol method.
4. Determination of iodine value of an oil.



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2021-22

**Core papers**

Major Domain Subject: BIO-CHEMISTRY

Semester - IV

Course: Microbiology, Immunology and Molecular biology

Code: BCH-V

6 HRS

(5 periods/week)

**Unit-I: Microbiology 12 hours**

Introduction to microbiology and microbial diversity. Classification of microorganisms- prokaryotic and eukaryotic microorganisms. Bacterial structure, growth curve and kinetics of growth. Introduction to viruses-plant and animal viruses, structure, life cycle, Food and dairy microbiology.

**Unit-II: Nitrogen Fixation 12 hours**

Nitrogen cycle, Non-biological and biological nitrogen fixation, photosynthetic and non-photosynthetic systems, Nitrogenase system. Utilization of nitrate ion, Ammonia incorporation into organic compounds. Synthesis of glutamine and regulatory mechanism of glutamine synthase.

**Unit-III: Applied Biochemistry  
12 hours**

Fermentation Technology: Batch, continuous culture techniques, principle types of fermentors. Pasteur effect. Industrial production of chemicals- alcohol, acids (citric acid), solvents (acetone), antibiotics (penicillin), Enzyme Technology: Immobilization of enzymes and cells, industrial applications, enzymes in Bioremediation.

**Unit- IV : Immunology 12 hours**

Organs and cells of immune system. Innate and acquired immunity, Cell mediated and humoral immunity (T-cells and B-cells). Classification of immunoglobulins, structure of IgG. Epitopes / antigenic determinants. Concept of haptens. Adjuvants. Monoclonal antibodies. Antigen-antibody reactions- agglutination, immunoprecipitation, immunodiffusion. Blood group antigens. Immunodiagnosics- ELISA. Vaccines and their

classification. Traditional vaccines-live and attenuated. Modern vaccines- recombinant and peptide vaccines. Outlines of hypersensitivity reactions.

**Unit- IV: Molecular biology**                      **12 hours**

Types of RNA and DNA, DNA replication-leading and lagging strands, okazaki fragments, inhibitors of DNA replication. Genetic code, Protein synthesis-transcription, translation, inhibitors of protein synthesis. Outlines of cloning technology, vectors, restriction enzymes, PCR, applications of cloning in agriculture, industry and medical fields.

**Practical – BCP-501: Microbiology and immunology**    **45 HRS**

**(3 periods/week)**

**List of Practical Experiments**

10. Biosafety and good laboratory practices (GLP) of Microbiology.
11. Sterilization of microbial media by autoclave.
12. Isolation of pure cultures: (i) Streak plate method. (ii) Serial dilution method.
13. Demonstration of alcohol fermentation.
14. Antibiotic sensitivity by paper disc method.
15. Effect of nitrogen sources on growth of E. coli
16. Immunodiffusion by Ouchterlony method.
17. Blood group analysis.
18. Isolation of DNA from plant tissues.
19. Spotters.



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2021-22

Core papers

**Biochemistry**

Semester-V

**Paper – V : Physiology, Clinical Biochemistry and Immunology**

**Unit- I: Physiology 12 hours**

Digestion and absorption of carbohydrates, lipids and proteins. Composition of blood and coagulation of blood. Hemoglobin and transport of gases in blood (oxygen and CO<sub>2</sub>). Muscle- kinds of muscles and mechanism of muscle contraction.

**Unit II: Endocrinology 12 hours**

Endocrinology- organization of endocrine system. Classification of hormones. Outlines of chemistry, physiological role and disorders of hormones of thyroid, parathyroid, pituitary and hypothalamus. Introduction of gastro intestinal hormones. Mechanism of hormonal action signal transduction pathways for gluco corticoids and insulin. Adrenalin, estrogen and progesterone.

**Unit- III: Nutritional Biochemistry 12 hours**

Balanced diet. Calorific values of foods and their determination by bomb calorimeter. BMR and factors affecting it. Specific dynamic action of foods. Energy requirements and recommended dietary allowance (RDA) for children, adults, pregnant and lactating women. Sources of complete and incomplete proteins. Biological value of proteins. Malnutrition- Kwashiorkar, Marasmus and PEM. Vitamins- sources, structure, biochemical roles, deficiency disorders of water and fat soluble vitamins. Introduction to neutraceutical and functional foods. Bulk and trace elements-Ca, Mg, Fe, I, Cu, Mo, Zn, Se and F. Obesity and starvation.

**Unit- IV: Clinical Biochemistry 12 hours**

Plasma proteins in health and disease. Disorders of blood coagulation (haemophilia). Types of anemias, haemoglobinopathies-sickle cell anemia. Liver diseases-jaundice. Liver function tests- conjugated and total bilirubin in serum, albumin: globulin ratio, Serum enzymes in liver diseases- SGPT, GGT and alkaline phosphatase. Kidneys-structure of nephron, urine formation, normal and abnormal constituents of urine. Biological buffers. Role of kidneys in maintaining acid-base and electrolyte balance in the body. Renal function test- creatinine.

**Unit- V: Immunology 12 hours**

Organization of immune system. Organs and cells of immune system. Innate and acquired immunity. Cell mediated and humoral immunity (T- and B- cells). Classification of

immunoglobulins, structure of IgG. Epitopes / antigenic determinants. Concept of haptens. Adjuvants. Monoclonal antibodies. Antigen-antibody reactions- agglutination, immunoprecipitation, immunodiffusion. Blood group antigens. Immunodiagnostics- ELISA. Vaccines and their classification. Traditional vaccines-live and attenuated. Modern vaccines-recombinant and peptide vaccines. Outlines of hypersensitivity reactions.



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2021-22

Core papers

**Biochemistry**

**SEMESTER V**

**Paper – VI(B) : Molecular Basis of Infectious Diseases (Elective-2)**

**Unit-I: Classification of infectious agents 12 hrs**

Bacteria, Viruses, protozoa and fungi. Past and present emerging and re-emerging infectious

diseases and pathogens. Source, reservoir and transmission of pathogens, Antigenic shift and antigenic drift. Host parasite relationship, types of infections associated with parasitic organisms. Overview of viral and bacterial pathogenesis. Infection and evasion.

**Unit-II: Overview of diseases caused by bacteria 12 hrs**

Detailed study of tuberculosis: History, causative agent, molecular basis of host specificity, infection and pathogenicity, Diagnostics, Therapeutics, inhibitors and vaccines. Drug resistance and implications on public health. Other bacterial diseases including Typhoid, Diphtheria, Pertussis, Tetanus and Pneumonia.

**Unit –III: Overview of diseases caused by Viruses 12 hrs**

Detailed study of AIDS, history, causative agent, pathogenesis, Diagnostics, Drugs and inhibitors. Other viral diseases including hepatitis, influenza, rabies, chikungunya and polio.

**Unit-IV: Overview of diseases caused by Parasites 12 hrs**

Detailed study of Malaria, history, causative agents, Vectors, life cycle, Host parasite interactions, Diagnostics, Drugs and Inhibitors, Resistance, Vaccine development. Other diseases including leishmaniasis, amoebiasis.

**Unit-V: Overview of diseases caused by other organisms 12 hrs**

Fungal diseases, General characteristics. Medical importance of major groups, pathogenesis, treatment.

**Elective Practical -6B: MOLECULAR BASIS OF INFECTIOUS DISEASES 45 hrs 3 periods/ Week**

**List of Experiments:**



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2021-22

Core papers

**Biochemistry**

**Semester – VI**

**Paper – VII : Microbiology and Molecular Biology**

**Unit- I: Microbiology 12hours**

Introduction to brief history of microbiology. Classification of microorganisms- prokaryotic and eukaryotic microorganisms. Isolation and cultivation of bacteria. Selective media and enriched media. Bacterial growth curve and kinetics of growth. Gram's staining- Gram positive and Gram negative bacteria, motility and sporulation. Structure and composition of viruses. Isolation and cultivation of bacterial plaques. Lytic and lysogenic life cycle of  $\lambda$  phage. Retro viruses- HIV.

**Unit II-Applied Biochemistry 12 hours**

Fermentation Technology: Batch, continuous culture techniques, principle types of fermentors. Industrial production of chemicals- alcohol, acids (citric acid), solvents (acetone), antibiotics (penicillin), Enzyme Technology: Immobilization of enzymes and cells, different methods. Industrial applications. Production of transgenic plants and their applications. Introduction to Bioinformatics- definitions of proteomics and genomics. Gene bank, NCBI, DDBJ, Swissprot, PDB. Sequence alignments- BLAST and FASTA.

**Unit- III: DNA Replication and Transcription 12 hours**

Nature and structure of the gene. DNA replication- models of replication, Meselson-Stahl's experimental proof for semi-conservative model. DNA polymerases I, II and III of E.coli, helicase, topoisomerases, primase, ligase. Bidirectional replication model. Okazaki fragments, leading and lagging strands of DNA synthesis. Inhibitors of DNA replication. Transcription - RNA synthesis, RNA polymerases of prokaryotes. Promoters, Initiation- sigma factors and their recognition sites. Elongation- role of core enzyme. Termination- rho dependent and rho independent.

**Unit- IV: Protein Synthesis and Regulation of Gene Expression 12 hours**

Introduction to protein synthesis- Genetic code, deciphering of genetic code, Nirenberg's and Khorana's experiments, wobble hypothesis, degeneracy of genetic code.

Protein synthesis- activation of amino acids (aminoacyl t-RNA synthetases). Ribosome structure. Initiation, elongation and termination of protein synthesis. Post- translational modifications signal hypothesis. Inhibitors of protein synthesis. Regulation of prokaryotic gene expression- induction and repression. Lac operon.

#### **Unit- V: Recombinant DNA technology 12 hours**

Outlines of cloning strategies. DNA sequencing- Maxam Gilbert and Sanger's methods. Tools of r-DNA technology: Enzymes- Restriction endonucleases, ligase, phosphatases, reverse transcriptase, polynucleotide kinases, terminal transferase nucleases-S1 and RNAase H.

Restriction mapping. Cloning vectors- Plasmid, Expression vector - Host- E.coli.

Construction of c-DNA and genomic libraries. Isolation and sequencing of cloned genes- colony hybridization, nucleic acid hybridization. Polymerase chain reaction- principle and applications. Outlines of blotting techniques-Southern, Northern and Western.

Applications of gene cloning- production of insulin and human growth hormone, production of Bt cotton and edible vaccines.

#### **Practical- 7: Microbiology and Molecular Biology 45 hrs**

##### **List of Experiments:**

1. Preparation of culture media and sterilization methods.
2. Isolation of pure cultures: (i) Streak plate method. (ii) Serial dilution method.
3. Gram staining.
4. Motility of bacteria by hanging drop method.
5. Antibiotic sensitivity by paper disc method.
6. Isolation of DNA from onion/liver/coconut endosperm.
7. Estimation of DNA by diphenylamine method.
8. Estimation of RNA by orcinol method..
9. Sequence alignments of insulin/BSA with other proteins using BLAST and FASTA.
10. Examination of milk quality



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2021-22

Core papers

**Biochemistry**

**Semester – VI**

Cluster Elective : VIII-A

**PAPER-VIII-A<sub>1</sub> : NUTRITIONAL BIOCHEMISTRY**

**Unit-I: Nutrition & Diet**

- 1.1 Introduction & definition-Foods and Nutrition
- 1.2 Principle food components, balanced diet
- 1.3 Nutritional requirement & recommended dietary allowance (RDA)
- 1.4 (BMR) Basal Metabolic Rate
- 1.5 Body Composition & Energy requirements

**Unit-II: Proteins in Nutrition**

- 2.1 Biological value of proteins
- 2.2 Protein calorie deficiencies
- 2.3 Kwashiorkor
- 2.4 Marasmus
- 2.5 Mal Nutrition

**Unit-III: Mineral Nutrients**

- 3.1 Micro Nutrients
- 3.2 Macro Nutrients
- 3.3 Dietary sources deficiency and recommended dietary allowances of calcium, phosphorus  
& Iron
- 3.4 Dietary sources, deficiency and recommended dietary allowance of trace elements

**Unit-IV: Vitamins**

- 4.1 Fat soluble vitamins
- 4.2 Vitamin B, D, E & K
- 4.3 Water soluble vitamins
- 4.4 Vitamin-B complex, Vitamin 5, Folic acid

**Unit-V: Fatty Acids**

- 5.1 Essential Fatty Acids
- 5.2 Energy value of fats
- 5.3 Phospholipids in Nutrition
- 5.4 Nutrition in pregnancy
- 5.5 Nutrition for Infants



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Core papers

**Biochemistry**

**PAPER-VIII-A2 : CLINICAL BIOCHEMISTRY**

<b>UNIT – I: Basic Medical Laboratory Principles and Procedures:</b>	10 Hours
1.1 Introduction to clinical biochemistry.	
1.2 Uses of Biochemical tests	
1.3 Specimen Collection and sample analysis, Reference values.	
1.4 Quality Control, Automation.	
<b>UNIT – II: Clinical Biochemistry of carbohydrates, proteins &amp; Lipids:</b>	20 Hours
2.1 Regulation of Blood Sugar, Tests for Diabetes, Fasting Blood Glucose, PP.	
2.2 Glucose Tolerance Test, Glycosylated Hemoglobin.	
2.3 Determination of plasma proteins and its importance.	
2.4 General lipid Metabolism, functions and disorders of plasma lipoproteins.	
<b>UNIT – III: Clinical Enzymology:</b>	10 Hours
3.1 Plasma Enzymes in Diagnosis.	
3.2 Chemical significance, SGOT, SGPT, LDH, CK, ALP & Amylase.	
3.3 Enzymes in Diagnosis of Liver, Heart muscle disorders.	
<b>UNIT – IV: Water &amp; Mineral Metabolism and Acid-Base Balance:</b>	10 Hours
4.1 Body fluid distribution (Electrolyte and water)	
4.2 Factors which influence the distribution of body water.	
4.3 Acid-Base balance in body, Acidosis and Alkalosis.	
4.4 Buffer systems in body to regulate acid-base balance.	
<b>UNIT – V: Organ Function Tests:</b>	10 Hours
5.1 Kidney function tests.	
5.2 Serum creatinine, Creatinine clearance.	
5.3 Liver function tests.	
5.4 Ischemic heart disease, Jaundice	
5.5 Gastric and pancreatic function tests.	
<b>Practicals:</b>	
1. Glucose Tolerance test.	



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2021-22

Core papers

**Biochemistry**

**Paper: VIII-A3 : MEDICAL MICROBIOLOGY**

**Unit –I Microbial and Human Interactions:**

Normal microbial population of healthy human body - Skin, mouth, upper respiratory tract, intestinal tract, urino-genital tract, eye.

**Unit –II Harmful Microbial and Human Interactions :**

Entry of pathogens into the host, types of bacterial pathogens, Mechanism of bacterial pathogenicity, colonization and growth, Virulence, Virulence factors – exotoxins, enterotoxins, endotoxins, neurotoxins

**Unit –III General Account of Epidemiology:**

Principles of epidemiology, Current epidemics (AIDS, Nosocomical, Acute respiratory Syndrome,) Measures for prevention of epidemics –Global health consideration, Emerging and reemerging infectious diseases Biological warfare and biological weapons.

**Unit –IV Person to person Microbial disease:**

Names of pathogen, disease symptoms, and preventive measures airborne transmission of diseases by airborne pathogens: Streptococcal diseases, Corynebacterium Diphtheria, and Whooping cough, Mycobacterium Tuberculosis Direct contact transmission of diseases: Staphylococcus, Hepatitis viruses. Sexually transmitted diseases: Gonorrhoea and syphilis

**Unit –V Animal transmitted, Artropod transmitted, Soil borne and Water borne microbial diseases:**

Animal transmitted disease: Rabies Artropod transmitted disease: Malaria Soil borne diseases: Tetanus Water borne microbial diseases: Cholera, Giardiasis.,

List of Experiments: Project work



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2021-22

**Core papers**

**B.Sc., Biotechnology: Choice based credit system**

**B.Sc., I Semester W.E.F. 2020-21**

**BT-101: Bio-molecules & Analytical Techniques**

**Course Objectives:** To ensure students gain knowledge about the structure, properties and functions of biomolecules and characterization of biomolecules using analytical techniques.

**Unit-I-Carbohydrates, Protein and Lipids**

Classification, structure, properties of carbohydrates. Classification, structure and properties of amino acids, peptide bond and peptides. Classification, structure (primary, secondary, tertiary, quaternary) and functions of proteins. Denaturation and renaturation of proteins. Classification structure and properties of saturated and unsaturated fatty acids. Structure and functions of glycolipids, phospholipids, and cholesterol.

**Unit-II- Nucleic acid, and Bioenergetics**

Structure and functions of DNA and RNA. Free energy, entropy, enthalpy and redox potential. High energy compounds, Glycolysis, TCA cycle, Electron-Transport System and Oxidative Phosphorylation.

**Unit-III-Centrifugation, Chromatography and Electrophoresis**

Basic principles and types of centrifugations (Analytical and Preparative). Principle, instrumentation and application of paper, TLC, ion exchange, gel permeation, affinity chromatography. Basic principles and types of electrophoresis, factors affecting electrophoretic migration. PAGE (Native, SDS-PAGE). Introduction to 2D & Isoelectric Focusing, Pulsed Field Gel Electrophoresis.

**Unit - IV-Spectroscopy, Microscopy and Laser Techniques**

Beer-Lambert law, light absorption and transmission. Extinction coefficient, Design and application of photoelectric colorimeter and UV-visible spectrophotometer. Introduction to crystallography and application. Types and design of microscopes - compound, phase contrast, fluorescent electron microscopy (TEM, SEM). Introduction to radioisotopes, measurement of radioactivity (scintillation counter and autoradiography). Pros and Cons of usage of radioactive material in life sciences.

## **Unit –V- Biostatistics**

Mean, median, mode, standard deviation, One-way Anova, t-test, F-test and chi-square.

### **List of Practicals:-**

1. Introduction to basic instruments (Principle standard operation procedure) demonstration and record
2. Calculation of molarity, normality and molecular weight of compounds.
3. Qualitative analysis of carbohydrates (sugars)
4. Quantitative analysis of carbohydrates
5. Quantitative estimation of protein - Lowery method
6. Estimation of DNA by diphenylamine reagent
7. Estimation of RNA by orcinol reagent
8. Preparation of standard buffer and pH determination
9. Separation of amino acids by paper chromatography



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2021-22

Core papers

**B.Sc., Biotechnology: Choice based credit system**

**B.Sc., -II Semester W.E.F. 2020-21**

**BT-201: Microbiology, Cell and Molecular Biology**

**Course Objectives:** To acquaint students with concepts of microbiology, cell and molecular biology. This course is aimed to give an understanding of the basics of microbiology, dealing types of microbes, classification and their characterization, structure and function of prokaryotic and eukaryotic cell organelles, cell division and basics of molecular biology including DNA replication, transcription, translation and regulation of gene expression.

**Unit-I- Scope and Techniques of Microbiology**

History and contribution of Leeuwenhoek, Louis Pasteur, Robert Koch, Joseph Lister and Alexander Fleming. Ultrastructure of bacteria and growth curve. Pure culture techniques. Sterilization techniques, principles and application of physical methods (autoclave, hot air oven, incineration), chemical methods and radiation methods. Simple, gram and acid-fast staining.

**Unit-II-Microbial and viral Taxonomy**

Concepts of microbial species and strains. Classification of bacteria based on morphology, nutrition and environment. General characteristics, transmission and cultivation of viruses. Structure and properties of plant (tobacco mosaic virus, TMV), animal (Newcastle disease virus, NDV), human (Human immunodeficiency virus, HIV) and bacterial viruses (T4 phage). Emerging and reemerging viruses (dengue virus), zoonotic viruses (rabies), SARS-CoV-2. Introduction to fungi, algae and mycoplasma.

**Unit-III- Cell Structure and Functions**

Structure, properties and functions of cellular organelles (E.R, Golgibodies, Mitochondria, Ribosomes, Chloroplast and Vacuoles) of eukaryotic cells. Cell cycle and cell division (mitosis and meiosis). Chemical composition and dynamic nature of the membrane, cell signaling and communication, endocytic pathways.

#### **Unit-IV- DNA Replication, Repair and Regulation of Gene Expression**

DNA replication in prokaryotes (semiconservative, dispersive, conservative, uni and bi-direction, rolling circle). Mechanism of DNA replication, enzymes and protein involved in DNA replication. DNA damage and repair. Regulation of gene expression in prokaryotes Lac and Trip operon concept.

#### **Unit – V - Central Dogma of Molecular Biology**

Genome organization of prokaryotic and eukaryotic organisms. Genetic code, prokaryotic transcription, enzymes involved in transcription. Post-transcriptional modification (Capping Poly adenylation) and splicing.

Translation: mechanism of translation in prokaryotic organisms.

#### **List of Practicals:-**

1. Cleaning and preparation of glassware
2. Preparation of nutrient agar medium for bacteria
3. Preparation of PDA medium for fungi
4. Sterilization techniques (autoclave, hot air oven, filter)
5. Isolation of bacteria from soil
6. Simple staining technique
7. Differential staining technique
8. Microbial counting by Haemocytometer
9. Identification of different bacteria
10. Motility test by hanging drop
11. Preparation of pure culture by slab, slant, streak culture
12. Study of stages of mitotic cell division



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2021-22

Core papers

**B.Sc., Biotechnology: Choice based credit system**

**B.Sc., -III- Semester W.E.F. 2020-21**



**BT-301: Immunology and rDNA technology**

**Course Objectives:** To acquaint students with concepts of immunology and recombinant DNA technology. This course is aimed to give an understanding of the basics of immunology dealing cells and organs of the immune system, types of immune responses, antigen-antibody interactions, vaccines and tools, techniques and strategies and applications of genetic engineering.

**Unit- I –Concepts, Cells and Organs of the Immune System**

Terminology, antigen, hapten, antibody (structure and types), antigenicity, immunogenicity. Types of immunity- Innate and adaptive immunity. Hematopoiesis, organs, tissues, cells and mediators of the immune system (primary and secondary lymphoid organs, lymphocytes and cytokines). Introduction to complement components, MHC. Basic concepts of humoral and cell-mediated immune response.

**Unit-II-Vaccinology and Clinical Immunology**

Live, killed, attenuated, subunit and recombinant vaccines. Role and properties of adjuvants. Hybridoma technology, monoclonal antibodies and their application in immunodiagnosis, polyclonal antibodies. Antigen and antibody interactions - precipitation, agglutination, immune diffusion and ELISA. Introduction to hypersensitivity and autoimmunity.

**Unit-III –Introduction, Tools and Techniques of rDNA Technology**

Introduction to rDNA technology, steps involved in cloning, tools of genetic engineering (Genes, Cloning vectors - plasmids and cosmids, Enzymes – restriction endonucleases and DNA Ligase, Hosts – bacteria and yeast). Principles and application of PCR. Southern, Northern and Western Blotting. Introduction to DNA sequencing (Sanger Sequencing).

**Unit-IV-Cloning Strategies and Application of rDNA Technology**

cDNA library, construction, methods of transformation, recombinant selection and screening methods. Applications of rDNA technology in agriculture (transgenic plants) and medicine (disease diagnosis).

### **Unit-V-Bioinformatics**

Databases (PubMed, NCBI, EMBL and ExPASy), nucleotide and protein BLAST analysis, CLustal W and phylogenetic tree construction. Introduction to omics (proteomics, genomics and transcriptomics).

#### **List of Practicals:-**

1. Determination of Blood Groups
2. Pregnancy test
3. Widal test
4. Ocuteroloney immunodiffusion
5. Radial immune diffusion
6. Production of antibodies (theory exercise)
7. Lymphoid organs (theory exercise)
8. Isolation of plasmid DNA (alkaline lysis method)
9. Analysis of plasmid DNA by Agarose gel electrophoresis
10. Southern blotting (theory exercise)
11. PCR Amplification (theory exercise)

#### **Textbooks for Immunology and rDNA technology**

1. Kuby immunology, Judy Owen, Jenni Punt, Sharon Stranford., 7th edition (2012), Freeman and Co., NY
2. Textbook of basic and clinical immunology, 1st edition (2013), Sudha Gangal and Shubhangi Sontakke, University Press, India
3. Immunology, 7th edition (2006), David Male, Jonathan Brostoff, David Roth, Ivan Roitt, Mosby, USA.



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2021-22

**Core papers**

**B.Sc., Biotechnology: Choice based credit system**

**B.Sc., -IV Semester W.E.F. 2020-21**

**BT-401 (i) Plant and Animal Biotechnology**

**Course Objectives**

The objectives of this course are to introduce students to the principles, practices and application of animal biotechnology, plant tissue culture, plant and animal genomics, genetic transformation.

**Unit – I**

**Plant tissue culture techniques & secondary metabolites production**

Plant tissue culture: totipotency, media preparation – nutrients and plant hormones; sterilization techniques; establishment of cultures – callus culture, cell suspension culture, applications of tissue culture-micro propagation; Somatic embryogenesis; synthetic seed production; protoplast culture and somatic hybridization - applications. Cryopreservation, Plant secondary metabolites- concept and their importance

**Unit – II**

**Transgenesis and Molecular markers**

Plant transformation technology-- Agrobacterium mediated Gene transfer (Ti plasmid), hairy root features of Ri plasmid, Transgenic plants as bioreactors. Herbicide resistance – glyphosphate, Insect resistance- Bt cotton, Molecular markers - RAPD, RFLP and DNA fingerprinting-principles and applications.

**Unit – III**

**Animal tissue culture techniques**

Animal cell culture: cell culture media and reagents; culture of mammalian cells, tissues and organs; primary culture, secondary culture, cell lines, stem cell cultures; Tests: cell viability and cytotoxicity, Cryopreservation. Transfection methods (calcium phosphate precipitation, electroporation, Microinjection) and applications.

## **Unit – IV**

### **Transgenic animals & Gene Therapy**

Production of vaccines, diagnostics, hormones and other recombinant DNA products in medicine (insulin, somatostatin, vaccines), IVF, Concept of Gene therapy, Concept of transgenic animals – Merits and demerits -Ethical issues in animal biotechnology

## **Unit V**

### **Bioethics, Biosafety and IPR**

Bioethics in cloning and stem cell research, human and animal experimentation, animal rights/welfare (CPCSEA guidelines). Bio safety-introduction to biological safety cabinets; primary containment for biohazards; biosafety levels; GLP,GMP, Introduction to IP-Types of IP: patents, trademarks & copyright

### **Student Learning Outcomes**

Students should be able to gain fundamental knowledge in animal and plant biotechnology and their applications.

### **PLANT AND ANIMAL BIOTECHNOLOGY-PRACTICALS**

- plant culture media and composition of MS media
  - Raising of aseptic seedlings
  - Induction of callus from different explants
  - Plant propagation through Tissue culture (shoot tip and Nodal culture)



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2021-22

Core papers

B.Sc., Biotechnology: Choice based credit system

B.Sc., -IV Semester W.E.F. 2020-21

**BT-401 (ii) Environmental & Industrial Biotechnology**

**Learning Objective**

This course aims to introduce fundamentals of Environmental Biotechnology. The course will also give an insight in introducing major groups of microorganisms and their industrial applications

**Unit – I**

**Pollution Types and Control**

Environmental Biotechnology-Environmental Pollution : Types of pollution, air pollution & its control through Biotechnology, Biofilters, Bioscrubbers, Biotrickling filter. Water pollution and its management: Measurement of water pollution, sources of water pollution. Microbiology of waste water treatment, aerobic processes, activated sludge, oxidation ponds, trickling filters, and rotating biological contactors. Anaerobic processes: Anaerobic digesters, upward flow anaerobic sludge blanket reactors.

**UNIT-II**

**Bioremediation**

Biodegradation and Bioremediation – Concepts & principles of Bioremediation, Bioremediation of Hydrocarbons and its applications Degradation of pesticides and other toxic chemicals by microorganism. Role of genetically Engineered microbes, Concept of Phytoremediation, environmental safety guidelines.

**UNIT III**

**Biofuels**

Bio fuels-biogas, microbial groups involved in biogas production & interactions, factors affecting biogas production, Biofertilizers, Vermiculture. Introduction to nanotechnology and its applications

#### **Unit IV**

##### **Basic principles of Microbial technology**

Industrially important microbes, its screening, selection and identification. Maintenance and preservation of industrially important microbial cultures. Strain Improvement, Basic concepts of fermentation; Design of fermenter and applications

#### **Unit V**

##### **Commercial Production of Microbial products**

Microbial technology products and applications; Microbial production of Organic acids (Lactic acid, citric acid), Amino acids (Glutamic acid, Aspartic acid and Lysine). Fermentation by microbes for food additives: dairy products (Cheese, Yogurt), beverages (Beer, Wine) and antibiotics (Streptomycin, Pencillin)

**Student Learning Outcomes** Students should be able to gain fundamental knowledge in animal and plant biotechnology and their applications.

#### **ENVIRONMENTAL AND INDUSTRIAL BIOTECHNOLOGY -PRACTICALS**

- Detection of coliforms for determination of the purity of potable water.
- Determination of total dissolved solids of water
- Determination of Hardness and alkalinity of water sample.
- Determination of dissolved oxygen concentration of water sample
- Determination of biological oxygen demand of sewage sample
- Determination of chemical oxygen demand (COD) of sewage sample.
- Isolation of industrially important microorganisms from soil.
- Isolation of amylase producing organisms from soil.
- Production of alcohol or wine using different substrates.
- Estimation of citric acid by titrimetry.



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Core papers

B. Sc. III –Semester V

**PAPER- V: MOLECULAR BIOLOGY**

**Unit I:**

**Genome Structure:**Watson and Crick model of DNA; Genome organization with specific reference to prokaryotic and eukaryotic genomes; Genome size. Concepts of Genetic Material, Gene, Chromosome and Genome. Experiments to prove DNA and RNA as genetic material (Griffith experiment, Hershey- Chase experiment, Fraenkel-Conrat experiment).

**Unit II**

**DNA Replication:**Enzymology of replication (DNA polymerase I, pol II and III, helicases, topoisomerases, single strand binding proteins, primase. Proof of semiconservative replication, Replication origin, initiation, elongation, and termination in prokaryotes. Rolling circle replication of DNA.

**Unit III**

**Transcription :**Enzymatic synthesis of RNA: Basic features of transcription, structure of prokaryotic RNA polymerase (core enzyme and holo enzyme, sigma factor ), concept of promoter (Pribnow box, -10 and -35 sequences), Four steps of transcription (promoter binding and activation, RNA chain initiation, chain elongation, termination and release). Reverse transcription,

**Unit IV**

**Genetic Code and Protein Synthesis**

Genetic code: Features of genetic code, Structure of mRNA, brief structure of tRNA, the wobble hypothesis. Initiation, elongation, termination of protein synthesis in prokaryotes; Poly and Mono cistronic m-RNA.

**Unit V:**

**Gene Expression and regulation**

Regulation of gene expression; Clustered genes and the operon concepts - Negative and positive control of the Lac Operon, trp operon, Control of gene expression.

**References:**

1. Molecular cell Biology (III rd Edition), Harvey Lodish, David Baltimore et al., W.H. Freeman, 2000.
2. The Molecular Biology of the Gene, J.D.Watson et al., 1987. Benjamin Cummings
3. Molecular Biology by David Freifelder 2004



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Core papers

B. Sc. III – Semester V

PAPER-VI(A) : rDNA TECHNOLOGY (Elective Theory)

**Unit I:**

**Restriction and Modification.** Classification of restriction endonucleases. Enzymes used in molecular cloning: Polymerases, ligases, phosphatases, kinases and nucleases, reverse transcriptase and terminal transferase.

**Unit II**

**Cutting and joining DNA** (cohesive end ligation, methods of blunt end ligation). Transfection and transformation. Selection of transformed cells. Screening methods (Genetic marker and blue white screening)

Unit III: **Cloning vehicles** - Plasmid, Bacteriophage, Construction of genomic and cDNA libraries. Advantages of cDNA libraries.

**Unit IV:**

**Methods of gene sequencing** – Maxam - Gilberts and Sanger's dideoxy chain termination methods; Polymerase chain reaction technique (Components in PCR and PCR conditions)

**Methods of gene transfer** in fungi, yeast and higher plants using microinjection, microprojectile bombardment (gene gun method, Electroporation and Agrobacterium mediated transformation)

**Unit V:**

**Applications** of recombinant DNA technology in Agriculture (Transgenic Plants) Medicine (production of Insulin, Growth hormone, Tissue plasminogen activator and HBsAg vaccine)

**References:**

1. Principles of Gene Manipulation and Genomics - Primrose, S.B. and Twyman, R.M. 2006. 7th Edition. Blackwell Publishing Company
2. A Text Book of Biotechnology. R.C. Dubey. S.Chand & Co Ltd, New Delhi.
3. Gene Cloning: An introduction by T. A. Brown (1986) 3<sup>rd</sup> Edition G Chapman & Hall



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2021-22

Core papers

**PAPER-VI(B) : GENETICS (Elective Theory)**

**UNIT I**

**Mendel's Laws and Inheritance:** Mendel experiments, Mendel Laws and deviations: incomplete dominance and Co dominance Penetration and pleiotropism, Recessive and Dominant epistatic gene interactions. Concept of multiple alleles.

**UNIT II**

**Genes and their variations:** Structure of gene, gene and environment, gene copies of prokaryotic and Eukaryotic chromosomes. Eukaryotic chromosome organization, histone proteins.

**Unit III:**

**Gene mutations:** Mutagenesis - Spontaneous and induced (Chemical and physical) mutations; Natural and induction of mutations, point mutations, frameshift mutations, auxotrophic conditional and suppressor mutations.

**UNIT IV:**

**DNA Damage and DNA Repair:** Factors affecting DNA damage; Light induced repair, Excision repair and mismatch repair, Post replication repair, Rec gene and its role in DNA repair, SOS repair and SOS response

**Unit V:**

**Transposable elements:** Structure and Molecular basis of AC-DS transposition in maize, "P" element of Drosophila and hybrid dysgenesis, Yeast "T7" elements, Retroposans

**References:**

1. Principles of Genetics – **E.J.Gardener, M.J.Simmons and D.P.Snustad**, John Wiley & Sons Publications.
2. Molecular Biology of the Cell – **Alberts**. Garland publication, edition 4, 2002.
3. Genetics by P. K. Gupta (2014) Rastogi Publications



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2021-22

**Core papers**

**B. Sc. III – Semester VI**

**PAPER-VII : PLANT AND ANIMAL BIOTECHNOLOGY**

**UNIT I:**

**Cell and tissue culture:**

Introduction to Plant Biotechnology: Principles of plant cell and tissue culture – totipotency, dedifferentiation, redifferentiation; Introduction to cell and Tissue culture Laboratory facilities; Types of media (Eg. MS Media & its composition), Preparation and sterilization.

**UNIT II:**

**Tissue and micropropagation:** Somatic embryogenesis and organogenesis; Clonal Propagation of economically important plants (Banana), Production of secondary metabolites through plant tissue culture, Methods in the production of transgenic plants, Bt Cotton, Golden rice.

**UNIT III:**

**Various techniques of animal cell and tissue culture:** Basic laboratory facilities of animal cell culture laboratory, Culture media, growth factors. Characteristics of cells in culture: Contact inhibition, anchorage dependence, cell-cell communication etc.; Cell senescence; cell and tissue response to trophic factors. Primary culture, immortal cells, cell lines. d) Maintenance of cell lines in the laboratory.

**UNIT IV:**

**Gene transfer methods in animals:** Transgenesis, transgenic methods – microinjection, electroporation, lipofection, embryonic stem cell mediated-, retroviral mediated-. Artificial insemination, In Vitro Fertilization, Embryo transfer in farm animals. Production of Dolly..

**UNIT V:**

IPR: Intellectual property rights- patent, copyright, trademark etc Social, ethical and legal issues in Biotechnology.

**References:**

1. Introduction to Plant Biotechnology Chawla,(2003) (2nd edn) Oxford and IBH Publishers
2. A Text Book of Biotechnology. R.C. Dubey. S.Chand & Co Ltd, New Delhi.
3. Biotechnology, Satyanarayana. U, 2008, Books and Allied (p) Ltd.
4. Basic Biotechnology, S. Ignachimuthu. 1995. Tata McGraw Hill Publishers, New



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2021-22

**Core papers**

**PAPER-VIII-A1 : ENVIRONMENTAL BIOTECHNOLOGY**

**Unit I:**

**Principles of Ecology**, Water and terrestrial ecosystems, Bio-geo chemical cycles - Carbon, Nitrogen cycles. Role of microbes in bio-geochemical cycles.

**Unit II:**

**Inorganic and Organic pollutants** of air, land and water; maintenance of standards, Environmental monitoring. Detection, treatment and prevention of pollution. Biological indicators

**Unit III:**

**Biocides**, Four stage alternatives, Refuse disposal - Treatment methods, effluent from pharmaceuticals, fertilizers, pulp and paper industry.

**Unit IV:**

**Waste water management** - Aerobic and anaerobic treatment, primary, secondary and tertiary treatment of municipal wastes, Solid waste management.

**Unit V:**

**Bioremediation**, Biodegradation of recalcitrant compounds and the role of genetically engineered microbes and genetically modified organisms in the environmental management.

**References:**

1. Waste water engineering - treatment, disposal and reuse, Metcalf and Eddy Inc., Tata McGraw Hill, New Delhi.
2. Bioremediation, Baaker, KH and Herson D.S., 1994. Mc.GrawHill Inc, NewYork
3. Environmental biotechnology - **Alan Scragg**, Pearson Education Limited.
4. Environmental Chemistry, AK. De, Wiley Eastern Ltd, New Delhi



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2021-22

Core papers

**PAPER-VIII-A2 : INDUSTRIAL BIOTECHNOLOGY**

**Unit I:**

**Isolation, Screening, Preservation and Improvement of Industrially Important Microorganisms.** Synthetic and Natural Medium, Precursors, Antifoams, Sterilization Methods and Inoculum Preparation.

**Unit II:**

**Definition of bioreactor,** basic principles of bioreactor. Classification of bioreactors. Analysis of batch, continuous, fed batch and semi-continuous bioreactors.

**Unit III:**

**Ethanol Production** by Fermentation using Molasses, Starchy Substances. Production of Alcoholic Beverages like Beer and Wine. Production of Citric Acid by Submerged and Solid State Fermentations.

**Unit IV:**

**Sources of Industrial Enzymes,** Production of Microbial Enzymes like Amylase and protease. Baker's Yeast and SCP Production. Production of Antibiotics: Penicillin.

**Unit V:**

**Biotechnology Products-** Production of recombinant proteins having therapeutic and diagnostic applications (Insulin, Growth Hormone, Recombinant vaccines, Monoclonal Antibody).

**References:**

1. Industrial Microbiology by L.E Casida, John Wiley and sons INC
2. Industrial microbiology by A.H.Patel, Macillan India Ltd.



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Core papers

**PAPER-VIII-A3 : MEDICAL BIOTECHNOLOGY**

**UNIT- I**

Human Genetics and Human Genome: History and development of human Genome Project; organization of the human genome. – chromosome and gene organization -Inherited human diseases-single gene diseases,complex traits.

**UNIT- II**

Gene Therapy: Identification and isolation of defective genes ,Cancer causes and genetics – Genetic Counselling.

Infectious Diseases: Classification: fungal, protozoal, helminthic, bacterial and viral; Hospital-acquired infections (nosocomial), Sexually transmitted Diseases.

**Unit -III**

Immunology, Vaccines and Transplantation Technology

Antigens and Antibodies –Acquired and Innate Immunity, Immune system, Immune diseases,Allergy. Immunity to infections by viruses, bacteria, fungi and parasites. Blood groups. Monoclonal antibodies.

**Unit -IV**

Embryonic Stem cells: Culture & Therapy. Artificial Blood. Aminocentosis. Biochemical and Molecular Diagnostics (PCR, ELISA, FISH, Microarray etc).Drug delivery methods

**UNIT- V**

Social, Ethical and Legal Issues in Medical Biotechnology

IPR : patents and copyrights. Human cloning. Pre-natal sex determination and foeticide.

Clinical Trials introduction.



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2021-22

**Core papers**

CBCS / Semester System (w.e.f. 2020-'21 Admitted Batch)

I Semester /Botany Core Course - 1

**Fundamentals of Microbes and Non-vascular Plants  
(Viruses, Bacteria, Fungi, Lichens, Algae and Bryophytes)**

(Total hours of teaching – 60 @ 04 Hrs./Week)

**Theory:**

**Learning Outcomes:**

On successful completion of this course, the students will be able to:

- Explain origin of life on the earth.
- Illustrate diversity among the viruses and prokaryotic organisms and can categorize them.
- Classify fungi, lichens, algae and bryophytes based on their structure, reproduction and life cycles.
- Analyze and ascertain the plant disease symptoms due to viruses, bacteria and fungi.
- Recall and explain the evolutionary trends among amphibians of plant kingdom for their shift to land habitat.
- Evaluate the ecological and economic value of microbes, thallophytes and bryophytes.

**Unit – 1: Origin of life and Viruses**

**12Hrs.**

1. Origin of life, concept of primary Abiogenesis; Miller and Urey experiment. Five kingdom classification of R.H. Whittaker
2. Discovery of microorganisms, Pasteur experiments, germ theory of diseases.
3. Shape and symmetry of viruses; structure of TMV and Gemini virus; multiplication of TMV; A brief account of Prions and Viroids.
4. A general account on symptoms of plant diseases caused by Viruses.
5. Significance of viruses in vaccine production, bio-pesticides and as cloning vectors.

**Unit – 2: Special groups of Bacteria and Eubacteria** **12Hrs.**

1. Brief account of Archaeobacteria, Actinomycetes and Cyanobacteria.
2. Cell structure of Eubacteria.
3. Reproduction- Asexual (Binary fission and endospores) and bacterial recombination (Conjugation, Transformation, Transduction).
4. Economic importance of Bacteria with reference to their role in Agriculture and industry (fermentation and medicine).
5. A general account on symptoms of plant diseases caused by Bacteria; Citrus canker.

**Unit – 3: Fungi & Lichens** **12 Hrs.**

1. General characteristics of fungi and Ainsworth classification (upto classes).
2. Structure, reproduction and life history of (a) *Rhizopus* (Zygomycota) and (b) *Puccinia* (Basidiomycota).
3. Economic uses of fungi in food industry, pharmacy and agriculture.
4. A general account on symptoms of plant diseases caused by Fungi; Blast of Rice.
5. Lichens- structure and reproduction; ecological and economic importance.

**Unit – 4: Algae** **12 Hrs.**

1. General characteristics of Algae (pigments, flagella and reserve food material); Fritsch classification (upto classes).
2. Thallus organization in Algae.
3. Occurrence, structure, reproduction and life cycle of (a) *Spirogyra* (Chlorophyceae) and (b) *Polysiphonia* (Rhodophyceae).
4. Economic importance of Algae.

**Unit – 5: Bryophytes** **12 Hrs.**

1. General characteristics of Bryophytes; classification upto classes.
2. Occurrence, morphology, anatomy, reproduction (developmental details are not needed) and life cycle of (a) *Marchantia* (Hepaticopsida) and (b) *Funaria* (Bryopsida).
3. General account on evolution of sporophytes in Bryophyta.



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2021-22

**Core papers**

**II Semester /Botany Core Course – 2**

**Basics of Vascular plants and Phytogeography**

**(Pteridophytes, Gymnosperms, Taxonomy of Angiosperms and Phytogeography)**

(Total hours of teaching – 60 @ 02 Hrs./Week)

**Theory:**

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**Learning Outcomes:**

On successful completion of this course, the students will be able to:

- Classify and compare Pteridophytes and Gymnosperms based on their morphology, anatomy, reproduction and life cycles.
  - Justify evolutionary trends in tracheophytes to adapt for land habitat.
  - Explain the process of fossilization and compare the characteristics of extinct and extant plants.
  - Critically understand various taxonomical aids for identification of Angiosperms.
  - Analyze the morphology of the most common Angiosperm plants of their localities and recognize their families.
  - Evaluate the ecological, ethnic and economic value of different tracheophytes and summarize their goods and services for human welfare.
  - Locate different phytogeographical regions of the world and India and can analyze their floristic wealth.
- 

**Unit – 1: Pteridophytes**

**12 Hrs.**

1. General characteristics of Pteridophyta; classification of Smith (1955) into divisions.
2. Occurrence, morphology, anatomy, reproduction (developmental details are not needed) and life history of (a) *Lycopodium* (Lycopsida) and (b) *Marsilea* (Filicopsida).
3. Steady evolution in Pteridophytes;
4. Heterospory and seed habit.

**Unit – 2:Gymnosperms****14 Hrs.**

1. General characteristics of Gymnosperms; Sporneclassification upto classes.
2. Occurrence, morphology, anatomy, reproduction (developmental details are not needed) and life history of (a) *Cycas*(Cycadopsida) and (b) *Gnetum* (Gnetopsida).
3. Outlines of geological time scale.
4. A brief account on *Cycadeoidea*.

**Unit – 3:Basic aspects of Taxonomy****13Hrs.**

1. Aim and scope of taxonomy; Species concept: Taxonomic hierarchy, species, genus and family.
2. Plant nomenclature: Binomial system, ICBN- rules for nomenclature.
3. Herbarium and its techniques,BSI herbarium and Kew herbarium; concept of digital herbaria.
4. Types of classification; Bentham and Hooker system of classification,
5. Systematic description and economic importance of the following families:  
(a) Annonaceae (b) Curcubitaceae

**Unit – 4: Systematic Taxonomy****13 Hrs.**

1. Systematic description and economic importance of the following families:  
(a) Asteraceae (b) Asclepiadaceae (c)Amaranthaceae(d) Euphorbiaceae  
(e) Arecaceae (f) Poaceae
2. Outlines of Angiosperm Phylogeny Group (APG IV).

**Unit – 5:Phytogeography****08 Hrs.**

1. Principles of Phytogeography, Distribution (wides, endemic, discontinuous species)
2. Endemism – types and causes.
3. Phytogeographic regions of World.
4. Phytogeographic regions of India.
5. Vegetation types in Andhra Pradesh.



2021-22

## Core papers

III

Semester /Botany CoreCourse - 3

Anatomy and Embryology of Angiosperms, Plant Ecology and Biodiversity

(Total hours of teaching – 60 @ 04 Hrs./Week)

### Theory:

#### Learning outcomes:

On successful completion of this course, the students will be able to;

- Understand on the organization of tissues and tissue systems in plants.
- Illustrate and interpret various aspects of embryology.
- Discuss the basic concepts of plant ecology, and evaluate the effects of environmental and biotic factors on plant communities.
- Appraise various qualitative and quantitative parameters to study the population and community ecology.
- Correlate the importance of biodiversity and consequences due to its loss.
- Enlist the endemic/endangered flora and fauna from two biodiversity hot spots in India and assess strategies for their conservation.

#### Unit – 1: Anatomy of Angiosperms

12 Hrs.

1. Organization of apical meristems: Tunica-carpus theory and Histogen theory.
2. Tissue systems—Epidermal, ground and vascular.
3. Anomalous secondary growth in *Boerhaavia* and *Dracaena*.
4. Study of timbers of economic importance - Teak, Red sanders and Rosewood.

#### Unit – 2: Embryology of Angiosperms

12 Hrs.

1. Structure of anther, anther wall, types of tapetum. Microsporogenesis and development of male gametophyte.
2. Structure of ovule, megasporogenesis; monosporic (*Polygonum*), bisporic (*Allium*) and tetrasporic (*Peperomia*) types of embryo sacs.
3. Outlines of pollination, pollen – pistil interaction and fertilization.
4. Endosperm - Types and biological importance - Free nuclear, cellular, helobial and ruminate.
5. Development of Dicot (*Capsella bursa-pastoris*) embryo.

**Unit – 3: Basics of Ecology****12 Hrs.**

1. Ecology: definition, branches and significance of ecology.
2. Ecosystem: Concept and components, energy flow, food chain, food web, ecological pyramids.
4. Plants and environment: Climatic (light and temperature), edaphic and biotic factors.
5. Ecological succession: Hydrosere and Xerosere.

**Unit – 4: Population, Community and Production Ecology****12 Hrs.**

1. Population ecology: Natality, mortality, growth curves, ecotypes, ecads
2. Community ecology: Frequency, density, cover, life forms, biological spectrum
3. Concepts of productivity: GPP, NPP and Community Respiration
4. Secondary production, P/R ratio.

**Unit – 5: Basics of Biodiversity****12 Hrs.**

1. Biodiversity: Basic concepts, Convention on Biodiversity - Earth Summit.
2. Value of Biodiversity; types and levels of biodiversity and Threats to biodiversity
3. Biodiversity Hot spots in India. Biodiversity in North Eastern Himalayas and Western Ghats.
4. Principles of conservation: IUCN threat-categories, RED data book
5. Role of NBPGR and NBA in the conservation of Biodiversity.



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2021-22

**Core papers**

**IV Semester/ Botany Core Course – 4**

**Plant Physiology and Metabolism**

(Total hours of teaching – 60 @ 04 Hrs./Week)

**Theory:**

**Learning outcomes:**

On successful completion of this course, the students will be able to;

- Comprehend the importance of water in plant life and mechanisms for transport of water and solutes in plants.
- Evaluate the role of minerals in plant nutrition and their deficiency symptoms.
- Interpret the role of enzymes in plant metabolism.
- Critically understand the light reactions and carbon assimilation processes responsible for synthesis of food in plants.
- Analyze the biochemical reactions in relation to Nitrogen and lipid metabolisms.
- Evaluate the physiological factors that regulate growth and development in plants.
- Examine the role of light on flowering and explain physiology of plants under stress conditions.

**Unit – 1: Plant-Water relations**

**10 Hrs.**

1. Importance of water to plant life, physical properties of water, diffusion, imbibition, osmosis. Water potential, osmotic potential, pressure potential.
2. Absorption and lateral transport of water; Ascent of sap
3. Transpiration: stomata structure and mechanism of stomatal movements ( $K^+$  ion flux).
4. Mechanism of phloem transport; source-sink relationships.

**Unit – 2: Mineral nutrition, Enzymes and Respiration**      **14 Hrs.**

1. Essential macro and micro mineral nutrients and their role in plants; symptoms of mineral deficiency
2. Absorption of mineral ions; passive and active processes.
3. Characteristics, nomenclature and classification of Enzymes. Mechanism of enzyme action, enzyme kinetics.
4. Respiration: Aerobic and Anaerobic; Glycolysis, Krebs cycle; electron transport system, mechanism of oxidative phosphorylation, Pentose Phosphate Pathway (HMP shunt).

**Unit – 3: Photosynthesis and Photorespiration**      **12 Hrs.**

1. Photosynthesis: Photosynthetic pigments, absorption and action spectra; Red drop and Emerson enhancement effect
2. Concept of two photosystems; mechanism of photosynthetic electron transport and evolution of oxygen; photophosphorylation
3. Carbon assimilation pathways (C<sub>3</sub>, C<sub>4</sub> and CAM);
4. Photorespiration - C<sub>2</sub> pathway

**Unit – 4: Nitrogen and lipid metabolism**      **12 Hrs.**

1. Nitrogen metabolism: Biological nitrogen fixation – asymbiotic and symbiotic nitrogen fixing organisms. Nitrogenase enzyme system.
2. Lipid metabolism: Classification of Plant lipids, saturated and unsaturated fatty acids.
3. Anabolism of triglycerides,  $\beta$ -oxidation of fatty acids, Glyoxylate cycle.

**Unit – 5: Plant growth - development and stress physiology**      **12 Hrs.**

1. Growth and Development: Definition, phases and kinetics of growth.
  2. Physiological effects of Plant Growth Regulators (PGRs) - auxins, gibberellins, cytokinins, ABA, ethylene and brassinosteroids.
  3. Physiology of flowering: Photoperiodism, role of phytochrome in flowering.
  4. Seed germination and senescence; physiological changes.
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2021-22

**Core papers**

**IV Semester / Botany Core Course –5**

**Cell Biology, Genetics and Plant Breeding**

(Total hours of teaching – 60 @ 04 Hrs./Week)

**Theory:**

**Learning outcomes:**

On successful completion of this course, the students will be able to:

- Distinguish prokaryotic and eukaryotic cells and design the model of a cell.
- Explain the organization of a eukaryotic chromosome and the structure of genetic material.
- Demonstrate techniques to observe the cell and its components under a microscope.
- Discuss the basics of Mendelian genetics, its variations and interpret inheritance of traits in living beings.
- Elucidate the role of extra-chromosomal genetic material for inheritance of characters.
- Evaluate the structure, function and regulation of genetic material.
- Understand the application of principles and modern techniques in plant breeding.
- Explain the procedures of selection and hybridization for improvement of crops.

**Unit – 1: The Cell**

**12 Hrs.**

1. Cell theory; prokaryotic vs eukaryotic cell; animal vs plant cell; a brief account on ultra-structure of a plant cell.
2. Ultra-structure of cell wall.
3. Ultra-structure of plasma membrane and various theories on its organization.
4. Polymorphic cell organelles (Plastids); ultrastructure of chloroplast. Plastid DNA.

**Unit – 2: Chromosomes**

**12 Hrs.**

1. Prokaryotic vs eukaryotic chromosome. Morphology of a eukaryotic chromosome.
2. Euchromatin and Heterochromatin; Karyotype and ideogram.
3. Brief account of chromosomal aberrations - structural and numerical changes
4. Organization of DNA in a chromosome (solenoid and nucleosome models).

**Unit – 3: Mendelian and Non-Mendelian genetics****14Hrs.**

1. Mendel's laws of inheritance. Incomplete dominance and co-dominance; Multiple allelism.
2. Complementary, supplementary and duplicate gene interactions (plant based examples are to be dealt).
3. A brief account of linkage and crossing over; Chromosomal mapping - 2 point and 3 point test cross.
4. Concept of maternal inheritance (Corren's experiment on *Mirabilis jalapa*); Mitochondrial DNA.

**Unit – 4: Structure and functions of DNA****12 Hrs.**

1. Watson and Crick model of DNA. Brief account on DNA Replication (Semi-conservative method).
2. Brief account on Transcription, types and functions of RNA. Gene concept and genetic code and Translation.
3. Regulation of gene expression in prokaryotes - Lac Operon.

**Unit – 5: Plant Breeding****12 Hrs.**

1. Plant Breeding and its scope; Genetic basis for plant breeding. Plant Introduction and acclimatization.
2. Definition, procedure; applications and uses; advantages and limitations of : (a) Mass selection, (b) Pure line selection and (c) Clonal selection.
3. Hybridization – schemes, and technique; Heterosis (hybrid vigour).
4. A brief account on Molecular breeding – DNA markers in plant breeding. RAPD, RFLP.



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2021-22

**Core papers**

**III B. Sc - SEMESTER- V: BOTANY SYLLABUS THEORY PAPER – V**

**Paper-V: Cell Biology, Genetics and Plant Breeding**

Total hours of teaching 60 hrs @ 3 hrs per week

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**UNIT – I Cell Biology:**

(12hrs)

1. Cell, the unit of life- Cell theory, Prokaryotic and eukaryotic cells; Eukaryotic cell components.
2. Ultra structure and functions of cell wall and cell membranes.
3. Chromosomes: morphology, organization of DNA in a chromosome (nucleosome model), Euchromatin and heterochromatin.

**UNIT – II Genetic Material:**

(12hrs)

1. DNA as the genetic material: Griffith's and Avery's transformation experiment, Hershey – Chase bacteriophage experiment.
2. DNA structure (Watson & Crick model) and replication of DNA (semi-conservative)
3. Types of RNA (mRNA, tRNA, rRNA), their structure and function.

**UNIT – III Mendelian Inheritance:**

(12 hrs)

1. Mendel's laws of Inheritance (Mono- and Di- hybrid crosses); backcross and test cross.
2. Chromosome theory of Inheritance.
3. Linkage: concept, complete and incomplete linkage, coupling and repulsion; linkage maps based on two and three factor crosses.
4. Crossing Over: concept & significance.

**UNIT – IV Plant Breeding:**

(12 hrs)

1. Introduction and Objectives of plant breeding.
2. Methods of crop improvement: Procedure, advantages and limitations of Introduction, Selection, and Hybridization (outlines only).

**UNIT – V Breeding, Crop Improvement and Biotechnology:**

(12 hrs)

1. Role of mutations in crop improvement.
2. Role of somaclonal variations in crop improvement.
3. Molecular breeding – use of DNA markers in plant breeding and crop improvement (RAPD, RFLP).

**Suggested activity:** Seminar, Debate, Quiz, observation of live cells and nucleus in Onion peels, observation of Meiotic nuclei in Maize pollen. Solving Genetics problems.

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2021-22

Core papers

**III B. Sc - SEMESTER- V: BOTANY THEORY SYLLABUS**

**PAPER-VI: PLANT ECOLOGY & PHYTOGEOGRAPHY**

Total hours of teaching 60 hrs @ 3 hrs per week

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**UNIT – I. Elements of Ecology**

**(12 hrs)**

1. Ecology: definition, branches and significance of ecology.
2. Climatic Factors: Light, Temperature, precipitation.
3. Edaphic Factor: Origin, formation, composition and soil profile.
4. Biotic Factor: Interactions between plants and animals.

**UNIT– II. Ecosystem Ecology**

**(12 hrs)**

1. Ecosystem: Concept and components, energy flow, Food chain, Food web, Ecological pyramids.
2. Productivity of ecosystem-Primary, Secondary and Net productivity.
3. Biogeochemical cycles- Carbon, Nitrogen and Phosphorous.

**UNIT – II Population & Community Ecology**

**(12 hrs)**

1. Population -definition, characteristics and importance, outlines –ecotypes.
2. Plant communities- characters of a community, outlines – Frequency, density, cover, life forms, competition.
3. Interaction between plants growing in a community.

**UNIT – IV Phytogeography**

**(12 hrs)**

1. Principles of Phytogeography, Distribution (wides, endemic, discontinuous species)
2. Phytogeographic regions of India.
3. Phytogeographic regions of World.
4. Endemism – types and causes

**UNIT- V: Plant Biodiversity and its importance**

**(12 hrs)**

1. Definition, levels of biodiversity-genetic, species and ecosystem.
2. Biodiversity hotspots- Criteria, Biodiversity hotspots of India.
3. Loss of biodiversity – causes and conservation (*In-situ* and *ex-situ* methods).
4. Seed banks - conservation of genetic resources and their importance

**Suggested activity** :Collection of different soils, studying their texture, observing polluted water bodies, student study projects, debates on man's activity on ecosystem and biodiversity conservation methods, visiting a nearest natural vegetation area. Visit to NGO, working in the field of biodiversity and report writing; to study Honey Bees and plants yielding honey.

**III B. Sc - BOTANY SYLLABUS SEMESTER- VI**  
**Paper VII: Plant tissue culture and its biotechnological applications**

Total hours of teaching 60hrs @ 3hrs per week

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**Unit I: PLANT TISSUE CULTURE – 1**

**(12hrs)**

1. History of plant tissue culture research - basic principles of plant tissue callus culture, meristem culture, organ culture, Totipotency of cells, differentiation and dedifferentiation.
2. Methodology - sterilization (physical and chemical methods), culture media, Murashige and Skoog's (MS medium), phytohormones, medium for micro-propagation/clonal propagation of ornamental and horticulturally important plants.
3. Callus subculture maintenance, growth measurements, morphogenesis in callus culture – organogenesis, somatic embryogenesis.

**UNIT-II: Plant Tissue culture -2**

**(12hrs)**

1. Endosperm culture – Embryo culture -culture requirements – applications, embryo rescue technique.
2. Production of secondary metabolites.
3. Cryopreservation; Germ plasm conservation.

**Unit III: Recombinant DNA technology**

**(12hrs)**

1. Restriction Endonucleases (history, types I-IV, biological role and application); concepts of restriction mapping.
2. Cloning Vectors: Prokaryotic (pUC 18, pBR322, Ti plasmid and Lambda phage, Eukaryotic Vectors (YAC and briefly PAC)
3. Gene cloning (Bacterial Transformation and selection of recombinant clones, PCR mediated gene cloning)
4. Construction of genomic and cDNA libraries, screening DNA libraries to obtain gene of interest by complementation technique, colony hybridization.

**Unit IV: Methods of gene transfer**

**(12hrs)**

1. Methods of gene transfer- Agrobacterium-mediated, direct gene transfer by Electroporation, Microinjection, Micro projectile bombardment.
2. Selection of transgenics– selectable marker and reporter genes (Luciferase, GUS, GFP).

**Unit V: Applications of Biotechnology**

**(12 hrs)**

1. Applications of Plant Genetic Engineering – crop improvement, herbicide resistance, insect resistance, virus resistance.
2. Genetic modification – transgenic plants for pest resistant (Bt-cotton); herbicide resistance (Round Up Ready soybean); improved agronomic traits - flavr Savr tomato, Golden rice); Improved horticultural varieties (Moon dust carnations)

III B.Sc.: BOTANY SYLLABUS SEMESTER- VI  
**Cluster Electives, CLUSTER–A CLUSTER ELECTIVE, PAPER–VIII-A1**

**Paper VIII-A1: Biological instrumentation and Methodology**

Total hours of teaching 60hrs @ 3hrs per week

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**Unit -I: Imaging and related techniques: (12hrs)**

Principles of microscopy; Light microscopy; Fluorescence microscopy; Electron Microscopy  
(a) Flow cytometry (b) Applications of fluorescence microscopy:

**Unit- II: pH and Centrifugation: (12 hrs)**

pH meter: Principles and instrumentation, Centrifugation: Principles, types of centrifuges, types of rotors, differential and density gradient centrifugation, application.

**Unit- III: Spectrophotometry: (12hrs)**

Principle involved in Spectrophotometer; Spectrophotometric techniques, Instrumentation: ultraviolet and visible spectrophotometry (single and double beam, double wavelength spectrophotometers), Infrared spectrometers.

**Unit- IV: Chromatography: (12hrs)**

Chromatographic techniques: Principle and applications – Column - thin layer –paper, affinity and gas chromatography - Gel filtration - Ion exchange and High performance liquid chromatography techniques– Examples of application for each chromatographic system - Basic principles of electrophoresis.

**Unit-V: Preparation of molar, molal and normal solutions, buffers, the art of scientific writing (12hrs)**

Understanding the details on the label of reagent bottles. Molarity and normality of common acids and bases. Preparation of solutions. Dilutions. Percentage solutions. Molar, molal and normal solutions.

Technique of handling micropipettes; Knowledge about common toxic chemicals and safety measures in their handling. The art of scientific writing and presentation of scientific matter. Scientific writing and ethics. Writing references. Powerpoint presentation. Poster presentation. Introduction to copyright-academic misconduct/plagiarism in scientific writing.

### III B.Sc.: BOTANY SYLLABUS SEMESTER- VI PAPER – VIII-A2

#### Paper VIII-A2: Mushroom Culture and Technology

Total hours of teaching 60hrs @ 3hrs per week

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#### Unit I: Introduction, history: (12hrs)

Introduction - history - scope of edible mushroom cultivation, Types of edible mushrooms available in India – *Volvariella volvacea*, *Pleurotus citrinopileatus*, *Agaricus bisporus*. Nutritional and medicinal value of edible mushrooms; Poisonous mushrooms.

#### UNIT II: Pure culture-spawn preparation: (12hrs)

Pure culture - preparation of medium (PDA and Oatmeal agar medium) sterilization - preparation of test tube slants to store mother culture – culturing of *Pleurotus* mycelium on Petriplates, preparation of mother spawn in saline bottle and polypropylene bag and their multiplication.

#### Unit III: Cultivation Technology: (12hrs)

Infrastructure: Substrates (locally available) Polythene bags, vessels, Inoculation hook, inoculation loop, low cost stove, sieves, culture rack, mushroom unit (Thatched house) water sprayer, tray, small polythene bag.

Mushroom bed preparation - paddy straw, sugarcane trash, maize straw, banana leaves. Factors affecting the mushroom bed preparation - Low cost technology, composting technology in mushroom production.

#### Unit IV: Storage and nutrition : (12hrs)

Short-term storage (Refrigeration - up to 24 hours) Long term Storage (canning, pickles, papads), drying, storage in salt solutions. Nutrition - Proteins - amino acids, mineral elements nutrition - Carbohydrates, Crude fibre content – Vitamins.

#### Unit V: Food Preparation: (12hrs)

Types of foods prepared from mushrooms; soup, cutlet, omelette, samosa, pickles and curry. Research Centres - National level and Regional level. Cost benefit ratio - Marketing in India and abroad, Export Value.

**Suggested activities:** Growing spawn on laboratory prepared medium in petriplates and maintaining, preparing compost and compost beds, packing of beds, spawning, maintaining moisture, picking, blanching and packing. Collecting naturally growing mushrooms and identifying





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Electronics

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SEMESTER-1

PAPER – I

**CIRCUIT THEORY AND ELECTRONIC DEVICES**

**Objectives:**

- To explain the basic concepts and laws of DC and AC electrical networks and solve them using mesh and nodal analysis techniques.
- To analyze circuits in time and frequency domain.
- To synthesize the networks using passive elements.
- To understand the construction, working and VI characteristics of electronic devices.
- To understand the concept of power supply.

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**UNIT- 1: (12Hrs)**

**SINUSOIDAL ALTERNATING WAVEFORMS:**

Definition of current and voltage. The sine wave, general format of sine wave for voltage or current, phase relations, average value, effective (R.M.S) values. Differences between A.C and D.C. Phase relation of R, L and C

**UNIT-II: (12hrs)**

**PASSIVE NETWORKS AND NETWORKS THEOREMS (D.C):**

Branch current method, Nodal Analysis, star to delta & delta to star conversions. Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum Power, Milliman and Reciprocity theorems.

**UNIT-III: (12hrs)**

**RC, RL AND RLC CIRCUITS:**

Frequency response of RC and RL circuits, their action as low pass and high pass filters. Passive differentiating and integrating circuits. Series resonance and parallel resonance circuits, Q – Factor.

**UNIT-IV: (12hrs)**

**BJT, FET and UJT:**

BJT: Construction, working, and characteristics of CE Configurations. Hybrid parameters and hybrid equivalent circuit of CE Transistor,

FET: Construction, working and characteristics of JFET and MOSFET. Advantages of FET over BJT.

UJT: Construction, working and characteristics of UJT. UJT as a Relaxation oscillator.

**UNIT-V:(12hrs)**

**POWER SUPPLIES & PHOTO ELECTRIC DEVICES**

Rectifiers: Half wave, full wave rectifiers-Efficiency-ripple factor- Filters- L-section &  $\pi$ -section filters. Three terminal fixed voltage I.C. regulators(78XX and &79XX). Light Emitting Diode – Photo diode and LDR.



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**SEMESTER – II**

**PAPER – 2**

**Digital Electronics**

**Objectives:**

- To understand the number systems, Binary codes and Complements.
- To understand the Boolean algebra and simplification of Boolean expressions.
- To analyze logic processes and implement logical operations using combinational logic circuits.
- To understand the concepts of sequential circuits and to analyze sequential systems in terms of state machines.
- To understand characteristics of memory and their classification.
- To implement combinational and sequential circuits using VHDL.
- 

**Unit – I (12hrs)**

**NUMBER SYSTEM AND CODES:** Decimal, Binary, Hexadecimal, Octal. Codes: BCD, Gray and Excess-3 codes- code conversions- Complements (1's, 2's, 9's and 10's), Addition - Subtraction using complement methods.

**Unit- II (12hrs)**

**BOOLEAN ALGEBRA AND THEOREMS:** Boolean Theorems, De-Morgan's laws. Digital logic gates, Multi level NAND & NOR gates. Standard representation of logic functions (SOP and POS), Minimization Techniques (Karnaugh Map Method: 2,3 variables).

**Unit-III (12hrs)**

**COMBINATIONAL DIGITAL CIRCUITS:**

Adders-Half & full adder, Subtractor-Half and full subtractors, Parallel binary adder, Magnitude Comparator, Multiplexers (4:1) and Demultiplexers (1:4), Encoder (8-line-to-3-line) and Decoder (3-line-to-8-line). IC-LOGIC FAMILIES: TTL logic, CMOS Logic families (NAND&NOR Gates).

**UNIT-IV (12hrs)**

**SEQUENTIAL DIGITAL CIRCUITS:**

Flip Flops: S-R FF, J-K FF, T and D type FFs, Master-Slave FFs, Excitation tables, Registers:-Serial In Serial Out and Parallel In and Parallel Out, Counters Asynchronous-Mod-8, Mod-10, Synchronous-4-bit & Ring counter.

**UNIT-IV (12hrs)**

**SEQUENTIAL DIGITAL CIRCUITS:**

Flip Flops: S-R FF , J-K FF, T and D type FFs, Master-Slave FFs, Excitation tables, Registers:-Serial In Serial Out and Parallel In and Parallel Out, Counters Asynchronous-Mod-8,Mod-10,Synchronous-4-bit &Ring counter.

**UNIT-(12hrs)**

**MEMORY DEVICES:**

General Memory Operations, ROM, RAM (Static and Dynamic), PROM, EPROM, EEPROM, EAROM,



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2<sup>nd</sup> YEAR

**SEMESTER – III**

**PAPER – 3**

**Analog Circuits and Communication**

**OBJECTIVES:**

- To understand the concepts, working principles and key applications of linear integrated circuits.
- To perform analysis of circuits based on linear integrated circuits.
- To design circuits and systems for particular applications using linear integrated circuits.
- To introduce students to various modulation and demodulation techniques of analog communication.
- To analyse different parameters of analog communication techniques.
- It also focuses on Transmitters and Receivers.

**Unit – I (12hrs)**

**OPERATIONAL AMPLIFIERS:** Definition, Characteristics of Op-Amp, Block diagram of op-amp, inverting, noninverting, virtual ground, , summing amplifier, subtractor, voltage follower, op-amp parameters, voltage to current convertor ,integrator, differentiator, differential amplifier, Logarithmic amplifier.

**Unit- II:(12hrs)**

**OP-AMP CIRCUITS:** voltage regulator, comparator, zero cross detecting circuit, instrumentation amplifier, Schmitt trigger. sine wave generator, square wave generator, triangular wave generator, Active filters (Basics)-low pass, high pass, band pass filters  
IC-555 –functional block diagram and mention it's applications

**UNIT –III (12Hrs) AMPLITUDE MODULATION:**

Need for modulation, amplitude modulation-frequency spectrum of AM wave, representation of AM, power relations in the AM wave. Generation of AM- Transistor modulators. Detection of AM signals – Diode detector.

***UNIT-IV (12hrs) FREQUENCY MODULATION:***

Theory of FM, Frequency deviation and carrier swing, modulation index, deviation ratio, percent modulation. Mathematical representation of FM, frequency spectrum and bandwidth of FM waves, Generation of FM signals – Varactor diode modulator and Reactance modulator. Detection of FM waves – FM demodulation with discriminator.

***UNIT-V (12hrs) RADIO BROADCASTING AND RECEPTION:***

Spectrum of electromagnetic waves, Radio broadcasting and reception, Transmitter, AM receivers- Straight forward receiver, Super heterodyne receiver. FM receivers.



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**2<sup>nd</sup> YEAR**

**Semester-IV**

**Paper- IV**

**I**

**TITLE: MICROPROCESSOR SYSTEMS**

**OBJECTIVES:**

- To understand basic architecture of 16 bit and 32 bit microprocessors.
- To understand interfacing of 16 bit microprocessor with memory and peripheral chips involving system design.
- To understand techniques for faster execution of instructions and improve speed of operation and performance of microprocessors
- To understand RISC based microprocessors.
- To understand concept of multi core processors.

**UNIT -I: (12Hrs)**

**CPU ARCHITECTURE**

*Introduction to Microprocessor, INTEL -8085(p) Architecture, CPU, ALU unit, Register organization, Address, data and control Buses. Pin configuration of 8085. Addressing modes*  
8086 Microprocessor: Architecture, Pin description. Instruction format, Instruction Execution timing, Addressing modes

**UNIT -II: (12 Hrs)**

**8085 Instruction Set:**

Data transfer Instruction, Logical Instructions, Arithmetic Instructions, Branch Instructions,  
**Machine Control instructions.**

**UNIT -III: (12Hrs)**

Assembly Language Programming using 8085, Programmes for Addition, Subtraction, Multiplication, Division, largest and smallest number in an array. BCD to ASCII and ASCII to BCD.

**UNIT -IV: (12Hrs)**

Basic 8086 Configurations – Minimum mode and Maximum Mode, Interrupt Priority Management I/O Interfaces: Serial Communication interfaces, Parallel Communication, Programmable Timers, Keyboard and display, DMA controller

**UNIT -V: (12Hrs) ARM PROCESSOR:** Introduction to 16/32 bit processors, Arm architecture & organization, Arm based MCUs, Programming model, Instruction set.



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**2<sup>nd</sup> YEAR**

IV SEMESTER

Paper: V

**MICRO CONTROLLER AND INTERFACING**

**OBJECTIVES:**

- To understand the concepts of microcontroller based system.
- To enable design and programming of microcontroller based system.
- To know about the interfacing Circuits.

**UNIT-I:** (10Hrs) Introduction, comparison of Microprocessor and micro controller, Evolution of microcontrollers from 4-bit to 32 bit , Development tools for micro controllers, Assembler-Compiler-Simulator/Debugger.

**UNIT -II:** (10Hrs)

**Microcontroller Architecture:** Overview and block diagram of 8051, Architecture of 8051, program counter and memory organization, Data types and directives, PSW register, Register banks and stack, pin diagram of 8051, Port organization, Interrupts and timers.

**UNIT-III:**(10Hrs)

**Addressing modes, instruction set of 8051:** Addressing modes and accessing memory using various addressing modes, instruction set: Arithmetic, Logical, Simple bit, jump, loop and call instructions and their usage. Time delay generation and calculation, Timer/Counter Programming,

**Unit -IV:** (15Hrs)

Assemble language programming Examples: Addition, Multiplication, Subtraction, division, arranging a given set of numbers in largest/smallest order.

**UNIT-V :** (15Hrs)

**Interfacing and Application of Microcontroller:** Interfacing of – PPI 8255, DAC (0804), Temperature measurement (LM35), interfacing seven segment displays, displaying information on a LCD, control of a stepper Motor (Uni-Polar),



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3<sup>RD</sup> YEAR

Semester - V

Paper- V

**TITLE: ANALOG AND DIGITAL COMMUNICATIONS**

**OBJECTIVES:**

- This course provides a thorough introduction to the basic principles and techniques used in analog and digital communications.
- The course will introduce analog and digital modulation techniques.
- Communication receiver and transmitter design, baseband and band pass communication techniques, line coding techniques, noise analysis, and multiplexing techniques.
- The course also introduces analytical techniques to evaluate the performance of communication systems.

***UNIT –I (10Hrs) AMPLITUDE MODULATION:***

Need for modulation, amplitude modulation-frequency spectrum of AM wave, representation of AM, power relations in the AM wave. Generation of AM- Transistor modulators.

Suppression of carrier, balanced modulator, suppression of one side band- the filter method, phase shift method.

***UNIT –II (10Hrs) FREQUENCY MODULATION:***

Theory of FM, mathematical representation of FM, frequency spectrum of FM wave, narrow band FM, wide band FM, power contents of the carrier and sidebands, Generation of FM signals – Reactance modulator.

***UNIT –III (10Hrs) BASIC RECEIVER CIRCUITS:***

Noise – Thermal, Shot, Noise figure, Super heterodyne Receiver block diagram, FM receiver, discriminators- slope, balanced slope, phase discriminator & Ratio detector

***UNIT –IV (12Hrs) RADIO WAVE PROPAGATION:***

Communication bands, Electromagnetic waves, propagation of waves - ground waves, Ionosphere & Space waves. ***PULSE MODULATION:*** Introduction, Sampling Theorem, TDM, FDM, PAM- Generation & Detection PWM- Generation & Detection, PPM- Generation & Detection

***UNIT –V (18Hrs) DIGITAL COMMUNICATIONS:***

PCM – PCM encoders, Quantization noise, S/N ratio of PCM system, relation between S/N ratio & BW, Companding. Advantages of digital over analog communications. Advantages of shift keying over digital communication, Types of shift keying, ASK – Generation & Detection, FSK – Generation & Detection, PSK – Generation & Detection.

**TEXT BOOKS:**

1. Electronic Communications - George Kennedy
2. Antennas and Wave Propagation – G S N Raju – PHI
3. Principles of communication system –Herbert Taub & D.L. Schilling

▲ **REFERENCES:**

1. Electronic Communications – Roody & Colen



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3RD YEAR

Semester-V

Paper- V

**TITLE: MICROPROCESSOR SYSTEMS**

**OBJECTIVES:**

- To understand basic architecture of 16 bit and 32 bit microprocessors.
- To understand interfacing of 16 bit microprocessor with memory and peripheral chips involving system design.
- To understand techniques for faster execution of instructions and improve speed of operation and performance of microprocessors
- To understand RISC based microprocessors.
- To understand concept of multi core processors.

**UNIT -I: (15Hrs)**

**CPU ARCHITECTURE**

Introduction to Microprocessor, INTEL -8085(P) Architecture, CPU, ALU unit, Register organization, Address, data and control Buses. Pin configuration of 8085, 8086 Architecture, Evaluation of Microprocessor, Internal operation, Pin description. Instruction format, Machine language instructions, Instruction Execution timing, Addressing modes

**UNIT -II: (10 Hrs)**

**INSTRUCTION SET:**

Data transfer Instruction, Logical Instructions, Arithmetic Instructions, Branch Instructions, Flag Manipulation, Shift and rotate Instruction, Loop Instruction

**UNIT -III: (15Hrs)**

Assembly Language Programming, Programms for Addition, Subtraction, Multiplication, Find the largest and smallest number in an array. **Modular programming**:-Linking and Relocation, Stacks, Procedures, Interrupts And Interrupt Routines.

**UNIT -IV: (10Hrs)**

Basic 8086 Configurations – Minimum mode and Maximum Mode, Interrupt Priority Management I/O Interfaces: Serial Communication interfaces, Parallel Communication, Programmable Timers, Keyboard and display, DMA controller

**UNIT -V: (10Hrs)**

**ARM PROCESSOR**

Introduction to 16/32 bit processors, Arm architecture & organization, Arm based MCUs, Programming model, Instruction



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3<sup>RD</sup> YEAR

VI SEMESTER

**PAPER-VII: MICRO CONTROLLER AND INTERFACING**

**OBJECTIVES:**

- To understand the concepts of microcontroller based system.
- To enable design and programming of microcontroller based system.
- To know about the interfacing Circuits.

**UNIT-I:** (10Hrs) Introduction, comparison of Microprocessor and micro controller, Evolution of microcontrollers from 4-bit to 32 bit, Development tools for micro controllers, Assembler-Compiler-Simulator/Debugger.

**UNIT -II:** (10Hrs)

**Microcontroller Architecture:** Overview and block diagram of 8051, Architecture of 8051, program counter and memory organization, Data types and directives, PSW register, Register banks and stack, pin diagram of 8051, Port organization, Interrupts and timers.

**UNIT-III:**(10Hrs)

**Addressing modes, instruction set of 8051:** Addressing modes and accessing memory using various addressing modes, instruction set: Arithmetic, Logical, Simple bit, jump, loop and call instructions and their usage. Time delay generation and calculation, Timer/Counter Programming,

**Unit -IV:** (15Hrs)

Assemble language programming Examples: Addition, Multiplication, Subtraction, division, arranging a given set of numbers in largest/smallest order.

**UNIT-V:** (15Hrs)

**Interfacing and Application of Microcontroller:** Interfacing of – PPI 8255, DAC (0804), Temperature measurement (LM35), interfacing seven segment displays, displaying information on a LCD, control of a stepper Motor (Uni-Polar), Interfacing a 4\*3 matrix keypad. Generation of different types of waveforms using DAC.



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2021-22

Core papers

Electronics

3<sup>RD</sup> YEAR  
VI SEMESTER

Cluster-1

**PAPER- VIII (A1): EMBEDDED SYSTEMS DESIGN**

TITLE: Embedded Systems Design

OBJECTIVES:

design embedded computer system hardware  
design, implement, and debug multi-threaded application software that operates under real-time constraints on embedded computer systems  
use and describe the implementation of a real-time operating system on an embedded computer system  
formulate an embedded computer system design problem including multiple constraints, create a design that satisfies the constraints, implement the design in hardware and software, and measure performance against the design constraints  
create computer software and hardware implementations that operate according to well-known standards  
organize and write design documents and project reports  
organize and make technical presentations that describe a design.

**UNIT 1: (10Hrs)**

Introduction to Embedded Systems:

Embedded systems overview, Design Challenge, Processor Technology, IC Technology, and Design Technology.

**UNIT 2: (15Hrs)**

Custom Single Purpose Processor – Hardware Development:

Introduction, Combinational logic, Sequential logic, Custom Single Purpose Processor Design, RT-Level Custom Single-Purpose Processor.

**UNIT 3: (15Hrs)**

General Purpose Processor – Software Development:

Introduction, Basic Architecture, Operation, Programmer's View, ASIPs, and Development Environment: Host and Target Machines, Linker / Locators for Embedded Software, Getting Embedded Software into the target system. Debugging Techniques: Testing on your Host Machine, and Instruction Set Simulators.

**UNIT 4: (10Hrs)**

RTWA for Embedded Systems:

Introduction, Timers, Counters and Watchdog Timers, UART, Pulse Width Modulators, LCD Controllers, Keypad Controllers, Stepper Motor Controllers, Analog – to – Digital Converters, and Real Time Clocks.

**UNIT 5: (10Hrs)**

Advanced Communication Principles:

Parallel Communication, Serial Communication, Wireless Communication, Serial Protocol I<sup>2</sup>C, CAN, FireWire, and USB. Parallel Protocols: PCI BUS and ARM BUS. Wireless Protocols: IrDA, Bluetooth, and IEEE 802.11.

TEXT BOOKS:

1. Embedded System Design – A Unified Hardware / Software Introduction By Frank Vahi Tony Givargis – WILEY EDITION.
2. Embedded Systems Architecture, Programming and Design – 2<sup>nd</sup> Edition By Raj Kama Tata McGraw-Hill Education.

REFERENCES:

An Embedded Software Premier - David E- Siman, PEARSON Education  
Embedded / real - time systems - DR. K.V.K.K. Prasad, dreamtech  
The art of programming Embedded systems, Jack G. Ganssle, academic press  
Intelligent Embedded systems, Louis L. Odette, Adison Wesly, 1991



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2021-22

Core papers

Electronics

B.Sc. Electronics CBCS

**SYLLABUS 3<sup>rd</sup> YEAR**

**VI SEMESTER**

**PAPER- VIII (A2)**

**ELECTRONIC INSTRUMENTATION**

<b>Sub:</b> <b>ELECTRONICS</b>		<b>Year:</b> 2017-18	<b>Group:</b> B.Sc	<b>Credits</b> <b>-3</b>
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**TITLE: ELECTRONIC**

**INSTRUMENTATION OBJECTIVES:**

The student will be introduced to

To introduce students to monitor, analyze and control any physical system

To understand students how different types of meters work and their construction

- To Study of absolute is merely confirmed within laboratories To Study integrating instruments like ammeter, voltmeter

To Measurement of impedance using bridges To Study of PLL ,ph-meter, PLC

**UNIT-I (10hrs)**

**Measurements:**

Basic block diagram of measurement system, Accuracy and precision, resolution, sensitivity, linearity, Errors, systematic and random errors, standards & calibrations of an instrument.

**Applications of instrument**

**UNIT –II (10hrs)**

Basic Measurement Instruments: DC measurement-ammeter, voltmeter, ohm meter, AC measurement, Digital voltmeter systems (integrating and non-integrating). Digital Multimeter; Block diagram principle of measurement of I, V, C. Accuracy and resolution of measurement.

**Measurement of Impedance- A.C. bridges, Measurement of Self Inductance (Anderson's bridge), Measurement of Capacitance (De Sauty bridge), Measurement of frequency (Wien's bridge).**

**UNIT-III (15hrs)**

**Lock-in-amplifier: Basic Principles of phase locked loop (PLL), Phase detector (XOR& edge triggered), Voltage Controlled Oscillator (Basics, varactor), lock and capture. Basic idea of PLL IC (565 or 4046). Lock-in-amplifier , Idea of techniques for sum and averaging of signals.**

**Signal Generators: Function generator, Pulse Generator, (Qualitative only).**

**UNIT-IV (15hrs)**

**Analytical instruments**

**Spectrophotometer, working with block diagram, features of spectrophotometer,**

**pH meter - principle working with block diagram, features of pH meter.**

**TEMPERATURE TRANSDUCERS**

**Standards and calibration, Fluid expansion and metal expansion type transducers, like bimetallic strip, Thermometer, RTD, Thermo couple and their characteristics.**

**UNIT-V : ( 10hrs)**

**Direct digital control (DDC), Distributed control system (DCS),**

**PLC'S: Block diagram, hardware, PLC operation, basic logic program (ladder logic), Applications of PLC'S**

**TEXT BOOKS**

**1,Introduction to instrumentation and control By A.K.Ghosh 2.Sensors and transducers PHI 2Ed By D.Patranabis.**



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2021-22

Core papers

Electronics

**3<sup>rd</sup> YEAR**  
**VI SEMESTER**

**Cluster-I**

**PAPER- VIII (A3) CONSUMER ELECTRONICS**

**Unit – I(12hrs)**

**MICROWAVE OVENS** – Microwaves (Range used in Microwave ovens) – Microwave oven block diagram – LCD timer with alarm – Single-Chip Controllers – types of Microwave oven – Wiring and Safety instructions – care and Cleaning.

**Unit – II(12hrs)**

**WASHING MACHINES** – Electronic controller for washing machines – Washing machine hardware and software – Types of washing machines – Fuzzy logic washing machines Features of washing machines.

**Unit – III(12hrs)**

**AIR CONDITIONERS AND REFRIGERATORS** - Air Conditioning – Components of air conditioning systems – All water air conditioning systems – All air conditioning systems – Unitary and central air conditioning systems – Split air conditioners.

**Unit – IV(12hrs)**

**HOME/OFFICE DIGITAL DEVICES** – Fascimile machine – Xerographic copier – calculators – Structure of a calculator – Internal organization of a calculator – Servicing electronic calculators – Digital clocks – Block diagram of a digital clock.

**Unit – V(12hrs)**

**DIGITAL ACCESS DEVICES** – Digital computer – Internet access – online ticket reservation – functions and networks – barcode scanner and decoder – Electronic Fund Transfer – Automated Teller Machines(ATMs) – Set-Top boxes – Digital cable TV – Video on demand.

**TEXTBOOKS:**

1. S.P. Bali, Consumer Electronics – Pearson Education, New Delhi, 2005.
2. R.G. Gupta Audio and Video systems Tata McGraw Hill (2004)

**ELECTRONICS LAB**

**CONSUMER ELECTRONICS LAB**



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2021-22

Core papers

**B.Sc. PHYSICS SYLLABUS UNDER CBCS**

**For Mathematics Combinations**

[2020-21 Batch onwards]

**I Year B.Sc.-Physics:I Semester**

**Course I: MECHANICS, WAVES AND OSCILLATIONS**

**Work load:60 hrs per semester**

**4 hrs/week**

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**Course outcomes:**

*On successful completion of this course, the students will be able to:*

- *Understand Newton's laws of motion and motion of variable mass system and its application to rocket motion and the concepts of impact parameter, scattering cross section.*
- *Apply the rotational kinematic relations, the principle and working of gyroscope and its applications and the precessional motion of a freely rotating symmetric top.*
- *Comprehend the general characteristics of central forces and the application of Kepler's laws to describe the motion of planets and satellite in circular orbit through the study of law of Gravitation.*
- *Understand postulates of Special theory of relativity and its consequences such as length contraction, time dilation, relativistic mass and mass-energy equivalence.*
- *Examine phenomena of simple harmonic motion and the distinction between undamped, damped and forced oscillations and the concepts of resonance and quality factor with reference to damped harmonic oscillator.*
- *Appreciate the formulation of the problem of coupled oscillations and solve them to obtain normal modes of oscillation and their frequencies in simple mechanical*

## **UNIT-I:**

### **1. Mechanics of Particles (5 hrs)**

Review of Newton's Laws of Motion, Motion of variable mass system, Motion of a rocket, Multistage rocket, Concept of impact parameter, scattering cross-section, Rutherford scattering-Derivation.

### **2. Mechanics of Rigid bodies (7 hrs)**

Rigid body, rotational kinematic relations, Equation of motion for a rotating body, Angular momentum and Moment of inertia tensor, Euler equations, Precession of a spinning top, Gyroscope.

## **Unit-II:**

### **3. Motion in a Central Force Field (12hrs)**

Central forces, definition and examples, characteristics of central forces, conservative nature of central forces, Equation of motion under a central force, Kepler's laws of planetary motion-Proofs, Motion of satellites, Basic idea of Global Positioning System (GPS), weightlessness, Physiological effects of astronauts

## **UNIT-III:**

### **4. Relativistic Mechanics (12hrs)**

Introduction to relativity, Frames of reference, Galilean transformations, absolute frames, Postulates of Special theory of relativity, Lorentz transformation, time dilation, length contraction, variation of mass with velocity, Einstein's mass-energy relation

## **Unit-IV:**

### **5. Undamped, Damped and Forced oscillations: (012 hrs)**

Simple harmonic oscillator and solution of the differential equation, Damped harmonic oscillator, Forced harmonic oscillator – Their differential equations and solutions, Resonance, Logarithmic decrement, Relaxation time and Quality factor.

## **Unit-V:**

### **6. Vibrating Strings: (07 hrs)**

Transverse wave propagation along a stretched string, General solution of wave equation and its significance, Modes of vibration of stretched string clamped at ends, Overtone.

### **7. Ultrasonics: (05 hrs)**

Ultrasonics, General Properties of ultrasonic waves, Production of ultrasonics by piezoelectric and magnetostriction methods, Detection of ultrasonics, Applications of ultrasonic waves,



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**B.Sc. PHYSICS SYLLABUS UNDER CBCS**

**For Mathematics Combinations**

[2020-21 Batch onwards]

**I Year B.Sc.-Physics: II Semester**

**Course-II: WAVE OPTICS**

**Work load:60 hrs per semester**

**4 hrs/week**

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**Course outcomes:**

On successful completion of this course, the student will be able to:

- ❖ *Understand the phenomenon of interference of light and its formation in (i) Lloyd's single mirror due to division of wave front and (ii) Thin films, Newton's rings and Michelson interferometer due to division of amplitude.*
- ❖ *Distinguish between Fresnel's diffraction and Fraunhofer diffraction and observe the diffraction patterns in the case of single slit and the diffraction grating.*
- ❖ *Describe the construction and working of zone plate and make the comparison of zone plate with convex lens.*
- ❖ *Explain the various methods of production of plane, circularly and polarized light and their detection and the concept of optical activity..*
- ❖ *Comprehend the basic principle of laser, the working of He-Ne laser and Ruby lasers and their applications in different fields.*
- ❖ *Explain about the different aberrations in lenses and discuss the methods of*

**UNIT-I Interference of light: (12hrs)** Introduction, Conditions for interference of light, Interference of light by division of wave front and amplitude, Phase change on reflection- Interference in thin films: wedge- shaped films, colours in thin films, Newton's rings in reflected light-Theory and experiment,

Determination of wavelength of monochromatic light, Michelson interferometer and determination of wavelength.

**UNIT-II Diffraction of light:(12hrs)**

Introduction, Types of diffraction: Fresnel and Fraunhofer diffractions, Distinction between Fresnel and Fraunhofer diffraction, Fraunhofer diffraction at a single slit, Plane diffraction grating, Determination of wavelength of light using diffraction grating. Fresnel's half period zones, Zone plate, comparison of zone plate with convex lens.

**UNIT-III Polarisation of light:(12hrs)**

Polarized light: Methods of production of plane polarized light, Double refraction, Brewster's law, Malus law, Nicol prism, Nicol prism as polarizer and analyzer, Quarter wave plate, Half wave plate, Plane, Circularly and Elliptically polarized light-Production and detection, Optical activity, Basic principle of LCDs.

**UNIT-IV Aberrations and Fibre Optics: (12hrs)**

Monochromatic aberrations, Spherical aberration, Methods of minimizing spherical aberration, Coma, Astigmatism and Curvature of field, Distortion; Chromatic aberration-the achromatic doublet; Achromatism for two lenses (i) in contact and (ii) separated by a distance.

Fibre optics: Introduction to Fibers, different types of fibers, rays and modes in an optical fiber, Principles of fiber communication (qualitative treatment only), Advantages of fiber optic communication.

**UNIT-V Lasers and Holography:(12hrs)**

Lasers: Introduction, Spontaneous emission, stimulated emission, Population Inversion, Laser principle. Types of lasers-He-Ne laser, Ruby laser, Applications of lasers; Holography: Basic principle of holography, Applications of holography

**REFERENCE BOOKS:**

- BSc Physics, Vol.2, Telugu Akademy, Hyderabad
- A Text Book of Optics-N Subramanvam. I. Briilal. S.Chand & Co.



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**B.Sc. PHYSICS SYLLABUS UNDER CBCS**

**For Mathematics Combinations**

[2020-21 Batch onwards]

**II Year B.Sc.-Physics: III Semester**

**Course-III: HEAT AND THERMODYNAMICS**

**Work load:60hrs per semester**

**4 hrs/week**

**Course outcomes:**

*On successful completion of this course, the student will be able to:*

- ❖ *Understand the basic aspects of kinetic theory of gases, Maxwell-Boltzman distribution law, equipartition of energies, mean free path of molecular collisions and the transport phenomenon in ideal gases*
- ❖ *Gain knowledge on the basic concepts of thermodynamics, the first and the second law of thermodynamics, the basic principles of refrigeration, the concept of entropy, the thermodynamic potentials and their physical interpretations.*
- ❖ *Understand the working of Carnot's ideal heat engine, Carnot cycle and its efficiency*
- ❖ *Develop critical understanding of concept of Thermodynamic potentials, the formulation of Maxwell's equations and its applications.*
- ❖ *Differentiate between principles and methods to produce low temperature and liquefy air and also understand the practical applications of substances at low temperatures.*
- ❖ *Examine the nature of black body radiations and the basic theories.*

**UNIT-I: Kinetic Theory of gases:**

**(12 hrs)**

Kinetic Theory of gases-Introduction, Maxwell's law of distribution of molecular velocities (qualitative treatment only Mean free path, Transport phenomenon in ideal gases: viscosity, Thermal conductivity and diffusion of gases.

**UNIT-II: Thermodynamics:**

**(12hrs)**

Introduction- Isothermal and Adiabatic processes, Reversible and irreversible processes, Carnot's engine and its efficiency, Carnot's theorem,

Second law of thermodynamics: Kelvin's and Clausius statements Entropy, Physical significance, Change in entropy in reversible and irreversible processes; Entropy and disorder-Entropy of Universe; Temperature-Entropy (T-S) diagram and its uses ; change of entropy when ice changes into steam.

**UNIT-III: Thermodynamic Potentials and Maxwell's equations: (12hrs)**

Thermodynamic potentials-Internal Energy, Enthalpy, Helmholtz Free Energy, Gibb's Free Energy and their significance, Derivation of Maxwell's thermodynamic relations from thermodynamic potentials, Applications to (i) Clausius-Clayperon's equation (ii) Value of  $C_p - C_v$  (iii) Value of  $C_p/C_v$

**UNIT-IV: Low temperature Physics: (12hrs)**

Methods for producing very low temperatures, Joule Kelvin effect, Porous plug experiment , Joule expansion, Distinction between adiabatic and Joule Thomson expansion, Expression for Joule Thomson cooling, Liquefaction of air by Linde's method, Production of low temperatures by adiabatic demagnetization (qualitative), Practical applications of substances at low temperatures.

**UNIT-V: Quantum theory of radiation: (12 hrs)**

Blackbody and its spectral energy distribution of black body radiation, Kirchoff's law, Wein's displacement law, Stefan-Boltzmann's law and Rayleigh-Jean's law (No derivations), Planck's law of black body radiation-Derivation, Deduction of Wein's law and Rayleigh-Jean's law from Planck's law, Solar constant , Estimation of surface temperature of Sun.



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**B.Sc. PHYSICS SYLLABUS UNDER CBCS**

**For Mathematics Combinations**

[2020-21 Batch onwards]

**II Year B.Sc.-Physics: IV Semester**

**Course-IV: ELECTRICITY, MAGNETISM AND ELECTRONICS**

**Work load:60 hrs per semester**

**4 hrs/week**

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**Course outcomes:**

*On successful completion of this course, the students will be able to:*

- ❖ *Understand the Gauss law and its application to obtain electric field in different cases and formulate the relationship between electric displacement vector, electric polarization, Susceptibility, Permittivity and Dielectric constant.*
- ❖ *Distinguish between the magnetic effect of electric current and electromagnetic induction and apply the related laws in appropriate circumstances.*
- ❖ *Understand Biot and Savart's law and Ampere's circuital law to describe and explain the generation of magnetic fields by electrical currents.*
- ❖ *Develop an understanding on the unification of electric and magnetic fields and Maxwell's equations governing electromagnetic waves.*
- ❖ *Phenomenon of resonance in LCR AC-circuits, sharpness of resonance, Q-factor, Power factor and the comparative study of series and parallel resonant circuits.*
- ❖ *Describe the operation of p-n junction diodes, zener diodes, light emitting diodes and transistors*
- ❖ *Understand the operation of basic logic gates and universal gates and their truth tables.*

## UNIT-I

### 1. Electrostatics: (6hrs)

Gauss's law-Statement and its proof, Electric field intensity due to (i) uniformly charged solid sphere and (ii) an infinite conducting sheet of charge, Electrical potential-Equipotential surfaces, Potential due to a (i) dipole (ii) uniformly charged sphere

### 2. Dielectrics: (6 hrs)

Dielectrics-Polar and Non-polar dielectrics- Effect of electric field on dielectrics, Dielectric strength, Capacitance of a parallel plate condenser with dielectric slab between the plates, Electric displacement D, electric polarization P, Relation between D, E and P, Dielectric constant and electric susceptibility.

## UNIT-II

### 3. Magnetostatics: (6 hrs)

Biot-Savart's law and its applications: (i) circular loop and (ii) solenoid, Divergence and curl of magnetic field, Ampere's Circuital Law and its application to Solenoid, Hall effect, determination of Hall coefficient and applications.

### 4. Electromagnetic Induction: (6 hrs)

Faraday's laws of electromagnetic induction, Lenz's law, Self induction and Mutual induction, Self inductance of a long solenoid, Mutual inductance of two coils, Energy stored in magnetic field.

## UNIT-III

### 5. Alternating currents: (6 hrs)

Alternating current - Relation between current and voltage in LR and CR circuits, Phasor and Vector diagrams, LCR series and parallel resonant circuit, Q -factor, Power in ac circuits, Power factor.

### 6. Electromagnetic waves-Maxwell's equations: (6 hrs)

Idea of displacement current, Maxwell's equations-Derivation, Maxwell's wave equation (with derivation), Transverse nature of electromagnetic waves, Poynting theorem (Statement).

## UNIT-IV

### 7. Basic Electronic devices: (12 hrs)

PN junction diode, Zener diode and Light Emitting Diode (LED) and their I-V characteristics, Zener diode as a regulator- Transistors and its operation, CB, CE and CC configurations, Input and output characteristics of a transistor in CE mode, Relation between alpha, beta and gamma.

## UNIT-V:

### 8. Digital Electronics: (12 hrs)

Number systems, Conversion of binary to decimal system and vice versa, Binary addition & Binary subtraction (1's and 2's complement methods), Laws of Boolean algebra, DeMorgan's laws-Statements and Proofs, Basic logic gates, NAND and NOR as universal gates, Exclusive-OR gate, Half adder and Full adder circuits.

**B.Sc. PHYSICS SYLLABUS UNDER CBCS**

**For Mathematics Combinations**

[2020-21 Batch onwards]

**II Year B.Sc.-Physics: IV Semester**

**Course V: MODERN PHYSICS**

**Work load:60hrs per semester**

**4 hrs/week**

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**Course outcomes:**

*On successful completion of this course, the students will be able to:*

- ❖ *Develop an understanding on the concepts of Atomic and Modern Physics, basic elementary quantum mechanics and nuclear physics.*
- ❖ *Develop critical understanding of concept of Matter waves and Uncertainty principle.*
- ❖ *Get familiarized with the principles of quantum mechanics and the formulation of Schrodinger wave equation and its applications.*
- ❖ *Examine the basic properties of nuclei, characteristics of Nuclear forces, salient features of Nuclear models and different nuclear radiation detectors.*
- ❖ *Classify Elementary particles based on their mass, charge, spin, half life and interaction.*
- ❖ *Get familiarized with the nano materials, their unique properties and applications.*
- ❖ *Increase the awareness and appreciation of superconductors and their practical applications.*

**UNIT-I :**

**1. Atomic and Molecular Physics:(12 hrs)**

Vector atom model and Stern-Gerlach experiment, Quantum numbers associated with it, Angular momentum of the atom, Coupling schemes, Zeeman effect, Experimental arrangement to study Zeeman effect; Raman effect, Characteristics of Raman effect,

Experimental arrangement to study Raman effect, Quantum theory of Raman effect, Applications of Raman effect.

#### **UNIT-II:**

##### **2. Matter waves&Uncertainty Principle: (12 hrs)**

Matter waves, de Broglie's hypothesis, Wave length of matter waves, Properties of matter waves, Davisson and Germer's experiment, Phase and group velocities, Heisenberg's uncertainty principle for position and momentum& energy and time, Illustration of uncertainty principle using diffraction of beam of electrons (Diffraction by a single slit)

#### **UNIT-III**

##### **3.Quantum (Wave) Mechanics:(12 hrs)**

Basic postulates of quantum mechanics, Schrodinger time independent and time dependent wave equations-Derivations, Physical interpretation of wave function, Eigen functions, Eigen values, Application of Schrodinger wave equation to (i) one dimensional potential box of infinite height(Infinite Potential Well).

#### **UNIT-IV:**

##### **3. Nuclear Physics:(12 hrs)**

*Nuclear Structure:* General Properties of Nuclei, Mass defect, Binding energy; *Nuclear forces:* Characteristics of nuclear forces- Yukawa's meson theory. *Nuclear Radiation detectors:* G.M. Counter, Cloud chamber, *Elementary Particles:* Elementary Particles and their classification

#### **UNIT-V:**

##### **4. Nano materials:(7hrs)**

Nanomaterials – Introduction, Electron confinement, Size effect, Surface to volume ratio, Quantum dots, Nano wires, Fullerene, CNT, Graphene(Mention structures and *mechanical, optical, electrical, and magnetic properties*); Mention of applications of nano materials: (*Fuel cells, Phosphors for HD TV, Next Generation Computer chips, elimination of pollutants, sensors*)

##### **5. Superconductivity: (5 hrs)**

Introduction to Superconductivity, Experimental results-critical temperature, critical magnetic field, Meissner effect, Isotope effect, Type I and Type II superconductors, BCS theory (elementary ideas only), Applications of superconductors

# **B.Sc. PHYSICS SYLLABUS UNDER CBCS**

## **For Mathematics Combinations**

### **Paper V: Electricity, Magnetism & Electronics (For Maths Combinations) V Semester**

**Work load: 60 hrs per semester**

**4 hrs/week**

#### **UNIT-I (12 hrs)**

##### **1. Electric field intensity and potential:**

Gauss's law statement and its proof- Electric field intensity due to (1) Uniformly charged sphere and (2) an infinite conducting sheet of charge. Electrical potential – potential due to i) a point charge, ii) charged spherical shell, Equipotential surfaces.

##### **2. Dielectrics:**

Electric dipole moment and molecular polarizability- Electric displacement  $D$ , electric polarization  $P$  – relation between  $D$ ,  $E$  and  $P$ - Dielectric constant and susceptibility.

#### **UNIT-II (12 hrs)**

##### **3. Electric and magnetic fields**

Biot-Savart's law, explanation and calculation of  $B$  due to long straight wire and solenoid, Hall effect – determination of Hall coefficient and applications.

##### **4. Electromagnetic induction**

Faraday's laws, Lenz's law, Self and mutual inductances, coefficient of coupling, calculation of self inductance of a long solenoid, Energy Stored in magnetic field, Transformer - energy losses - efficiency.

#### **UNIT-III (12 hrs)**

##### **5. Alternating currents and electromagnetic waves**

Alternating current - Relation between current and voltage in LR and CR circuits - vector diagrams, LCR series and parallel resonant circuits,  $Q$ -factor.

##### **6. Maxwell's equations**

Idea of displacement current - Maxwell's equations (integral and differential forms) (no derivation), Maxwell's wave equation (with derivation), Transverse nature of electromagnetic waves, production of electromagnetic waves (Hertz experiment).

#### **UNIT-IV (12 hrs)**

##### **7. Basic electronics:**

PN junction diode and Zener diode - I-V characteristics, PNP and NPN transistors, CB, CE and CC configurations, transistor (CE) characteristics, Determination of hybrid parameters, Transistor as an amplifier.

#### **UNIT-V: (12 hrs)**

##### **8. Digital electronics :**

Number systems - Conversion of binary to decimal system and vice versa, Laws of Boolean algebra, De Morgan's laws - statement and proof, Basic logic gates, NAND and NOR as universal gates, exclusive-OR gate, Half and full adders.

# B.Sc. PHYSICS SYLLABUS UNDER CBCS

## For Mathematics Combinations

Paper VI: Modern Physics

(For Maths Combinations)

V Semester

Work load: 60 hrs per semester

4 hrs/week

### UNIT-I (12 hrs)

#### 1. Atomic and molecular physics

Introduction, Drawbacks of Bohr's atomic model, Sommerfeld's elliptical orbits - relativistic correction (no derivation). Vector atom model- quantum numbers associated with it, Stern-Gerlach experiment, Zeeman effect and its experimental arrangement. Raman effect - hypothesis, Stokes and Anti Stokes lines, Quantum theory of Raman effect, Experimental arrangement, Applications of Raman effect.

### UNIT-II (12 hrs)

#### 2. Matter waves & Uncertainty Principle

Matter waves, de Broglie's hypothesis - wavelength of matter waves, Properties of matter waves, Davisson and Germer experiment. Heisenberg's uncertainty principle for position and momentum (x and p), energy and time (E and t). Experimental verification.

### UNIT-III (12 hrs)

#### 3. Quantum (wave) mechanics

Basic postulates of quantum mechanics, Schrodinger time independent and time dependent wave equations - derivations. Physical interpretation of wave function, Application of Schrodinger wave equation to particle in one dimensional potential infinite box.

### UNIT-IV(12 hrs)

#### 4. General Properties of Nuclei

Basic ideas of nucleus - size, mass, charge, density, angular momentum, magnetic moment, electric quadrupole moments, binding energy of nucleus, Liquid drop model and Shell model (qualitative aspects only).

#### 5. Radioactivity decay:

**Alpha decay:**  $\alpha$ -decay - Gamow's theory, Geiger Nuttal law,  $\beta$ -decay- electron emission, positron emission, electron capture and neutrino hypothesis of  $\beta$ -decay.

### UNIT-V (12 hrs)

#### 6. Crystal Structure

Amorphous and crystalline materials, unit cell, Miller indices, Bragg's law, diffraction of X-rays by crystals- experimental techniques of Laue's method and powder diffraction method.

#### 7. Superconductivity:

Introduction, experimental facts, critical temperature, critical field, Meissner effect, Isotope effect, Type I and type II superconductors, applications of superconductors.

# B.Sc. PHYSICS SYLLABUS UNDER CBCS

## For Mathematics Combinations

### Paper-VII-(A) Elective(Electronics)

Semester – V I

Elective Paper –VII-(A): Analog and Digital Electronics

No. of Hours per week: 04

Total Lectures:60

#### Unit-I (14 Hours)

1. **FET**-Advantages of FET over BJT ,FET-Construction, Working, characteristics and uses; MOSFET-enhancement MOSFET, depletion MOSFET, construction and working , drain and transfer characteristics of MOSFET, applications of MOSFET.

#### Unit-II (12Hours)

2. **Operational Amplifiers**: Characteristics of ideal and practical Op-Amp (IC 741), Basic differential amplifiers, Op-Amp supply voltage, IC identification, Internal blocks of Op-Amp, its parameter -off set voltages and currents, CMRR, slew rate.

#### Unit-III (12 Hours)

3. **Applications of Op-Amp**: Op-Amp as voltage amplifier, Inverting amplifier, Non-inverting amplifier, voltage follower, summing amplifier, difference amplifier, comparator, integrator, differentiator.

#### Unit-IV(10 Hours)

4. **IC 555 Timer** -Its pin diagram,internal architecture, Application as astable-multivibrator and mono stable multivibrator, Applications of mono stable multivibrator-a) frequency divider b) pulse stretcher, Applications of astable multivibrator-a) square wave oscillator b)Free-running ramp generator .

#### Unit-V (12 Hours)

5. **Sequential digital circuits**: Flip-flops, RS, Clocked SR, JK, D, T, Master-Slave Flip-flops, Conversion of Flip flops.

#### Reference Books

1. Digital Electronics by G.K.Kharate Oxford University Press
2. Unified Electronics by Agarwal and Agarwal. Vol I,II&III
3. Op- Amp and Linear ICs by Ramakanth A Gayekwad, 4<sup>th</sup> edition PHI
4. Digital Principles and Applications by Malvino and Leach, TMH, 1996, 4<sup>th</sup> edition.
5. Digital Circuit design by Morris Mano,PHI
6. Switching Theory and Logic design by A.AnandKumar ,PHI
7. operations amplifier by SV Subramanyam.

#### **Elective Paper-VII Practical: Analog and Digital Electronics**

2hrs/Week

Minimum of 6 experiments to be done and recorded

- 1) Characteristics of FET
- 2) Characteristics of MOSFET
- 3) Characteristics of Op-amp.(IC741)
- 4) Op-Amp as amplifier/inverting amplifier
- 5) Op-Amp as integrator/differentiator
- 6) Op-Amp as summing amplifier/difference amplifier
- 7) IC 555 as astable multivibrator
- 8) IC 555 as monostable amplifier
- 9) Master slave flip-flop

# **B.Sc. PHYSICS SYLLABUS UNDER CBCS**

## **For Mathematics Combinations**

Semester –VI

Cluster Electives VIII-A

Paper – VIII-A-1: Electronic devices and circuits

No. of Hours per week: 04

Total Lectures : 60

**UNIT-I : (10hrs)**

**1.Networks Theorems:**

Statement and proofs of Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum Power transfer theorem, Milliman's theorem and Reciprocity theorem.

**UNIT-II : (12 hrs)**

**2.UJT & SCR:**

UJT construction-working, V-I characteristics, Experimental determination of UJT parameters, UJT as a Relaxation oscillator.

Silicon Controlled Rectifier (SCR), Structure and working of SCR. Two transistor representation, Characteristics of SCR. Experimental set up to study the SCR characteristics, Application of SCR for power control.

**UNIT-III : (12 hrs)**

**3.Rectifiers and Power Supplies :**

Half wave, full wave and bridge rectifiers-Efficiency-ripple factor- Regulation, Types of filter-choke input(inductor) filter, L-section &  $\pi$ -section filters. Three terminal fixed voltage I.C(78 XX) regulators - Principle and working of SMPS(switch mode power supplies).

**UNIT-IV : (12hrs)**

**4.Photo electric devices:** Structure and operation, characteristics, spectral response and application of photo diode, multiple junction photo diode, LDR and LED, Photovoltaic cell.

**Unit- V (14 Hours)**

**5. CRO :** Block diagram of basic CRO, construction of CRT, electron gun, electrostatic focusing and acceleration(only explanation) , time base operation, synchronization, front panel controls.

**6. Applications CRO:** Measurements of dc and ac voltages, ac frequency, time period, special features of dual trace.

**REFERENCE BOOKS:**

1. Electric Circuit Analysis- **S.R. Paranjothi**- New Age International.
2. Networks and Systems – **D.Roy Chowdary**.
3. Unified Electronics (Circuit Analysis and Electronic Devices) by **Agarwal-Arora**. Vol- I
4. A text book in electrical technology by B.L. Thereja (S.Chand&Co).Vol- IV
5. Electronic devices and circuits by Milman and Halkias.

# **B.Sc. PHYSICS SYLLABUS UNDER CBCS**

## **For Mathematics Combinations**

Semester –VI

Cluster Elective Paper VIII-A-2: Computational Methods and Programming

No. of Hours per week: 04

Total Lectures:60

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### **UNIT-I (12hrs)**

1. **Fundamentals of C language:** C character set-Identifiers and Keywords-Constants - Variables-Data types-Declarations of variables-Declaration of storage class-Defining symbolic constants- Assignment statement.
2. **Operators:** Arithmetic operators-Relational operators-Logic operators-Assignment operators- Increment and decrement operators-Conditional operators.

### **UNIT-II (12hrs)**

3. **Expressions and I/O Statements:** Arithmetic expressions-Precedence of arithmetic operators-Type converters in expressions-Mathematical (Library) functions - Data input and output-The getch and putchar functions-Scanf-Printf simple programs.

### **UNIT-III (12hrs)**

4. **Arrays:** One dimensional and two dimensional arrays - Initialization - Type declaration - Inputting and outputting of data for arrays - Programs of matrices addition, subtraction and multiplication

### **UNIT-IV (12hrs)**

5. **Linear and Non - Linear equations:** Solution of Algebra and transcendental equations-Bisection, Falsi position and Newton-Rhapson methods-Basic principles-Formulae-algorithms

### **UNIT-V (12hrs)**

6. **Numerical differentiation and integration:** Numerical differentiation-algorithm for evaluation of first order derivatives using formulae based on Taylor's series-Numerical integration-Trapezoidal and Simpson's 1/3 rule- Formulae-Algorithms.

# **B.Sc. PHYSICS SYLLABUS UNDER CBCS**

## **For Mathematics Combinations**

Semester –VI

Cluster Elective Paper –VIII-A-3: Electronic Instrumentation

No. of Hours per week: 04

Total Lectures:60

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### **Unit – I (12Hours)**

1. **Basics of measurements:** Instrument, accuracy, precision, sensitivity, resolution, range, errors in measurement, Multi meter - principle- measurement of dc voltage and dc current, ac voltage and resistance, Operating instructions of multi meter.

### **Unit -II (10 Hours)**

2. **Electronic Voltmeter:** Advantages over conventional multi meter, considerations in selecting voltmeter, Basic volt meter (TVM), Differential voltmeter, Solid state voltmeter AC voltmeter using rectifiers and their significances.

### **Unit– III (14 Hours)**

3. **Digital Multi meter:** Block diagram, working and specifications of digital multi meter, Universal counter and Frequency counter- Block diagram, frequency and time period measurement & accuracy and resolution.

### **Unit – IV (12 Hours)**

4. **Digital instruments:** Comparison of analog and digital instruments, Principle and working of digital instruments - Tacho meter, P<sup>H</sup> meter, Capacitance meter and phase meter. Digital voltmeter- advantages, Performance parameters, Block diagram and working.

### **Unit – V (12 Hours)**

5. **Signal generators:** Block diagram explanation, specifications of low frequency signal generators(AF Sine and square wave generator, RF Signal Generator), pulse generator, function generator-working, Brief idea for testing, specifications. Distortion factor meter, wave analysis.

### **Reference Books**

1. A text book in electrical technology by B.L. Thereja (S.Chand&Co)-Vol IV
2. Digital circuits and systems by Venugopal 2011 (Tata Mcgraw Hill)
3. Digital Electronics by SubrathaGhoshal 2012 (Cengage Learning)
4. Electronic measurements and instrumentation by U.A.Bakshi, A.V.Bakshi K.A.Bakshi
5. Electronic instrumentation by H. S. Kalsi.



### 3. Theories of bonding in metals:

4h

Valence bond theory and Free electron theory, explanation of thermal and electrical conductivity of metals based on these theories, Band theory- formation of bands, explanation of conductors, semiconductors and insulators.

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#### UNIT-III

##### Solidstate

10h

Symmetry in crystals. Law of constancy of interfacial angles. The law of rationality of indices. The law of symmetry. Miller indices, Definition of lattice point, space lattice, unit cell. Bravais lattices and crystal systems. X-ray diffraction and crystal structure. Bragg's law. Powder method. Defects in crystals. Stoichiometric and non-stoichiometric defects.

#### UNIT-IV

##### 1. Gaseous state

6h

van der Waal's equation of state. Andrew's isotherms of carbon dioxide, continuity of state. Critical phenomena. Relationship between critical constants and vander Waal's constants. Law of corresponding states. Joule- Thomson effect. Inversion temperature.

##### 2. Liquid state

4h

Liquid crystals, mesomorphic state. Differences between liquid crystal and solid/liquid. Classification of liquid crystals into Smectic and Nematic. Application of liquid crystals as LCD devices.

#### UNIT-V

##### Solutions, Ionic equilibrium & dilute solutions

##### 1. Solutions

6h

Azeotropes-HCl-H<sub>2</sub>O system and ethanol-water system. Partially miscible liquids-phenol-water system. Critical solution temperature (CST), Effect of impurity on consolute temperature. Immiscible liquids and steam distillation. Nernst distribution law. Applications of distribution law.

##### 2. Ionic equilibrium

3h

Ionic product, common ion effect, solubility and solubility product.

##### 3. Dilute solutions

7h

Colligative properties- RLVP, Osmotic pressure, Elevation in boiling point and depression in freezing point. Experimental methods for the determination of molar mass of a non-volatile solute using osmotic pressure, Elevation in boiling point and depression in freezing point. Abnormal colligative properties. Van't Hoff factor.

##### Co-curricular activities and Assessment Methods

1. Continuous Evaluation: Monitoring the progress of student's learning
2. Class Tests, worksheets and Quizzes



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2021-22

**CHEMISTRY**

**SEMESTER – II**

**Course II – (Organic & General Chemistry) 60 hrs (4h/w)**

**Course outcomes:**

At the end of the course, the student will be able to;

1. Understand and explain the differential behavior of organic compounds based on fundamental concepts learnt.
2. Formulate the mechanism of organic reactions by recalling and correlating the fundamental properties of the reactants involved.
3. Learn and identify many organic reaction mechanisms including Free Radical Substitution, Electrophilic Addition and Electrophilic Aromatic Substitution.
4. Correlate and describe the stereochemical properties of organic compounds and reactions.

**ORGANIC CHEMISTRY**

**36h**

**UNIT-I**

**Recapitulation of Basics of Organic Chemistry**

**Carbon-Carbon sigma bonds (Alkanes and Cycloalkanes)**

**12h**

General methods of preparation of alkanes- Wurtz and Wurtz-Fittig reaction, Corey House synthesis, physical and chemical properties of alkanes, Isomerism and its effect on properties, Free radical substitutions; Halogenation, concept of relative reactivity v/s selectivity. Conformational analysis of alkanes (Conformations, relative stability and energy diagrams of Ethane, Propane and butane). General molecular formulae of cycloalkanes and relative stability, Baeyer strain theory, Cyclohexane conformations with energy diagram, Conformations of monosubstituted cyclohexane.

**UNIT-II**

**Carbon-Carbon pi Bonds (Alkenes and Alkynes)**

**12h**

General methods of preparation, physical and chemical properties. Mechanism of E1, E2, E1CB reactions, Saytzeff and Hoffmann eliminations, Electrophilic Additions, mechanism (Markownikoff/Antimarkownikoff addition) with suitable examples, syn and anti-addition; addition of H<sub>2</sub>, X<sub>2</sub>, HX. oxymercuration-demercuration, hydroboration-oxidation, ozonolysis, hydroxylation, Diels Alder reaction, 1,2- and 1,4-addition reactions in conjugated dienes.

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**Reactions of alkynes;** acidity, electrophilic and nucleophilic additions, hydration to form carbonyl compounds, Alkylation of terminal alkynes.

### UNIT-III

#### **Benzene and its reactivity**

**12h**

Concept of aromaticity, Huckel's rule - application to Benzenoid (Benzene, Naphthalene) and Non-Benzenoid compounds (cyclopropenyl cation, cyclopentadienyl anion and tropylium cation) Reactions - General mechanism of electrophilic aromatic substitution, mechanism of nitration, Friedel- Craft's alkylation and acylation. Orientation of aromatic substitution - ortho, para and meta directing groups. Ring activating and deactivating groups with examples (Electronic interpretation of various groups like NO<sub>2</sub> and Phenolic). Orientation of (i) Amino, methoxy and methyl groups (ii) Carboxy, nitro, nitrile, carbonyl and sulphonic acid groups (iii) Halogens (Explanation by taking minimum of one example from each type)

### GENERAL CHEMISTRY

**24 h**

### UNIT-IV

#### **1. Surface chemistry and chemical bonding**

##### **Surface chemistry**

**6h**

**Colloids-** Coagulation of colloids, Hardy-Schulze rule. Stability of colloids, Protection of Colloids, Gold number.

**Adsorption-**Physical and chemical adsorption, Langmuir adsorption isotherm, applications of adsorption.

#### **2. Chemical Bonding**

**6h**

Valence bond theory, hybridization, VB theory as applied to ClF<sub>3</sub>, Ni(CO)<sub>4</sub>, Molecular orbital theory -LCAO method, construction of M.O. diagrams for homo-nuclear and hetero-nuclear diatomic molecules (N<sub>2</sub>, O<sub>2</sub>, CO and NO).

#### **3. HSAB**

**2h**

Pearson's concept, HSAB principle & its importance, bonding in Hard-Hard and Soft-Soft combinations.

### UNIT-V

#### **Stereochemistry of carbon compounds**

**10h**

Molecular representations- Wedge, Fischer, Newman and Saw-Horse formulae.

Optical isomerism: Optical activity- wave nature of light, plane polarised light, optical rotation and specific rotation.

diastereomers – Explanation of optical isomerism with examples- Glyceraldehyde, Lactic acid, Alanine, Tartaric acid, 2,3-dibromopentane.

D,L, R,S and E,Z- configuration with examples.

Definition of Racemic mixture – Resolution of racemic mixtures (any 3 techniques)

#### Co-curricular activities and Assessment Methods

Continuous Evaluation: Monitoring the progress of student's learning

Class Tests, Worksheets and Quizzes

Presentations, Projects and Assignments and Group Discussions: Enhance critical thinking skills and personality

Semester-end Examination: critical indicator of student's learning and teaching methods adopted by teacher throughout the semester.



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2021-22

## CHEMISTRY

### SEMESTER - III

Course III (ORGANIC CHEMISTRY & SPECTROSCOPY) 60hrs (4 h / w)



#### Course outcomes:

At the end of the course, the student will be able to;

1. Understand preparation, properties and reactions of halo alkanes, halo arenes and oxygen containing functional groups.
2. Use the synthetic chemistry learnt in this course to do functional group transformations.
3. To propose possible mechanisms for any relevant reaction

#### ORGANIC CHEMISTRY

34h

##### UNIT – I

##### 1. Chemistry of Halogenated Hydrocarbons:

6h

Alkylhalides: Methods of preparation and properties, nucleophilic substitution reactions– SN1, SN2 and SNi mechanisms with stereochemical aspects and effect of solvent etc.; nucleophilic substitution vs elimination, Williamson's synthesis. Arylhalides: Preparation (including preparation from diazonium salts) and properties, nucleophilic aromatic substitution; SN<sup>Ar</sup>, Benzyne mechanism. Relative reactivity of alkyl, allyl, benzyl, vinyl and arylhalides towards nucleophilic substitution reactions.

##### 2. Alcohols & Phenols

6h

Alcohols: preparation, properties and relative reactivity of 1°, 2°, 3° alcohols, Oxidation of diols by periodic acid and lead tetra acetate, Pinacol- Pinacolone rearrangement;

Phenols: Preparation and properties; Acidity and factors effecting it, Ring substitution reactions, Reimer-Tiemann and Kolbe's-Schmidt Reactions, Fries and Claisen rearrangements with mechanism;

## UNIT-II

### Carbonyl Compounds

10h

Structure, reactivity, preparation and properties; Nucleophilic addition-elimination reactions with ammonia derivatives.

Mechanisms of Aldol and Benzoin condensation, Claisen-Schmidt, Perkin, Cannizzaro and Wittig reaction, Beckmann, haloform reaction and Baeyer-Villiger oxidation,  $\alpha$ -substitution reactions, oxidations and reductions (Clemmensen, Wolff-Kishner, with  $\text{LiAlH}_4$  &  $\text{NaBH}_4$ ).

Addition reactions of  $\alpha$ ,  $\beta$ -unsaturated carbonyl compounds: Michael addition.

### Active methylene compounds:

Keto-Enol tautomerism. Preparation of diethyl malonate, ethyl acetoacetate (Claisen Condensation) and synthesis of propanoic acid, succinic acid and crotonic acids

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## UNIT-III

### Carboxylic Acids and their Derivatives

12h

Effect of Substituents on acidic strength, Typical reactions of dicarboxylic acids, hydroxyl acids and unsaturated acids. Comparative study of nucleophilic substitution at acyl group- Mechanism of acidic and alkaline hydrolysis of esters, Claisen condensation, Reformatsky reaction and Curtius rearrangement.

Reactions involving H, OH and COOH groups- salt formation, anhydride formation, acid chloride formation, amide formation and esterification (mechanism). Degradation of carboxylic acids by Hunsdiecker reaction, decarboxylation by Schmidt reaction, Arndt-Eistert synthesis, halogenation by Hell-Volhard-Zelinsky reaction.

### SPECTROSCOPY

26 h

## UNIT-IV

### Molecular Spectroscopy:

18h

Interaction of electromagnetic radiation with molecules and various types of spectra;

**Rotation spectroscopy:** Selection rules, intensities of spectral lines, determination of bond lengths of diatomic and linear triatomic molecules, isotopic substitution.

**Vibrational spectroscopy:** Classical equation of vibration, computation of force constant, Harmonic and anharmonic oscillator, Morse potential curve, vibrational degrees of freedom for polyatomic molecules, modes of vibration. Selection rules for vibrational transitions, Fundamental frequencies, overtones and hot bands.

**Electronic spectroscopy:** Energy levels of molecular orbitals ( $\sigma$ ,  $\pi$ ,  $n$ ). Selection rules for electronic spectra. Types of electronic transitions in molecules, effect of conjugation. Concept of chromophore. bathochromic and hypsochromic shifts. Beer-Lambert's law and its limitations.

**Nuclear Magnetic Resonance (NMR) spectroscopy:** Principles of nuclear magnetic resonance, equivalent and non-equivalent protons, position of signals. Chemical shift, NMR splitting of signals - spin-spin coupling, coupling constants. Applications of NMR with suitable examples - ethyl bromide, ethanol, acetaldehyde, 1,1,2-tribromo ethane, ethyl acetate, toluene and acetophenone.

**Application of Spectroscopy to Simple Organic Molecules****Application of visible, ultraviolet and Infrared spectroscopy in organic molecules.**

Application of electronic spectroscopy and Woodward rules for calculating  $\lambda_{\text{max}}$  of conjugated dienes and  $\alpha,\beta$  – unsaturated compounds.

Infrared radiation and types of molecular vibrations, functional group and fingerprint region. IR spectra of alkanes, alkenes and simple alcohols (inter and intramolecular hydrogen bonding), aldehydes, ketones, carboxylic acids and their derivatives (effect of substitution on  $>\text{C}=\text{O}$  stretching absorptions).

**Co-curricular activities and Assessment Methods**

1. Continuous Evaluation: Monitoring the progress of student's learning Class Tests, Work sheets and Quizzes
2. Presentations, projects and Assignments and Group Discussions: Enhances critical thinking skills and personality
3. Semester-end Examination: critical indicator of student's learning and teaching methods adopted by teachers throughout the semester.

**List of Reference Books**

1. A Text Book of Organic Chemistry by Bahl and Arunbahl
2. A Text Book of Organic chemistry by I L Finar Vol I
3. Organic chemistry by Bruice
4. Organic chemistry by Clayden
5. Spectroscopy by William Kemp
6. Spectroscopy by Pavia
7. Organic Spectroscopy by J. R. Dyer



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2021-22

**CHEMISTRY**

**SEMESTER - IV**

**Course IV (INORGANIC, ORGANIC AND PHYSICAL CHEMISTRY) 60hrs (4 h / w)**

**Course outcomes:**

At the end of the course, the student will be able to;

1. To learn about the laws of absorption of light energy by molecules and the subsequent photo chemical reactions.
2. To understand the concept of quantum efficiency and mechanism of photochemical reactions.

**UNIT - I**

**Organo metallic Compounds**

**8h**

Definition and classification of organo metallic Compounds on the basis of bond type, Concept of hapticity of organic ligands. Metalcarbonyls: 18electronrule, electron count of mononuclear, poly nuclear and substituted metal carbonyls of Fe and Co. Pi-acceptor behaviour of carbon monoxide. Synergic effects (VB approach)

**UNIT – II**

**Carbohydrates**

**8h**

Occurrence, classification and their biological importance, Monosaccharides: Constitution and absolute configuration of glucose and fructose, epimers and anomers, mutarotation, determination of ring size of glucose and fructose, Haworth projections and conformational structures; Inter conversions of aldoses and ketoses; Killiani-Fischer synthesis and Ruff degradation;

**UNIT- III**

**Amino acids and proteins**

**6h**

Introduction: Definition of Amino acids, classification of Amino acids into alpha, beta, and gamma amino acids. Natural and essential amino acids - definition and examples, classification of alpha amino acids into acidic, basic and neutral amino acids with examples. Methods of synthesis: General methods of synthesis of alpha amino acids (specific examples - Glycine, Alanine, valine and leucine) by following methods: a) from halogenated carboxylic acid b) Gabriel Phthalimide synthesis c) strecker's synthesis.

Physical properties: Zwitter ion structure - salt like character - solubility, melting points, amphoteric character, definition of isoelectric point.

Chemical properties: General reactions due to amino and carboxyl groups - lactams from gamma and delta amino acids by heating- peptide bond (amide linkage).

## Heterocyclic Compounds

7h

Introduction and definition: Simple five membered ring compounds with one hetero atom Ex. Furan. Thiophene and pyrrole - Aromatic character – Preparation from 1, 4, -dicarbonyl compounds, Paul-Knorr synthesis.

Properties: Acidic character of pyrrole - electrophilic substitution at 2 or 5 position, Halogenation, Nitration and Sulphonation under mild conditions - Diels Alder reaction in furan.

Pyridine – Structure - Basicity - Aromaticity- Comparison with pyrrole- one method of preparation and properties - Reactivity towards Nucleophilic substitution reaction.

## UNIT- IV

### Nitrogen Containing Functional Groups

Preparation, properties and important reactions of nitro compounds, amines and diazonium salts.

#### 1. Nitro hydrocarbons

3h

Nomenclature and classification-nitro hydrocarbons, structure -Tautomerism of nitroalkanes leading to aci and keto form, Preparation of Nitroalkanes, reactivity -halogenation, reaction with HONO (Nitrous acid), Nef reaction and Mannich reaction leading to Micheal addition and reduction.

#### 2. Amines:

11h

Introduction, classification, chirality in amines (pyramidal inversion), importance and general methods of preparation.

Properties : Physical properties, Basicity of amines: Effect of substituent, solvent and steric effects. Distinction between Primary, Secondary and tertiary amines using Hinsberg's method and nitrous acid. Discussion of the following reactions with emphasis on the mechanistic pathway: Gabriel Phthalimide synthesis, Hoffmann-Bromamide reaction, Carbylamine reaction, Mannich reaction, Hoffmann's exhaustive methylation, Hofmann-elimination reaction and Cope elimination.

**Diazonium Salts:** Preparation and synthetic applications of diazonium salts including preparation of arenes, haloarenes, phenols, cyano and nitro compounds. Coupling reactions of diazonium salts (preparation of azo dyes).

## UNIT- V

### Photochemistry

5h

Difference between thermal and photochemical processes, Laws of photochemistry- Grothus-Draper's law and Stark-Einstein's law of photochemical equivalence, Quantum yield- Photochemical reaction mechanism- hydrogen- chlorine and hydrogen- bromine reaction.

Qualitative description of fluorescence, phosphorescence, Jablonski diagram, Photosensitized reactions- energy transfer processes (simple example).

### **Thermodynamics**

**12 h**

The first law of thermodynamics-statement, definition of internal energy and enthalpy, Heat capacities and their relationship, Joule-Thomson effect- coefficient, Calculation of work for the expansion of perfect gas under isothermal and adiabatic conditions for reversible processes, State function. Temperature dependence of enthalpy of formation- Kirchoff's equation, Second law of thermodynamics Different Statements of the law, Carnot cycle and its efficiency, Carnot theorem, Concept of entropy, entropy as a state function, entropy changes in reversible and irreversible processes. Entropy changes in spontaneous and equilibrium processes.

### **Co-curricular activities and Assessment Methods**

1. Continuous Evaluation: Monitoring the progress of student's learning Class Tests, Work sheets and Quizzes
2. Presentations, projects and Assignments and Group Discussions: Enhances critical thinking skills and personality
3. Semester-end Examination: critical indicator of student's learning and teaching methods adopted by teachers throughout the semester.

## SEMESTER - IV

### Course V (INORGANIC & PHYSICAL CHEMISTRY) 60 hrs (4 h / w)

#### Course outcomes:

At the end of the course, the student will be able to;

1. Understand concepts of boundary conditions and quantization, probability distribution, most probable values, uncertainty and expectation values
2. Application of quantization to spectroscopy.
3. Various types of spectra and their use in structure determination.

#### INORGANIC CHEMISTRY

26 h

##### UNIT –I

##### Coordination Chemistry

12 h

IUPAC nomenclature of coordination compounds, Structural and stereoisomerism in complexes with coordination numbers 4 and 6. Valence Bond Theory (VBT): Inner and outer orbital complexes. Limitations of VBT, Crystal field effect, octahedral symmetry. Crystal field stabilization energy (CFSE), Crystal field effects for weak and strong fields. Tetrahedral symmetry, Factors affecting the magnitude of crystal field splitting energy, Spectrochemical series, Comparison of CFSE for Octahedral and Tetrahedral complexes, Tetragonal distortion of octahedral geometry, Jahn-Teller distortion, square planar coordination.

##### UNIT –II

##### 1. Inorganic Reaction Mechanism:

4h

Introduction to inorganic reaction mechanisms. Concept of reaction pathways, transition state, intermediate and activated complex. Labile and inert complexes, ligand substitution reactions  $SN^1$  and  $SN^2$ , Substitution reactions in square planar complexes, Trans-effect, theories of trans effect and its applications

##### 2. Stability of metal complexes:

2h

Thermodynamic stability and kinetic stability, factors affecting the stability of metal complexes, chelate effect, determination of composition of complex by Job's method and mole ratio method.

##### Bioinorganic Chemistry:

8h

Toxicity of metal ions (Hg, Pb, Cd and As), reasons for toxicity, Use of chelating agents in medicine, Cisplatin as an anti-cancer drug. Iron and its application in bio-systems, Haemoglobin, Myoglobin.

## PHYSICAL CHEMISTRY

34 h

### UNIT-III

#### 1 .Phase rule

6h

Concept of phase, components, degrees of freedom. Thermodynamic derivation of Gibbs phase rule. Phase diagram of one component system - water system, Study of Phase diagrams of Simple eutectic systems i) Pb-Ag system, desilverisation of lead ii) NaCl-Water system, Congruent and incongruent melting point- Definition and examples for systems having congruent and incongruent melting point , freezing mixtures.

### UNIT-IV

#### Electrochemistry

14h

Specific conductance, equivalent conductance and molar conductance- Definition and effect of dilution. Cell constant. Strong and weak electrolytes, Kohlrausch's law and its applications, Definition of transport number, determination of transport number by Hittorf's method. Debye-Huckel-Onsagar's equation for strong electrolytes (elementary treatment only), Application of conductivity measurements- conductometric titrations.

Electrochemical Cells- Single electrode potential, Types of electrodes with examples: Metal-metal ion, Gas electrode, Inert electrode, Redox electrode, Metal-metal insoluble salt- salt anion. Determination of EMF of a cell, Nernst equation, Applications of EMF measurements - Potentiometric titrations.

Fuel cells- Basic concepts, examples and applications

### UNIT-V

#### Chemical Kinetics:

14 h

The concept of reaction rates. Effect of temperature, pressure, catalyst and other factors on reaction rates. Order and molecularity of a reaction, Derivation of integrated rate equations for zero, first and second order reactions (both for equal and unequal concentrations of reactants). Half-life of a reaction. General methods for determination of order of a reaction. Concept of activation energy and its calculation from Arrhenius equation. Theories of Reaction Rates: Collision theory and Activated Complex theory of bimolecular reactions. Comparison of the two theories (qualitative treatment only).

#### Co-curricular activities and Assessment Methods

1. Continuous Evaluation: Monitoring the progress of student's learning Class Tests, Work

## SEMESTER-V

### Paper - V (INORGANIC, PHYSICAL & ORGANIC CHEMISTRY) 45 hrs (3 h / w)

#### INORGANIC CHEMISTRY

##### UNIT – I

###### Coordination Chemistry:

8h

IUPAC nomenclature - bonding theories - Review of Werner's theory and Sidgwick's concept of coordination - Valence bond theory - geometries of coordination numbers 4-tetrahedral and square planar and 6-octahedral and its limitations, crystal field theory - splitting of d-orbitals in octahedral, tetrahedral and square-planar complexes - low spin and high spin complexes - merits of crystal-field theory. Isomerism in coordination compounds - structural isomerism and stereo isomerism, stereochemistry of complexes with 4 and 6 coordination numbers.

##### UNIT-II

###### 1. Magnetic properties of metal complexes:

4h

Types of magnetic behavior, spin-only formula, calculation of magnetic moments, experimental determination of magnetic susceptibility-Gouy method.

###### 2. Stability of metal complexes:

3h

Thermodynamic stability and kinetic stability, factors affecting the stability of metal complexes, chelate effect, determination of composition of complex by Job's method and mole ratio method.

#### ORGANIC CHEMISTRY

##### UNIT- III

###### Nitro hydrocarbons:

3h

Nomenclature and classification-nitro hydrocarbons, structure -Tautomerism of nitroalkanes leading to aci and keto form, Preparation of Nitroalkanes, reactivity -halogenation, reaction with HONO (Nitrous acid), Nef reaction and Mannich reaction leading to Micheal addition and reduction.

##### UNIT – IV

###### Nitrogen compounds:

12h

Amines (Aliphatic and Aromatic): Nomenclature, Classification into 1°, 2°, 3° Amines and Quarternary ammonium compounds. Preparative methods – 1. Ammonolysis of alkyl halides 2. Gabriel synthesis 3. Hoffman's bromamide reaction (mechanism).

Reduction of Amides and Schmidt reaction. Physical properties and basic character - Comparative basic strength of Ammonia, methyl amine, dimethyl amine, trimethyl amine and aniline - comparative basic strength of aniline, N-methylaniline and NN-dimethyl aniline (in aqueous and non-aqueous medium), steric effects and substituent effects. Chemical properties: a) Alkylation b) Acylation c) Carbylamine reaction d) Hinsberg

separation e) Reaction with Nitrous acid of 1°, 2°, 3° (Aliphatic and aromatic amines). Electrophilic substitution of Aromatic amines – Bromination and Nitration. Oxidation of aryl and Tertiary amines, Diazotization.

## PHYSICAL CHEMISTRY

### UNIT- V

#### Thermodynamics

15h

The first law of thermodynamics-statement, definition of internal energy and enthalpy. Heat capacities and their relationship. Joule-Thomson effect- coefficient. Calculation of  $w$ , for the expansion of perfect gas under isothermal and adiabatic conditions for reversible processes. State function. Temperature dependence of enthalpy of formation- Kirchoff's equation. Second law of thermodynamics. Different Statements of the law. Carnot cycle and its efficiency. Carnot theorem. Concept of entropy, entropy as a state function, entropy changes in reversible and irreversible processes. Entropy changes in spontaneous and equilibrium processes.

#### List of Reference Books

1. Concise coordination chemistry by Gopalan and Ramalingam
2. Coordination Chemistry by Basalo and Johnson
3. Organic Chemistry by G. Mare loudan. Purdue Univ
4. Advanced Physical Chemistry by
5. Text book of physical chemistry by S Glasstone
6. Concise Inorganic Chemistry by J.D.Lee
7. Advanced Inorganic Chemistry Vol-I by Satyaprakash, Tuli, Basu and Madan
8. A Text Book of Organic Chemistry by Bahl and Arun bahl
9. A Text Book of Organic chemistry by I L Finar Vol I
10. Advanced physical chemistry by Gurudeep Raj

## SEMESTER-V

### Paper - VI (INORGANIC, ORGANIC & PHYSICAL CHEMISTRY)

45 hrs (3 h / w)

#### INORGANIC CHEMISTRY

##### UNIT-I

###### 1. Reactivity of metal complexes:

4h

Labile and inert complexes, ligand substitution reactions -  $SN^1$  and  $SN^2$ , substitution reactions of square planar complexes - Trans effect and applications of trans effect.

###### 2. Bioinorganic chemistry:

4h

Essential elements, biological significance of Na, K, Mg, Ca, Fe, Co, Ni, Zn, Metalloporphyrins – Structure and functions of hemoglobin, and Chlorophyll.

#### PHYSICAL CHEMISTRY

##### UNIT-II

###### 1. Chemical kinetics

8h

Rate of reaction - Definition of order and molecularity. Derivation of rate constants for first, second, third and zero order reactions and examples. Derivation for time half change. Methods to determine the order of reactions. Effect of temperature on rate of reaction, Arrhenius equation, concept of activation energy.

###### 2. Photochemistry

5h

Difference between thermal and photochemical processes. Laws of photochemistry- Grothus-Draper's law and Stark-Einstein's law of photochemical equivalence. Quantum yield-Photochemical reaction mechanism- hydrogen- chlorine, hydrogen- bromine reaction. Qualitative description of fluorescence, phosphorescence, Photosensitized reactions- energy transfer processes (simple example)

#### ORGANIC CHEMISTRY

##### UNIT- III

###### Heterocyclic Compounds

7h

Introduction and definition: Simple five membered ring compounds with one hetero atom  
Ex. Furan. Thiophene and pyrrole - Aromatic character – Preparation from 1,4,-dicarbonyl compounds, Paul-Knorr synthesis.

Properties : Acidic character of pyrrole - electrophilic substitution at 2 or 5 position, Halogenation, Nitration and Sulphonation under mild conditions - Diels Alder reaction in furan.

Pyridine – Structure - Basicity - Aromaticity - Comparison with pyrrole - one method of preparation and properties - Reactivity towards Nucleophilic substitution reaction.

## UNIT-IV

### Carbohydrates

8h

Monosaccharides: (+) Glucose (aldo hexose) - Evidence for cyclic structure of glucose (some negative aldehydes tests and mutarotation) - Proof for the ring size (methylation, hydrolysis and oxidation reactions) - Pyranose structure (Haworth formula and chair conformational formula).

(-) Fructose (keto hexose) - Evidence of 2 - keto hexose structure (formation of pentaacetate, formation of cyanohydrin its hydrolysis and reduction by HI). Cyclic structure for fructose (Furanose structure and Haworth formula) - osazone formation from glucose and fructose – Definition of anomers with examples.

Interconversion of Monosaccharides: Aldopentose to Aldohexose (Arabinose to D- Glucose, D-Mannose) (Kiliani - Fischer method). Epimers, Epimerisation - Lobry de bruyn van Ekenstein rearrangement. Aldohexose to Aldopentose (D-Glucose to D- Arabinose) by Ruff degradation. Aldohexose to Ketohexose [(+) Glucose to (-) Fructose] and Ketohexose to Aldohexose (Fructose to Glucose)

## UNIT- V

### Amino acids and proteins

7h

Introduction: Definition of Amino acids, classification of Amino acids into alpha, beta, and gamma amino acids. Natural and essential amino acids - definition and examples, classification of alpha amino acids into acidic, basic and neutral amino acids with examples. Methods of synthesis: General methods of synthesis of alpha amino acids (specific examples - Glycine, Alanine, valine and leucine) by following methods: a) from halogenated carboxylic acid b) Malonic ester synthesis c) strecker's synthesis.

Physical properties: Zwitter ion structure - salt like character - solubility, melting points, amphoteric character, definition of isoelectric point.

Chemical properties: General reactions due to amino and carboxyl groups - lactams from gamma and delta amino acids by heating peptide bond (amide linkage). Structure and nomenclature of peptides and proteins.

### List of Reference Books

1. Concise coordination chemistry by Gopalan and Ramalingam
2. Coordination Chemistry by Basalo and Johnson
3. Organic Chemistry by G.Mare loudan, Purdue Univ
4. Advanced Physical Chemistry by Atkins
5. Text book of physical chemistry by S Glasstone

**SEMESTER-VI**  
**ELECTIVE PAPER – VII: ENVIRONMENTAL CHEMISTRY**  
**45 hrs (3 h / w)**

**UNIT-I**

**Introduction**

**9h**

Concept of Environmental chemistry-Scope and importance of environment in now adays – Nomenclature of environmental chemistry – Segments of environment - Natural resources – Renewable Resources – Solar and biomass energy and Nonrenewable resources – Thermal power and atomic energy – Reactions of atmospheric oxygen and Hydological cycle.

**UNIT-II**

**Air Pollution**

**9h**

Definition – Sources of air pollution – Classification of air pollution – Acid rain – Photochemical smog – Green house effect – Formation and depletion of ozone – Bhopal gas disaster – Controlling methods of air pollution.

**UNIT-III**

**Water pollution**

**9h**

Unique physical and chemical properties of water – water quality and criteria for finding of water quality – Dissolved oxygen – BOD, COD, Suspended solids, total dissolved solids, alkalinity – Hardness of water – Methods to convert temporary hard water into soft water – Methods to convert permanent hard water into soft water – eutrophication and its effects – principal wastage treatment – Industrial waste water treatment.

**UNIT-IV**

**Chemical Toxicology**

**9h**

Toxic chemicals in the environment – effects of toxic chemicals – cyanide and its toxic effects – pesticides and its biochemical effects – toxicity of lead, mercury, arsenic and cadmium.

**UNIT-V**

**Ecosystem and biodiversity**

**9h**

**Ecosystem**

Concepts – structure – Functions and types of ecosystem – Abiotic and biotic components – Energy flow and Energy dynamics of ecosystem – Food chains – Food web – Tropic levels – Biogeochemical cycles (carbon, nitrogen and phosporus)

**Biodiversity**

Definition – level and types of biodiversity – concept - significance – magnitude and distribution of biodiversity – trends - biogeographical classification of india – biodiversity at national, global and regional level.

**List of Reference books**

1. Fundamentals of ecology by M.C.Dash
2. A Text book of Environmental chemistry by W. Moore and F.A. Moore
3. Environmental Chemistry by Samir k. Banerji

**Cluster Elective –VIII A**  
**Fuels and Industrial Inorganic materials**  
**PAPER – VIII-A-1: FUEL CHEMISTRY AND BATTERIES**

**45 hrs (3 h / w)**

- UNIT –I** **12h**  
Review of energy sources (renewable and non-renewable) – classification of fuels and their calorific value. Coal: Uses of Coal (fuel and non fuel) in various industries, its composition, carbonization of coal - coal gas, producer gas and water gas – composition and uses – fractionation of coal tar – uses of coal tar based chemicals, requisites of a good metallurgical coke, coal gasification (Hydro gasification and catalytic gasification) coal liquefaction and solvent refining.
- UNIT-II** **6h**  
Petroleum and petrol chemical industry:  
Composition of crude petroleum, refining and different types of petroleum products and their applications.
- UNIT-III** **10h**  
Fractional distillation (principle and process), cracking (Thermal and catalytic cracking). Reforming petroleum and non petroleum fuels (LPG, CNG, LNG, biogas), fuels derived from biomass, fuel from waste, synthetic fuels (gaseous and liquids), clear fuels, petro chemicals: vinyl acetate, propylene oxide, isoprene, butadiene, toluene and its derivative xylene.
- UNIT-IV** **10h**  
Lubricants:  
Classification of lubricants, lubricating oils (conducting and non conducting), solid and semi solid lubricants, synthetic lubricants. Properties of lubricants (viscosity index, cloud point, pour point) and their determination.
- UNIT-V** **7h**  
**Batteries:**  
Primary and secondary batteries, battery components and their role, Characteristics of Battery. Working of following batteries: Pb acid, Li-Battery, Solid state electrolyte battery. Fuel cells, Solar cell and polymer cell.

**Reference books:**

1. E. Stochi : Industrial chemistry, Vol-1, Ellis Horwood Ltd. UK
  2. P. C. Jain, M. Jain: Engineering chemistry, Dhannpat Rai & sons, Delhi.
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**SEMESTER-VI**  
**PAPER – VIII-A-2: INORGANIC MATERIALS OF INDUSTRIAL**  
**IMPORTANCE**

**45 hrs (3 h / w)**

**UNIT - I**

**Recapitulation of s- and p-Block Elements**

**8h**

Periodicity in s- and p-block elements with respect to electronic configuration, atomic and ionic size, ionization enthalpy, electronegativity (Pauling, Mulliken, and Alfred - Rochow scales). Allotropy in C, S, and P. Oxidation states with reference to elements in unusual and rare oxidation states like carbides and nitrides), inert pair effect, diagonal relationship and anomalous behaviour of first member of each group.

**UNIT – II**

**15h**

**Silicate Industries**

**Glass:** Glassy state and its properties, classification (silicate and non-silicate glasses).

Manufacture and processing of glass. Composition and properties of the following types of glasses: Soda lime glass, lead glass, armoured glass, safety glass, borosilicate glass, fluorosilicate, coloured glass, photosensitive glass.

**Ceramics:** Important clays and feldspar, ceramic, their types and manufacture. High technology ceramics and their applications, superconducting and semiconducting oxides, fullerenes carbon nanotubes and carbon fibre.

**Cements:** Classification of cement, ingredients and their role, Manufacture of cement and the

setting process, quick setting cements.

**UNIT – III**

**8h**

**Fertilizers:**

Different types of fertilizers. Manufacture of the following fertilizers: Urea, ammonium nitrate, calcium ammonium nitrate, ammonium phosphates; polyphosphate, superphosphate, compound and mixed fertilizers, potassium chloride, potassium sulphate.

**UNIT – IV**

**8h**

**Surface Coatings:**

Objectives of coatings surfaces, preliminary treatment of surface, classification of surface coatings. Paints and pigments-formulation, composition and related properties. Oil paint, Vehicle, modified oils, Pigments, toners and lakes pigments, Fillers, Thinners, Enamels, emulsifying agents. Special paints (Heat retardant, Fire retardant, Eco-friendly paint, Plastic paint), Dyes, Wax polishing, Water and Oil paints, additives, Metallic coatings (electrolytic and electroless), metal spraying and anodizing.

**UNIT – V**

**6h**

**Alloys:**

Classification of alloys, ferrous and non-ferrous alloys, Specific properties of elements in alloys. Manufacture of Steel (removal of silicon decarbonization, demanganization, desulphurization dephosphorisation) and surface treatment (argon treatment, heat treatment, nitriding, carburizing). Composition and properties of different types of steels.

**Chemical explosives:**

Origin of explosive properties in organic compounds, preparation and explosive properties of lead azide, PETN, cyclonite (RDX). Introduction to rocket propellants.

**Reference Books:**

1. E. Stocchi: *Industrial Chemistry*, Vol-I, Ellis Horwood Ltd. UK.
2. R. M. Felder, R. W. Rousseau: *Elementary Principles of Chemical Processes*, Wiley Publishers, New Delhi.
3. W. D. Kingery, H. K. Bowen, D. R. Uhlmann: *Introduction to Ceramics*, Wiley Publishers, New Delhi.
4. J. A. Kent: *Riegel's Handbook of Industrial Chemistry*, CBS Publishers, New Delhi.
5. P. C. Jain & M. Jain: *Engineering Chemistry*, Dhanpat Rai & Sons, Delhi.
6. R. Gopalan, D. Venkappayya, S. Nagarajan: *Engineering Chemistry*, Vikas Publications, New Delhi.
7. B. K. Sharma: *Engineering Chemistry*, Goel Publishing House, Meerut

## SEMESTER-VI

### PAPER – VIII-A-3: ANALYSIS OF APPLIED INDUSTRIAL PRODUCTS

45 hrs (3 h / w)

#### UNIT-I

Analysis of soaps: moisture and volatile matter, combined alkali, total fatty matter, free alkali, total fatty acid, sodium silicate and chlorides.

Analysis of paints: Vehicle and pigments, Barium Sulphate, total lead, lead chromate, iron pigments, zinc chromate

#### UNIT- II

Analysis of oils: saponification value, iodine value, acid value, ester value, bromine value, acetyl value.

Analysis of industrial solvents like benzene, acetone, methanol and acetic acid.,  
Determination of methoxyl and N-methyl groups.,

#### UNIT-III

Analysis of fertilizers: urea, NPK fertilizer, super phosphate,

Analysis of DDT, BHC, endrin, endosulfone, malathion, parathion.,

Analysis of starch, sugars, cellulose and paper,

#### UNIT -IV

Gas analysis: carbon dioxide, carbon monoxide, oxygen, hydrogen, saturated hydrocarbon, unsaturated hydrocarbons, nitrogen, octane number, cetane number

Analysis of Fuel gases like: water gas, producer gas, kerosene (oil) gas.

Ultimate analysis: carbon, hydrogen, nitrogen, oxygen, phosphorus and sulfur.,

#### UNIT - V

Analysis of Complex materials:

**Analysis of cement**- loss on ignition, insoluble residue, total silica, sesqui oxides, lime, magnesia, ferric oxide, sulphuric anhydride.

**Analysis of glasses** - Determination of silica, sulphur, barium, arsenic, antimony, total  $R_2O_3$ , calcium, magnesium, total alkalis, aluminium, chloride, fluoride



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Affiliated to Yogi Vemana University



2021-22

**Computer Science**

**PROBLEM SOLVING IN C**

Semester	Course Code	Course Title	Hours	Credits
I	C1	PROBLEM SOLVING IN C	60	3

**Objectives:**

This course aims to provide exposure to problem-solving through programming. It introduces the concepts of the C Programming language.

**Course Learning Outcomes:**

Upon successful completion of the course, a student will be able to:

1. Understand the evolution and functionality of a Digital Computer.
2. Apply logical skills to analyse a given problem
3. Develop an algorithm for solving a given problem.
4. Understand 'C' language constructs like Iterative statements, Array processing, Pointers, etc.
5. Apply 'C' language constructs to the algorithms to write a 'C' language program.

**UNIT I**

**General Fundamentals:** Introduction to computers: Block diagram of a computer, characteristics and limitations of computers, applications of computers, types of computers, computer generations.

**Introduction to Algorithms and Programming Languages:** Algorithm–Key features of Algorithms, Flow Charts, Programming Languages – Generations of Programming Languages – Structured Programming Language- Design and Implementation of Correct, Efficient and Maintainable Programs.

## UNIT II

**Introduction to C:** Introduction–Structure of C Program–Writing the first C Program–File used in C Program – Compiling and Executing C Programs – Using Comments – Keywords – Identifiers – Basic Data Types in C – Variables – Constants – I/O Statements in C- Operators in C- Programming Examples.

**Decision Control and Looping Statements:** Introduction to Decision Control Statements– Conditional Branching Statements – Iterative Statements – Nested Loops – Break and Continue Statement – Goto Statement

## UNIT III

**Arrays:** Introduction–Declaration of Arrays–Accessing elements of the Array–Storing Values in Array– Operations on Arrays – one dimensional, two dimensional and multi dimensional arrays, character handling and strings.

## UNIT IV

**Functions:** Introduction–using functions–Function declaration/ prototype–Function definition – function call – return statement – Passing parameters – Scope of variables – Storage Classes – Recursive functions.

**Structure, Union, and Enumerated Data Types:** Introduction–Nested Structures–Arrays of Structures – Structures and Functions– Union – Arrays of Unions Variables – Unions inside Structures – Enumerated Data Types.

## UNIT V

**Pointers:** Understanding Computer Memory–Introduction to Pointers–declaring Pointer Variables – Pointer Expressions and Pointer Arithmetic – Null Pointers - Passing Arguments to Functions using Pointer – Pointer and Arrays – Memory Allocation in C Programs – Memory Usage – Dynamic Memory Allocation – Drawbacks of Pointers

**Files:** Introduction to Files–Using Files in C–Reading Data from Files–Writing Data to Files – Detecting the End-of-file – Error Handling during File Operations – Accepting Command Line Arguments.



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**DATA STRUCTURES USING C**

Semester	Course Code	Course Title	Hours	Credits
II	C2	DATA STRUCTURES USING C	60	3

**Course Objectives**

To introduce the fundamental concept of data structures and to emphasize the importance of various data structures in developing and implementing efficient algorithms.

**Course Learning Outcomes:**

Upon successful completion of the course, a student will be able to:

1. Understand available Data Structures for data storage and processing.
2. Comprehend Data Structure and their real-time applications - Stack, Queue, Linked List, Trees and Graph
3. Choose a suitable Data Structures for an application
4. Develop ability to implement different Sorting and Search methods
5. Have knowledge on Data Structures basic operations like insert, delete, search, update and traversal
6. Design and develop programs using various data structures
7. Implement the applications of algorithms for sorting, pattern matching etc

**UNIT – I:**

**Introduction to Data Structures:** Introduction to the Theory of Data Structures, Data Representation, Abstract Data Types, Data Types, Primitive Data Types, Data Structure and Structured Type, Atomic Type, Difference between Abstract Data Types, Data Types, and Data Structures, Refinement Stages

**UNIT – II:**

**Arrays:** Introduction to Linear and Non- Linear Data Structures, One- Dimensional Arrays, Array Operations, Two- Dimensional arrays, Multidimensional Arrays, Pointers and Arrays, an Overview of Pointers

**Linked Lists:** Introduction to Lists and Linked Lists, Dynamic Memory Allocation, Basic Linked List Operations, Doubly Linked List, Circular Linked List, Atomic Linked List, Linked List in Arrays, Linked List versus Arrays

**UNIT – III:**

**Stacks:** Introduction to Stacks, Stack as an Abstract Data Type, Representation of Stacks through Arrays, Representation of Stacks through Linked Lists, Applications of Stacks, Stacks and Recursion

**Queues:** Introduction, Queue as an Abstract data Type, Representation of Queues, CircularQueues, Double Ended Queues- Deques, Priority Queues, Application of Queues

**UNIT – IV:**

**Binary Trees:** Introduction to Non- Linear Data Structures, Introduction Binary Trees, Types of Trees, Basic Definition of Binary Trees, Properties of Binary Trees, Representation of Binary Trees, Operations on a Binary Search Tree, Binary Tree Traversal, Counting Number of Binary Trees, Applications of Binary Tree

**UNIT – V:**

**Searching and sorting:** Sorting–An Introduction, Bubble Sort, Insertion Sort, Merge Sort, Searching – An Introduction, Linear or Sequential Search, Binary Search, Indexed Sequential Search

**Graphs:** Introduction to Graphs, Terms Associated with Graphs, Sequential Representation of Graphs, Linked Representation of Graphs, Traversal of Graphs, Spanning Trees, Shortest Path, Application of Graphs.

**BOOKS:**

1. “Data Structures using C”, ISRD group Second Edition, TMH
2. “Data Structures through C”, Yashavant Kanetkar, BPB Publications
3. “Data Structures Using C” Balagurusamy E. TMH

**RECOMMENDED CO-CURRICULAR ACTIVITIES:**

(Co-curricular activities shall not promote copying from textbook or from others work and shall encourage self/independent and group learning)

## DATABASE MANAGEMENT SYSTEMS

Semester	Course Code	Course Title	Hours	Credits
III	C3	DATABASE MANAGEMENT SYSTEMS	60	3

### Course Objective:

The objective of the course is to introduce the design and development of databases with special emphasis on relational databases.

### Course Learning Outcomes:

On completing the subject, students will be able to:

1. Gain knowledge of Database and DBMS.
2. Understand the fundamental concepts of DBMS with special emphasis on relational data model.
3. Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database
4. Model database using ER Diagrams and design database schemas based on the model.
5. Create a small database using SQL.
6. Store, Retrieve data in database.

### UNIT I

**Overview of Database Management System:** Introduction to data, information, database, database management systems, file-based system, Drawbacks of file-Based System, database approach, Classification of Database Management Systems, advantages of database approach, Various Data Models, Components of Database Management System, three schema architecture of data base, costs and risks of database approach.

## **UNIT II**

**Entity-Relationship Model:** Introduction, the building blocks of an entity relationship diagram, classification of entity sets, attribute classification, relationship degree, relationship classification, reducing ER diagram to tables, enhanced entity-relationship model (EER model), generalization and specialization.

## **UNIT III**

**Relational Model:** Introduction, CODD Rules, relational data model, concept of key, relational integrity, relational algebra, relational algebra operations, advantages of relational algebra, limitations of relational algebra, Functional dependencies and normal forms upto 3<sup>rd</sup> normal form.

## **UNIT IV**

**Structured Query Language:** Introduction, History of SQL Standard, Commands in SQL, Data Types in SQL, Data Definition Language, Selection Operation, Projection Operation, Aggregate functions, Data Manipulation Language, Table Modification Commands, Join Operation, Set Operations, View, Sub Query.

## **UNIT V**

**PL/SQL:** Introduction, Shortcomings of SQL, Structure of PL/SQL, PL/SQL Language Elements, Data Types, Operators Precedence, Control Structure, Steps to Create a PL/SQL, Program, Iterative Control, Procedure, Function, Database Triggers, Types of Triggers.

## **BOOKS:**

1. Database System Concepts by Abraham Silberschatz, Henry Korth, and S. Sudarshan, McGrawhill
2. Database Management Systems by Raghu Ramakrishnan, McGrawhill
3. Principles of Database Systems by J. D. Ullman
4. Fundamentals of Database Systems by R. Elmasri and S. Navathe
5. SQL: The Ultimate Beginners Guide by Steve Tale.

## OBJECT ORIENTATED PROGRAMMING THROUGH JAVA

Semester	Course Code	Course Title	Hours	Credits
IV	C4	OBJECT ORIENTATED PROGRAMMING THROUGH JAVA	60	3

### Objectives:

To introduce the fundamental concepts of Object-Oriented programming and to design & implement object oriented programming concepts in Java.

**Course Learning Outcomes:** At the end of this course student will:

1. Understand the benefits of a well-structured program
2. Understand different computer programming paradigms
3. Understand underlying principles of Object-Oriented Programming in Java
4. Develop problem-solving and programming skills using OOP concepts
5. Develop the ability to solve real-world problems through software development in high-level programming language like Java

### UNIT – I

**Introduction to Java:** Features of Java, The Java virtual Machine, Parts of Java

**Naming Conventions and Data Types:** Naming Conventions in Java, Data Types in Java, Literals

**Operators in Java:** Operators, Priority of Operators

**Control Statements in Java:** if... else Statement, do... while Statement, while Loop, forLoop, switch Statement, break Statement, continue Statement, return Statement

**Input and Output:** Accepting Input from the Keyboard, Reading Input with Java.util.Scanner Class, Displaying Output with System.out.printf(), Displaying Formatted Output with String.format()

## UNIT – II

**Arrays:** Types of Arrays, Three Dimensional Arrays (3D array), arrayname.length, Command Line Arguments

**Strings:** Creating Strings, String Class Methods, String Comparison, Immutability of Strings

**Introduction to OOPS:** Problems in Procedure Oriented Approach, Features of Object-Oriented Programming System (OOPS)

**Classes and Objects:** Object Creation, Initializing the Instance Variables, Access Specifiers, Constructors

**Methods in Java:** Method Header or Method Prototype, Method Body, Understanding Methods, Static Methods, Static Block, The keyword 'this', Instance Methods, Passing Primitive Data Types to Methods, Passing Objects to Methods, Passing Arrays to Methods, Recursion, Factory Methods

## UNIT – III

**Inheritance:** Inheritance, The keyword 'super', The Protected Specifier, Types of Inheritance

**Polymorphism:** Polymorphism with Variables, Polymorphism using Methods, Polymorphism with Static Methods, Polymorphism with Private Methods, Polymorphism with Final Methods, final Class

**Type Casting:** Types of Data Types, Casting Primitive Data Types, Casting Referenced Data Types, The Object Class

**Abstract Classes:** Abstract Method and Abstract Class

**Interfaces:** Interface, Multiple Inheritance using Interfaces

**Packages:** Package, Different Types of Packages, The JAR Files, Interfaces in a Package, Creating Sub Package in a Package, Access Specifiers in Java, Creating API Document

## UNIT – IV

**Exception Handling:** Errors in Java Program, Exceptions, throws Clause, throw Clause, Types of Exceptions, Re – throwing an Exception

**Streams:** Stream, Creating a File using FileOutputStream, Reading Data from a File using FileInputStream, Creating a File using FileWriter, Reading a File using FileReader, Zipping and Unzipping Files, Serialization of Objects, Counting Number of Characters in a File, File Copy, File Class

## UNIT – V

**Threads:** Single Tasking, Multi Tasking, Uses of Threads, Creating a Thread and Running it, Terminating the Thread, Single Tasking Using a Thread, Multi Tasking Using Threads, Multiple Threads Acting on Single Object, Thread Class Methods, Deadlock of Threads, Thread Communication, Thread Priorities, thread Group, Daemon Threads, Applications of Threads, Thread Life Cycle.

**Applets:** Creating an Applet, Uses of Applets, <APPLET> tag, A Simple Applet, An Applet with Swing Components, Animation in Applets, A Simple Game with an Applet, Applet Parameters

### BOOKS:

1. Core Java: An Integrated Approach, Authored by Dr. R. Nageswara Rao & Kogent Learning Solutions Inc.
2. E. Balaguruswamy, Programming with JAVA, A primer, 3e, TATA McGraw-Hill Company.
3. John R. Hubbard, Programming with Java, Second Edition, Schaum's outline Series, TMH.
4. Deitel & Deitel. Java TM: How to Program, PHI (2007)

### RECOMMENDED CO-CURRICULAR ACTIVITIES:

(Co-curricular activities shall not promote copying from textbook or from others work and shall encourage self/independent and group learning)

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## OPERATING SYSTEMS

Semester	Course Code	Course Title	Hours	Credits
IV	C5	OPERATING SYSTEMS	60	2

### Objectives:

This course aims to introduce the structure and organization of a file system. It emphasizes various functions of an operating system like memory management, process management, device management, etc.

### Course Learning Outcomes:

Upon successful completion of the course, a student will be able to:

1. Know Computer system resources and the role of operating system in resource management with algorithms
2. Understand Operating System Architectural design and its services.
3. Gain knowledge of various types of operating systems including Unix and Android.
4. Understand various process management concepts including scheduling, synchronization, and deadlocks.
5. Have a basic knowledge about multithreading.
6. Comprehend different approaches for memory management.
7. Understand and identify potential threats to operating systems and the security features design to guard against them.
8. Specify objectives of modern operating systems and describe how operating systems have evolved over time.
9. Describe the functions of a contemporary operating system

### UNIT- I

What is Operating System? History and Evolution of OS, Basic OS functions, Resource Abstraction, Types of Operating Systems– Multiprogramming Systems, Batch Systems, Time Sharing Systems; Operating Systems for Personal Computers, Workstations and Hand-held Devices, Process Control & Real time Systems.

## UNIT- II

Processor and User Modes, Kernels, System Calls and System Programs, System View of the Process and Resources, Process Abstraction, Process Hierarchy, Threads, Threading Issues, Thread Libraries; Process Scheduling, Non-Preemptive and Preemptive Scheduling Algorithms.

## UNIT III

**Process Management:** Deadlock, Deadlock Characterization, Necessary and Sufficient Conditions for Deadlock, Deadlock Handling Approaches: Deadlock Prevention, Deadlock Avoidance and Deadlock Detection and Recovery.

Concurrent and Dependent Processes, Critical Section, Semaphores, Methods for Inter-process Communication; Process Synchronization, Classical Process Synchronization Problems: Producer-Consumer, Reader-Writer.

## UNIT IV

**Memory Management:** Physical and Virtual Address Space; Memory Allocation Strategies– Fixed and -Variable Partitions, Paging, Segmentation, Virtual Memory.

## UNIT V

**File and I/O Management, OS security :** Directory Structure, File Operations, File Allocation Methods, Device Management, Pipes, Buffer, Shared Memory, Security Policy Mechanism, Protection, Authentication and Internal Access Authorization

## REFERENCE BOOKS:

1. Operating System Principles by Abraham Silberschatz, Peter Baer Galvin and Greg Gagne (7<sup>th</sup> Edition) Wiley India Edition.
2. Operating Systems: Internals and Design Principles by Stallings (Pearson)
3. Operating Systems by J. Archer Harris (Author), Jyoti Singh (Author) (TMH)
4. Online Resources for UNIT V



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Y.S.R. Kadapa District – 516001, Andhra Pradesh, India.

Affiliated to Yogi Vemana University

Structure of Computer Science/Information Technology (IT) Syllabus



**III YEAR V SEMESTER**

**Paper-V: Data Base Management System**

**Course Objective:**

Design & develop database for large volumes & varieties of data with optimized data processing techniques.

**Course Outcomes**

On completing the subject, students will be able to:

1. Design and model of data in database.
2. Store, Retrieve data in database.

**UNIT I**

**Overview of Database Management System:** Introduction, Data and information, Database, Database management System, Objectives of DBMS, Evaluation of Database management System, Classification of Database Management System, file-based system, Drawbacks of file-Based System, advantages of DBMS, Data models, Database Architecture.

**UNIT II**

**Relational Model:** Introduction, CODD's Rules, relational data model, concept of key, relational integrity, relational algebra, relational algebra operations, advantages of relational algebra, limitations of relational algebra.

**UNIT III**

**Entity-Relationship Model:** Introduction, the building blocks of an entity relationship diagram, classification of entity sets, attribute classification, relationship degree, relationship classification, reducing ER diagram to tables, enhanced entity-relationship model (EER model), generalization and specialization, IS A relationship and attribute inheritance, multiple inheritance, advantages of ER modelling.

**UNIT IV**

**Structured Query Language:** Introduction, History of SQL Standard, Commands in SQL, Data Types in SQL, Data Definition Language, Selection Operation, Projection Operation, Aggregate functions, Data Manipulation Language, Table Modification Commands, Table Truncation, Imposition of Constraints, Join Operation, Set Operations, View, Sub Query, Embedded SQL,

**UNIT V**

**PL/SQL:** Introduction, Structure of PL/SQL, PL/SQL Language Elements, Data Types, Operators Precedence, Control Structure, Steps to Create a PL/SQL, Program, Iterative Control, Cursors, Steps to create a Cursors, Procedure, Function, Exceptions Handling.

### III YEAR V SEMESTER

#### Paper VI: Software Engineering

##### Course Objectives

The Objective of the course is to assist the student in understanding the basic theory of software engineering, and to apply these basic theoretical principles to a group software development project.

##### Course outcomes

1. Ability to gather and specify requirements of the software projects.
2. Ability to analyze software requirements with existing tools
3. Able to differentiate different testing methodologies
4. Able to understand and apply the basic project management practices in real life projects
5. Ability to work in a team as well as independently on software projects

##### UNIT I

**INTRODUCTION:** Software Engineering Process paradigms - Project management - Process and Project Metrics – software estimation - Empirical estimation models - Planning - Risk analysis.

##### UNIT II

**REQUIREMENTS ANALYSIS:** Requirement Engineering Processes – Feasibility Study – Software Requirement Analysis – Analysis Concepts and Principles – Analysis Process – Analysis Model.

##### UNIT III

**SOFTWARE DESIGN:** Software design - Abstraction - Modularity - Software Architecture - Effective modular design - Cohesion and Coupling - Architectural design and Procedural design - Data flow oriented design.

##### UNIT IV

**USER INTERFACE DESIGN AND REAL TIME SYSTEMS:** User interface design - Human computer interaction - Human - Computer Interface design - Interface design - Interface standards.

##### UNIT V

**SOFTWARE QUALITY AND TESTING:** Software Quality Assurance - Software Reliability - Software testing - Path testing – Control Structures testing - Black Box testing - Integration, Validation and system testing.

### III YEAR VI SEMESTER

#### Paper-VII: Web Technologies

##### Course Objective

- To provide knowledge on web architecture, web services, client side and server side scripting technologies to focus on the development of web-based information systems and web services.
- To provide skills to design interactive and dynamic web sites.

##### Course Outcome

1. To understand the web architecture and web services.
2. To practice latest web technologies and tools by conducting experiments.
3. To design interactive web pages using HTML and Style sheets.
4. To study the framework and building blocks of .NET Integrated Development Environment.
5. To provide solutions by identifying and formulating IT related problems.

##### Unit I

**HTML:** Basic HTML, Document body, Text, Hyper links, adding more formatting, Lists, Tables using images. **More HTML:** Multimedia objects, Frames, Forms towards interactive, HTML document heading detail.

##### Unit II

**Cascading Style Sheets:** Introduction, using Styles, simple examples, your own styles, properties and values in styles, style sheet, formatting blocks of information, layers.

##### Unit III

**Introduction to JavaScript:** What is DHTML, JavaScript, basics, variables, string manipulations, mathematical functions, statements, operators, arrays, functions. **Objects in JavaScript:** Data and objects in JavaScript, regular expressions, exception handling.

##### Unit IV

**DHTML with JavaScript:** Data validation, opening a new window, messages and confirmations, the status bar, different frames, rollover buttons, moving images.

##### Unit V

**XML:** defining data for web applications, basic XML, document type definition, presenting XML. document object model. Web Services.

**III YEAR VI SEMESTER**  
**Cluster Elective VIIIA**  
**Paper-VIII-AI: Foundations of Data Science**

**Course Objectives**

Modern scientific, engineering, and business applications are increasingly dependent on data, existing traditional data analysis technologies were not designed for the complexity of the modern world. Data Science has emerged as a new, exciting, and fast-paced discipline that explores novel statistical, algorithmic, and implementation challenges that emerge in processing, storing, and extracting knowledge from Big Data.

**Course Outcomes**

1. Able to apply fundamental algorithmic ideas to process data.
2. Learn to apply hypotheses and data into actionable predictions.
3. Document and transfer the results and effectively communicate the findings using visualization techniques.

**UNIT I**

**INTRODUCTION TO DATA SCIENCE** :Data science process – roles, stages in data science project – working with data from files – working with relational databases – exploring data – managing data – cleaning and sampling for modeling and validation – introduction to NoSQL.

**UNIT II**

**MODELING METHODS** :Choosing and evaluating models – mapping problems to machine learning, evaluating clustering models, validating models – cluster analysis – K-means algorithm.

**UNIT III**

**INTRODUCTION TO R Language**: Reading and getting data into R – ordered and unordered factors – arrays and matrices – lists and data frames.

#### UNIT IV

**MAP REDUCE:** Introduction – distributed file system – algorithms using map reduce, Matrix-Vector Multiplication by Map Reduce – Hadoop - Understanding the Map Reduce architecture.

#### UNIT V

**DELIVERING RESULTS :** Documentation and deployment – producing effective presentations– Introduction to graphical analysis – plot() function – displaying multivariate data.

#### Reference Books

1. Nina Zumel, John Mount, “Practical Data Science with R”, Manning Publications, 2014.
2. Jure Leskovec, Anand Rajaraman, Jeffrey D.Ullman, “Mining of Massive Datasets”, Cambridge University Press, 2014.
3. Mark Gardener, “Beginning R - The Statistical Programming Language”, John Wiley & Sons, Inc., 2012.
4. W. N. Venables, D. M. Smith and the R Core Team, “An Introduction to R”, 2013.
5. Tony Ojeda, Sean Patrick Murphy, Benjamin Bengfort, Abhijit Dasgupta, “Practical Data Science Cookbook”, Packt Publishing Ltd., 2014.
6. Nathan Yau, “Visualize This: The FlowingData Guide to Design, Visualization, and Statistics”, Wiley, 2011.
7. Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, “Professional Hadoop Solutions”, Wiley, ISBN: 9788126551071, 2015.

#### Student Activity:

1. **Collect data from any real time system and create clusters using any clustering algorithm**
2. **Read the student exam data in R\_perform statistical analysis on data and print results.**

## Paper-VIII-A2 : BIG DATA TECHNOLOGY

### Course Objective

The Objective of this course is to provide practical foundation level training that enables immediate and effective participation in big data projects. The course provides grounding in basic and advanced methods to big data technology and tools, including MapReduce and Hadoop and its ecosystem.

### Course Outcome

1. Learn tips and tricks for Big Data use cases and solutions.
2. Learn to build and maintain reliable, scalable, distributed systems with Apache Hadoop.
3. Able to apply Hadoop ecosystem components.

### UNIT I

**INTRODUCTION TO BIG DATA:** Introduction – distributed file system – Big Data and its importance, Four V's in big data, Drivers for Big data, Big data analytics, Big data applications. Algorithms using map reduce, Matrix-Vector Multiplication by Map Reduce.

### UNIT II

**INTRODUCTION HADOOP :** Big Data – Apache Hadoop & Hadoop Eco-System – Moving Data in and out of Hadoop – Understanding inputs and outputs of MapReduce - Data Serialization.

### UNIT- III

**HADOOP ARCHITECTURE:** Hadoop Architecture, Hadoop Storage: HDFS, Common Hadoop Shell commands , Anatomy of File Write and Read., NameNode, Secondary NameNode, and DataNode.

#### UNIT-IV

Hadoop Map Reduce paradigm, Map and Reduce tasks, Job, Task trackers - Cluster Setup – SSH & Hadoop Configuration – HDFS Administering –Monitoring & Maintenance.

#### UNIT-V

**HIVE AND HIVEQL, HBASE**:-Hive Architecture and Installation, Comparison with Traditional Database, HiveQL - Querying Data - Sorting And Aggregating, Map Reduce Scripts, Joins & Subqueries.

#### Reference Books

1. Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, “Professional Hadoop Solutions”, Wiley, ISBN: 9788126551071, 2015.
2. Chris Eaton, Dirk deroos et al., “Understanding Big data ”, McGraw Hill, 2012.
3. Tom White, “HADOOP: The definitive Guide”, O Reilly 2012.
4. Vignesh Prajapati, “Big Data Analytics with R and Hadoop”, Packet Publishing 2013.
5. Tom Plunkett, Brian Macdonald et al, “Oracle Big Data Handbook”, Oracle Press, 2014.
6. Jy Liebowitz, “Big Data and Business analytics” CRC press, 2013.

#### Student Activity:

1. Collect real time data and justify how it has become Big Data
2. Reduce the dimensionality of a big data using your own map reducer

## Paper-VIII-A3 : COMPUTING FOR DATA ANALYTICS

### Course Objectives

The objective of this course is to teach fundamental concepts and tools needed to understand the emerging role of business analytics in Organizations.

### Course Outcomes

1. Learn the Big Data in Technology Perspective.
2. Understanding of the statistical procedures most often used by practicing engineers
3. Understand Forecasting methods and apply for business applications.

### UNIT – I

**DATA ANALYTICS LIFE CYCLE: Introduction** to Big data Business Analytics - State of the practice in analytics role of data scientists - Key roles for successful analytic project - Main phases of life cycle - Developing core deliverables for stakeholders.

### UNIT – II

**STATISTICS Sampling Techniques** : Data classification, Tabulation, Frequency and Graphic representation - Measures of central value - Arithmetic mean, Geometric mean, Harmonic mean, Mode, Median, Quartiles, Deciles, Percentile.

### UNIT – III

**PROBABILITY AND HYPOTHESIS TESTING: Random** variable, distributions, two dimensional R.V, joint probability function, marginal density function. Random vectors - Some special probability distribution - Binomial, Poison, Geometric, uniform, exponential, normal, gamma and Erlang. Multivariate normal distribution.

### UNIT – IV

**PREDICTIVE ANALYTICS: Predictive modeling and Analysis** - Regression Analysis, Multicollinearity, Correlation analysis, Rank correlation coefficient, Multiple correlation, Least square, Curve fitting and good ness of fit.

### UNIT – V

**TIME SERIES FORECASTING AND DESIGN OF EXPERIMENTS** :Forecasting Models for Time series : MA, SES, TS with trend, season - Design of Experiments, one way classification, two way classification, ANOVA, Latin square, Factorial Design.

### Reference Books

1. Chris Eaton, Dirk Deroos, Tom Deutsch et al., “Understanding Big Data”, McGrawHill, 2012.
2. Alberto Cordoba, “Understanding the Predictive Analytics Lifecycle”, Wiley, 2014.
3. Eric Siegel, Thomas H. Davenport, “Predictive Analytics: The Power to Predict Who Will Click, Buy, Lie, or Die”, Wiley, 2013.
4. James R Evans, “Business Analytics – Methods, Models and Decisions”, Pearson 2013.
5. R. N. Prasad, Seema Acharya, “Fundamentals of Business Analytics”, Wiley, 2015.
6. S M Ross, “Introduction to Probability and Statistics for Engineers and Scientists”, Academic Foundation, 2011.
7. David Hand, Heiki Mannila, Padhria Smyth, “Principles of Data Mining”, PHI 2013.
8. Spyros Makridakis, Steven C Wheelwright, Rob J Hyndman, “Forecasting methods and applications”, Wiley 2013( Reprint).

### Student Activity:

1. Collect temperatures of previous months and prepare a logic to estimate the temperature of next one week
2. Collect real time data and apply statistical techniques to classify it.

**III YEAR VI SEMESTER**  
**(Cluster 2) Paper-VIII: Elective –B-1**

**Distributed Systems**

**Course Objectives**

- To expose the fundamentals of distributed computer systems, assuming the availability of facilities for data transmission.
- To discuss multiple levels of distributed algorithms, distributed file systems, distributed databases, security and protection.

**Course Outcomes**

- Create models for distributed systems.
- Apply different techniques learned in the distributed system.

**UNIT I**

Introduction to Distributed Computing Systems, System Models, and Issues in Designing a Distributed Operating System, Examples of distributed systems.

**UNIT II**

Features of Message Passing System, Synchronization and Buffering, Introduction to RPC and its models, Transparency of RPC, Implementation Mechanism, Stub Generation and RPC Messages, Server Management.

**UNIT III**

Introduction, Design and implementation of DSM system, Granularity and Consistency Model, Advantages of DSM, Clock Synchronization, Event Ordering, Mutual exclusion, Deadlock.

**UNIT IV**

Task Assignment Approach, Load Balancing Approach, Load Sharing Approach, Process Migration and Threads.

**UNIT V**

File Models, File Accessing Models, File Sharing Semantics, File Caching Schemes, File Replication, Atomic Transactions, Access control.

**III YEAR VI SEMESTER**  
**(Cluster 2) Paper-VIII : Elective –B-2**

**Cloud Computing**

**Course Objectives:**

The student will learn about the cloud environment, building software systems and components that scale to millions of users in modern internet, cloud concepts capabilities across the various cloud service models including IaaS, Paas, Saas, and developing cloud based software applications on top of cloud platforms.

**Course Outcomes**

1. Compare the strengths and limitations of cloud computing
2. Identify the architecture, infrastructure and delivery models of cloud computing
3. Apply suitable virtualization concept.
4. Choose the appropriate cloud player, Programming Models and approach.
5. Address the core issues of cloud computing such as security, privacy and interoperability
6. Design Cloud Services and Set a private cloud

**UNIT I**

**Introduction & Concepts:** Introduction to cloud computing: introduction, characteristics of cloud computing, cloud models, cloud services examples, cloud-based services & applications.

**Cloud Concepts & Technologies:** Virtualization, Load Balancing, Scalability & Elasticity, Deployment, Replication, Monitoring, Software Defined Networking, Networking Function Virtualization, Map Reduce, Identity And Access Management, Service Level Agreements, Billing.

**UNIT II**

**Cloud Services & Platforms:** Compute Services, Storage Services, Database Services, Applications Services, Content Delivery Services, Analytics Services, Deployment & Management Services, Identity & Access Management Services, Open Source Private Cloud Software.

**UNIT III**

**Cloud Application Design:** Introduction, Design Considerations for Cloud Applications, Reference Architecture for Cloud Applications, Cloud Application Design Methodologies, Data Storage Approaches.

**UNIT IV**

**Python Basics:** Introduction, Installing Python, Python Data Types & Data Structures, Control flow, Functions, Modules, Packages, File Handling, Date/Time Operations, Classes 163.

**UNIT V**

**Python for Cloud:** Python for Amazon Web Services, Python for Google Cloud Platform, Python for Windows Azure.

**TEXT BOOK:**

1. Cloud Computing A Hands On Approach By Arshdeep Bahga And Vijay Madisetti From University Press.

**Reference Books**

1. Cloud computing a practical approach - Anthony T.Velte , Toby J. Velte Robert Elsenpeter TATA McGraw- Hill , New Delhi - 2010
2. Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online - Michael Miller - Que 2008
3. Cloud Computing, Theory and Practice, Dan C Marinescu, MK Elsevier.
4. Cloud Computing, A Hands on approach, Arshadeep Bahga, Vijay Madisetti, University Press
5. Mastering Cloud Computing, Foundations and Application Programming, Raj Kumar Buyya, Christenvecctiola, S Tammarai selvi, TMH

**Student Activity:**

1. Prepare the list of companies providing cloud services category wise.
2. Create a private cloud using local server

**III YEAR VI SEMESTER**  
**(Cluster 2) Paper-VIII: Elective –B-3**

**Cryptography and Network Security**

**Course Objectives:**

The student will learn about the different security issues in different environments. This will also helps us to learn different sciences in providing security like cryptography and steganography.

**Course Outcomes**

1. Compare the strengths and limitations of different security mechanisms
2. Address the core issues of security and transmission of information.
3. Develop simple and new algorithms.

**UNIT 1:**

Introduction: Attacks, services and mechanisms, security attacks, security services, a model for internet work security.

Classical techniques: Conventional encryption model, steganography, classical encryption techniques

Modern techniques: Simplified DES, block cipher principles, data encryption standard, strength of DES, differential and linear crypt analysis, block cipher design principles and modes of operations.

**UNIT 2:**

Conventional encryption: Placement of encryption function, traffic confidentiality, key distribution, random number generation.

Public key cryptography: Principles, RSA algorithm, key management, Diffie-Hellmen key exchange, elliptic curve cryptography.

**UNIT 3:**

Message authentication and hash functions: Authentication requirements and functions, Message Authentication, Hash functions, security of hash functions and Macs.

**UNIT 4:**

Hash and MAC algorithms: MD file, message digest algorithm, secure hash algorithm

Digital signatures and authentication protocols: Digital signatures, authentication protocols, digital signature standards

**UNIT 5:**

Authentication applications: Kerbores, X.509 directory authentication service.

Electronic mail security: Pretty good privacy, S/MIME.

**Text Books:**



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2021-22

Core papers



**COURSE-I**

**CBCS/ SEMESTER SYSTEM**

**B.A./B.Sc. MATHEMATICS (w.e.f. 2020-21 Admitted Batch)**

**DIFFERENTIAL EQUATIONS**

**SYLLABUS (75 Hours)**

**Course Outcomes:**

After successful completion of this course, the student will be able to;

1. Solve linear differential equations
2. Convert nonexact homogeneous equations to exact differential equations by using integrating factors.
3. Know the methods of finding solutions of differential equations of the first order but not of the first degree.
4. Solve higher-order linear differential equations, both homogeneous and non homogeneous, with constant coefficients.
5. Understand the concept and apply appropriate methods for solving differential equations.

**Course Syllabus:**

**UNIT – I (12 Hours)**

**Differential Equations of first order and first degree:**

Linear Differential Equations; Differential equations reducible to linear form; Exact differential equations; Integrating factors; Change of variables.

**UNIT – II (12 Hours)**

Orthogonal Trajectories

**Differential Equations of first order but not of the first degree:**

Equations solvable for  $p$ ; Equations solvable for  $y$ ; Equations solvable for  $x$ ; Equations that do not contain  $x$  (or  $y$ ); Equations homogeneous in  $x$  and  $y$ ; Equations of the first degree in  $x$  and  $y$  – Clairaut's Equation.

### UNIT – III (12 Hours)

#### Higher order linear differential equations-I:

Solution of homogeneous linear differential equations of order  $n$  with constant coefficients; Solution of the non-homogeneous linear differential equations with constant coefficients by means of polynomial operators. General Solution of  $f(D)y=0$ .

General Solution of  $f(D)y=Q$  when  $Q$  is a function of  $x$ ,  $\frac{1}{f(D)}$  is expressed as partial fractions.

P.I. of  $f(D)y = Q$  when  $Q = be^{ax}$

P.I. of  $f(D)y = Q$  when  $Q$  is  $b\sin ax$  or  $b \cos ax$ .

### UNIT – IV (12 Hours)

#### Higher order linear differential equations-II:

Solution of the non-homogeneous linear differential equations with constant coefficients.

P.I. of  $f(D)y = Q$  when  $Q = bx^k$

P.I. of  $f(D)y = Q$  when  $Q = e^{ax} V$ , where  $V$  is a function of  $x$ .

of  $f(D)y = Q$  when  $Q = xV$ , where  $V$  is a function of  $x$ .

of  $f(D)y = Q$  when  $Q = x^m V$ , where  $V$  is a function of  $x$ .

### UNIT –V (12 Hours)

#### Higher order linear differential equations-III :

Method of variation of parameters; Linear differential Equations with non-constant coefficients; The Cauchy-Euler Equation, Legendre's linear equations.

#### Co-Curricular Activities(15 Hours)

Seminar/ Quiz/ Assignments/ Applications of Differential Equations to Real life Problem /Problem Solving.



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2021-22

Core papers

COURSE-II

CBCS/ SEMESTER SYSTEM

(w.e.f. 2020-21 Admitted Batch)

B.A./B.Sc. MATHEMATICS

THREE DIMENSIONAL ANALYTICAL SOLID GEOMETRY

Syllabus (75 Hours)

**Course Outcomes:**

After successful completion of this course, the student will be able to;

1. get the knowledge of planes.
2. basic idea of lines, sphere and cones.
3. understand the properties of planes, lines, spheres and cones.
4. express the problems geometrically and then to get the solution.

**Course Syllabus:**

**UNIT – I (12 Hours)**

**The Plane :**

Equation of plane in terms of its intercepts on the axis, Equations of the plane through the given points, Length of the perpendicular from a given point to a given plane, Bisectors of angles between two planes, Combined equation of two planes.

**UNIT – II (12 hrs)**

**The Line :**

Equation of a line; Angle between a line and a plane; The condition that a given line may lie in a given plane; The condition that two given lines are coplanar; Number of arbitrary constants in the equations of straight line; Sets of conditions which determine a line; The shortest distance between two lines; The length and equations of the line of shortest distance between two straight lines; Length of the perpendicular from a given point to a given line.

**UNIT – III (12 hrs)**

**The Sphere :**

Definition and equation of the sphere; Equation of the sphere through four given points; Plane sections of a sphere; Intersection of two spheres; Equation of a circle; Sphere through a given circle;

Intersection of a sphere and a line; Power of a point; Tangent plane; Plane of contact; Polar plane; Pole of a Plane; Conjugate points; Conjugate planes;

#### **UNIT – IV (12 hrs)**

##### **The Sphere and Cones :**

Angle of intersection of two spheres; Conditions for two spheres to be orthogonal; Radical plane; Coaxial system of spheres; Simplified form of the equation of two spheres.

Definitions of a cone; vertex; guiding curve; generators; Equation of the cone with a given vertex and guiding curve; equations of cones with vertex at origin are homogenous; Condition that the general equation of the second degree should represent a cone;

#### **UNIT – V (12 hrs)**

##### **Cones :**

Enveloping cone of a sphere; right circular cone: equation of the right circular cone with a given vertex, axis and semi vertical angle: Condition that a cone may have three mutually perpendicular generators; intersection of a line and a quadric cone; Tangent lines and tangent plane at a point; Condition that a plane may touch a cone; Reciprocal cones; Intersection of two cones with a common vertex.

##### **Co-Curricular Activities(15 Hours)**

Seminar/ Quiz/ Assignments/Three dimensional analytical Solid geometry and its applications/ Problem Solving.



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2021-22

Core papers

**COURSE-III**

**CBCS/ SEMESTER SYSTEM**

**(w.e.f. 2020-21 Admitted Batch)**

**B.A./B.Sc. MATHEMATICS**

**ABSTRACT ALGEBRA**

**SYLLABUS (75 Hours)**

**Course Outcomes:**

After successful completion of this course, the student will be able to;

1. acquire the basic knowledge and structure of groups, subgroups and cyclic groups.
2. get the significance of the notation of a normal subgroups.
3. get the behavior of permutations and operations on them.
4. study the homomorphisms and isomorphisms with applications.
5. understand the ring theory concepts with the help of knowledge in group theory and to prove the theorems.
6. understand the applications of ring theory in various fields.

**Course Syllabus:**

**UNIT – I (12 Hours)**

**GROUPS :**

Binary Operation – Algebraic structure – semi group-monoid – Group definition and elementary properties Finite and Infinite groups – examples – order of a group, Composition tables with examples.

**UNIT – II (12 Hours)**

**SUBGROUPS :**

Complex Definition – Multiplication of two complexes Inverse of a complex-Subgroup definition-examples-criterion for a complex to be a subgroups. Criterion for the product of two subgroups to be a subgroup-union and Intersection of subgroups.

## UNIT – II (12 Hours)

### SUBGROUPS :

Complex Definition – Multiplication of two complexes Inverse of a complex-Subgroup definition-examples-criterion for a complex to be a subgroups. Criterion for the product of two subgroups to be a subgroup-union and Intersection of subgroups.

### Co-sets and Lagrange's Theorem :

Cosets Definition – properties of Cosets–Index of a subgroups of a finite groups–Lagrange's Theorem.

## UNIT –III (12 Hours)

### NORMAL SUBGROUPS :

Definition of normal subgroup – proper and improper normal subgroup–Hamilton group – criterion for a subgroup to be a normal subgroup – intersection of two normal subgroups – Sub group of index 2 is a normal sub group –quotient group – criteria for the existence of a quotient group.

## UNIT – IV (12 Hours)

### HOMOMORPHISM :

Definition of homomorphism – Image of homomorphism elementary properties of homomorphism – Isomorphism – automorphism definitions and elementary properties–kernel of a homomorphism – fundamental theorem on Homomorphism and applications.

## UNIT – V (12 Hours)

### RINGS :

Definition of Ring and basic properties, Boolean Rings, divisors of zero and cancellation laws Rings, Integral Domains, Division Ring and Fields, The characteristic of a ring - The characteristic of an Integral Domain, The characteristic of a Field, Sub Rings.

### Co-Curricular Activities(15 Hours)

Seminar/ Quiz/ Assignments/ Group theory and its applications / Problem Solving.

### Text Book :

A text book of Mathematics for B.A. / B.Sc. by B.V.S.S. SARMA and others, published by S.Chand & Company, New Delhi.

### Reference Books :

1. Abstract Algebra by J.B. Fraleigh, Published by Narosa publishing house.
2. Modern Algebra by M.L. Khanna.
3. Rings and Linear Algebra by Pundir & Pundir, published by Pragathi Prakashan.

**COURSE-IV**  
**CBCS/ SEMESTER SYSTEM**  
**(w.e.f. 2020-21 Admitted Batch)**  
**B.A./B.Sc. MATHEMATICS**  
**REAL ANALYSIS**  
**SYLLABUS (75 Hours)**

**Course Outcomes:**

After successful completion of this course, the student will be able to

1. get clear idea about the real numbers and real valued functions.
2. obtain the skills of analyzing the concepts and applying appropriate methods for testing convergence of a sequence/ series.
3. test the continuity and differentiability and Riemann integration of a function.
4. know the geometrical interpretation of mean value theorems.

**Course Syllabus:**

**UNIT - I (12Hours)**

**REAL NUMBERS :**

The algebraic and order properties of  $\mathbb{R}$ , Absolute value and Real line, Completeness property of  $\mathbb{R}$ , Applications of supremum property; intervals. Sequences and their limits, Range and Boundedness of Sequences, Limit of a sequence and Convergent sequence.

**(No question is to be set from this portion).**

**INFINITE SERIES :**

**Series :** Introduction to series, convergence of series. Cauchy's general principle of convergence for series tests for convergence of series, Series of Non-Negative Terms.

### **INFINITE SERIES :**

**Series :** Introduction to series, convergence of series. Cauchy's general principle of convergence for series tests for convergence of series, Series of Non-Negative Terms.

1. P-test
  2. Cauchy's  $n^{\text{th}}$  root test or Root Test.
  3. D'Alembert's Test or Ratio Test.
  4. Alternating Series – Leibnitz Test.
- Absolute convergence and conditional convergence.

### **UNIT – II (12 Hours)**

#### **CONTINUITY :**

**Limits :** Real valued Functions, Boundedness of a function, Limits of functions. Some extensions of the limit concept, Infinite Limits. Limits at infinity. (No question is to be set from this portion).

**Continuous functions :** Continuous functions, Combinations of continuous functions, Continuous Functions on intervals, uniform continuity.

### **UNIT – III (12 Hours)**

#### **DIFFERENTIATION AND MEAN VALUE THEOREMS :**

The derivability of a function, on an interval, at a point, Derivability and continuity of a function, Graphical meaning of the Derivative, Mean value Theorems; Rolle's Theorem, Lagrange's Theorem, Cauchy's Mean value Theorem

### **UNIT – IV(12 Hours)**

#### **RIEMANN INTEGRATION :I**

Riemann Integral, Riemann integral functions, Darboux theorem. Necessary and sufficient condition for R – integrability, Another definition of Riemann integral, Some classes of Bounded integrable functions.

### **UNIT –V(12 Hours)**

#### **RIEMANN INTEGRATION :II**

Properties of integrals functions, Fundamental theorem of integral calculus, integral as the limit of a sum, Mean value Theorems.

#### **Co-Curricular Activities(15 Hours)**

Seminar/ Quiz/ Assignments/ Real Analysis and its applications / Problem Solving.

#### **Text Book:**

Introduction to Real Analysis by Robert G. Bartle and Donald R. Sherbert, published by John Wiley.

#### **Reference Books:**

1. A Text Book of B.Sc Mathematics by B.V.S.S. Sarma and others, published by S. Chand & Company Pvt. Ltd., New Delhi.
2. Elements of Real Analysis as per UGC Syllabus by Shanthi Narayan and Dr. M.D. Raisinghania, published by S. Chand & Company Pvt. Ltd., New Delhi.

**COURSE-V**  
**CBCS/ SEMESTER SYSTEM**  
**(w.e.f. 2020-21 Admitted Batch)**  
**B.A./B.Sc. MATHEMATICS**  
**LINEAR ALGEBRA**  
**SYLLABUS (75 Hours)**

**Course Outcomes:**

After successful completion of this course, the student will be able to;

1. understand the concepts of vector spaces, subspaces, basis, dimension and their properties
2. understand the concepts of linear transformations and their properties
3. understand the elementary properties of matrices and rank of matrix
4. apply Cayley- Hamilton theorem to problems for finding the inverse of a matrix and higher powers of matrices without using routine methods

**Course Syllabus:**

**UNIT – I (12 Hours)**

**Vector Spaces-I:**

Vector Spaces, General properties of vector spaces, n-dimensional Vectors, addition and scalar multiplication of Vectors, internal and external composition, Null space, Vector subspaces, Algebra of subspaces, Linear Sum of two subspaces, linear combination of Vectors, Linear span Linear independence and Linear dependence of Vectors.

**UNIT –II (12 Hours)**

**Vector Spaces-II:**

Basis of Vector space, Finite dimensional Vector spaces, basis extension, co-ordinates, Dimension of a Vector space, Dimension of a subspace, Quotient space and Dimension of Quotient space.

**UNIT –III (12 Hours)**

**Linear Transformations:**

Linear transformations, linear operators, Properties of L.T, sum and product of LTs, Algebra of Linear Operators, Range and null space of linear transformation, Rank and Nullity of linear transformations – Rank – Nullity Theorem.

#### UNIT –IV (12 Hours)

##### **Matrices – I :**

Matrices, Elementary Properties of Matrices, Rank of Matrix, Normal form, Echelon form , Inverse of a matrix by using elementary operations.

#### UNIT –V (12 Hours)

##### **Matrices – II :**

**Linear Equations:** System of Homogeneous and non homogeneous Linear Equations.

Characteristic equations, Characteristic Values & Vectors of a square matrix, Cayley – Hamilton Theorem and problems.

##### **Co-Curricular Activities(15 Hours)**

Seminar/ Quiz/ Assignments/ Linear algebra and its applications / Problem Solving.

##### **Text Book:**

Linear Algebra by J.N. Sharma and A.R. Vasista, published by Krishna Prakashan Mandir, Meerut- 250002.

##### **Reference Books :**

1. Matrices by Shanti Narayana, published by S.Chand Publications.
2. Linear Algebra by Kenneth Hoffman and Ray Kunze, published by Pearson Education (low priced edition),New Delhi.
3. Linear Algebra by Stephen H. Friedberg et. al. published by Prentice Hall of India Pvt. Ltd. 4<sup>th</sup> Edition, 2007.

B.A./B.Sc. MATHEMATICS SYLLABUS  
SEMESTER – V  
PAPER – V: RING THEORY & VECTOR CALCULUS

60 Hrs

**UNIT – 1 (12 hrs) RINGS-I**

Definition of Ring and basic properties, Boolean Rings, divisors of zero and cancellation laws Rings, Integral Domains, Division Ring and Fields, The characteristic of a ring - The characteristic of an Integral Domain, The characteristic of a Field.

**UNIT – 2 (12 hrs) RINGS-II**

Sub Rings, Ideals, Quotient Rings.

Definition of Homomorphism – Homomorphic Image – Elementary Properties of Homomorphism – Kernel of a Homomorphism – Fundamental theorem of Homomorphism.

**UNIT –3 (12 hrs) VECTOR DIFFERENTIATION**

Vector Differentiation, Ordinary derivatives of vectors, Differentiability, Gradient, Divergence, Curl operators, Formulae Involving these operators.

**UNIT – 4 (12 hrs) VECTOR INTEGRATION**

Line Integral, Surface Integral, Volume integral with examples.

**UNIT – 5 (12 hrs) VECTOR INTEGRATION APPLICATIONS**

Theorems of Gauss and Stokes, Green's theorem in plane and applications of these theorems.

**Reference Books :-**

1. Abstract Algebra by J. Fraleigh. Published by Narosa Publishing house.
2. Vector Calculus by Santhi Narayana, Published by S. Chand & Company Pvt. Ltd., New Delhi.
3. A text Book of B.Sc., Mathematics by B.V.S.S. Sarma and others, published by S. Chand & Company Pvt. Ltd., New Delhi.
4. Vector Calculus by R. Gupta, Published by Laxmi Publications.
5. Vector Calculus by P.C. Matthews, Published by Springer Verlag publications.
6. Rings and Linear Algebra by Pundir & Pundir. Published by Pragathi Prakashan.

**Suggested Activities:**

Seminar/ Quiz/ Assignments/ Project on Ring theory and its applications

B.A./B.Sc. MATHEMATICS SYLLABUS  
SEMESTER – V  
PAPER – VI : LAPLACE TRANSFORMS

60 Hrs

**UNIT – 1 (12 hrs) Laplace Transform - I**

Definition of - Integral Transform – Laplace Transform Linearity, Property, Piecewise continuous Functions, Existence of Laplace Transform, Functions of Exponential order, and of Class A.

**UNIT – 2 (12 hrs) Laplace Transform - II**

First Shifting Theorem, Second Shifting Theorem, Change of Scale Property, Laplace Transform of the derivative of  $f(t)$ , Initial Value theorem and Final Value theorem.

**UNIT – 3 (12 hrs) Laplace Transform - III**

Laplace Transform of Integrals – Multiplication by  $t$ , Multiplication by  $t^n$  – Division by  $t$ . Laplace transform of Bessel Function, Laplace Transform of Error Function, Laplace Transform of Sine and cosine integrals.

**UNIT – 4 (12 hrs) Inverse Laplace Transform - I**

Definition of Inverse Laplace Transform. Linearity, Property, First Shifting Theorem, Second Shifting Theorem, Change of Scale property, use of partial fractions, Examples.

**UNIT – 5 (12 hrs) Inverse Laplace Transform - II**

Inverse Laplace transforms of Derivatives–Inverse Laplace Transforms of Integrals – Multiplication by Powers of ‘P’– Division by powers of ‘P’– Convolution Definition – Convolution Theorem – proof and Applications – Heaviside’s Expansion theorem and its Applications.

**Reference Books :-**

1. Laplace Transforms by A.R. Vasistha and Dr. R.K. Gupta Published by Krishna Prakashan Media Pvt. Ltd. Meerut.
2. Fourier Series and Integral Transforms by Dr. S. Sreenadh Published by S.Chand and Co., Pvt. Ltd., New Delhi.
3. Laplace and Fourier Transforms by Dr. J.K. Goyal and K.P. Gupta, Published by Pragathi Prakashan, Meerut.
4. Integral Transforms by M.D. Raising hania - H.C. Saxsena and H.K. Dass Published by S. Chand and Co., Pvt.Ltd., New Delhi.

B.A./B.Sc. MATHEMATICS SYLLABUS  
SEMESTER – VI  
PAPER – VII : LINEAR ALGEBRA - I

60 Hrs

**UNIT – I (12 hrs) : Vector Spaces - I**

Vector Spaces, General properties of vector spaces, n-dimensional Vectors, addition and scalar multiplication of Vectors, internal and external composition, Null space, Vector subspaces, Algebra of subspaces, Linear Sum of two subspaces, linear combination of Vectors, Linear span Linear independence and Linear dependence of Vectors.

**UNIT –II (12 hrs) : Vector Spaces - II**

Basis of Vector space, Finite dimensional Vector spaces, basis extension, co-ordinates, Dimension of a Vector space, Dimension of a subspace, Quotient space and Dimension of Quotient space.

**UNIT –III (12 hrs) : Linear Transformations**

Linear transformations, linear operators, Properties of L.T., Determination of L.T, sum and product of L.T's Algebra of Linear Operators, Range and null space of linear transformation, Rank and Nullity of linear transformations – Rank -Nullity Theorem.

**UNIT –IV (12 hrs) : Vector Space Isomorphism**

Fundamental theorem of homomorphism, Singular and non –singular transformations, inverse function, Uniqueness of inverse.

**UNIT –V (12 hrs) : Matrix of a Linear Transformation**

Definition of Matrix of a Linear Transformation, Problems on finding the matrix of a Linear Transformation, Transition matrix and problems on transition matrix.

**Reference Books :**

1. Linear Algebra by J.N. Sharma and A.R. Vasista, published by Krishna Prakashan Mandir, Meerut-250002.
2. Linear Algebra by Kenneth Hoffman and Ray Kunze, published by Pearson Education (low priced edition), New Delhi.
3. Linear Algebra by Stephen H. Friedberg et al published by Prentice Hall of India Pvt. Ltd. 4<sup>th</sup> Edition 2007.

**Suggested Activities:**

Seminar/ Quiz/ Assignments/ Project on “Applications of Linear algebra Through Computer Sciences”

B.A./B.Sc. MATHEMATICS SYLLABUS  
SEMESTER – VI  
Cluster Elective – Paper VIII - A1: INTEGRAL TRANSFORMS

**UNIT – I (12 hrs) Application of Laplace Transform to solutions of Differential Equations :-**

Solutions of ordinary Differential Equations.  
Solutions of Differential Equations with constants co-efficient  
Solutions of Differential Equations with Variable co-efficient

**UNIT – II (12 hrs) Application of Laplace Transform :-**

Solution of simultaneous ordinary Differential Equations.  
Solutions of partial Differential Equations.

**UNIT – III (12 hrs) Application of Laplace Transforms to Integral Equations :-**

Integral Equations-Abel's, Integral Equation-Integral Equation of Convolution Type, Integro Differential Equations. Application of L.T. to Integral Equations.

**UNIT – IV (12 hrs) Fourier Transforms:-**

Definition of Fourier Transform – Fourier sine Transform – Fourier cosine Transform – Relationship between Fourier and Laplace transforms – Linear Property – Change of Scale Property – Modulation theorem – Derivative theorem – Shifting property – Convolution Theorem for Fourier transform – Problems related to Integral Equations – Parseval's Identity.

**UNIT – V (12 hrs) Fourier Series:-**

Fourier series, Fourier series in the interval  $[-\pi, \pi]$ , Fourier series in the interval  $[0, 2\pi]$ . Half range series, Fourier sine series in  $[0, \pi]$ , Fourier cosine series in  $[0, \pi]$ , Fourier series in the interval  $[-l, l]$ , Fourier series in the interval  $[0, 2l]$ , Fourier half range series in  $[0, l]$ .

**Reference Books :-**

1. Integral Transforms by A.R. Vasistha and Dr. R.K. Gupta Published by Krishna Prakashan Media Pvt. Ltd. Meerut.
  2. A Course of Mathematical Analysis by Shanthi Narayana and P.K. Mittal, Published by S. Chand and Company pvt. Ltd., New Delhi.
  3. Fourier Series and Integral Transforms by Dr. S. Sreenadh Published by S.Chand and Company Pvt. Ltd., New Delhi.
  4. Lapalce and Fourier Transforms by Dr. J.K. Goyal and K.P. Gupta, Published by Pragathi Prakashan, Meerut.
  5. Integral Transforms by M.D. Raising hanja, - H.C. Saxsena and H.K. Dass Published by S.Chand and Company pvt. Ltd., New Delhi.
  6. Fourier series and Integral Transforms by Dr.S.Sreenadh, S.Ranganatham, MVSSN Prasad.
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B.A./B.Sc. MATHEMATICS SYLLABUS  
SEMESTER – VI

Cluster Elective – Paper VIII – A2 : NUMERICAL ANALYSIS

60 Hrs

UNIT- I: (12 hours)

**Errors in Numerical computations and Solution of Algebraic and Transcendental Equations:** Errors and their Accuracy, Mathematical Preliminaries, Errors and their Analysis, Absolute, Relative and Percentage Errors, A general error formula, Error in a series approximation. The bisection method, The iteration method, The method of false position, Newton Raphson method, Generalized Newton Raphson method.

UNIT – II: (12 hours)

**Interpolation–I:** Errors in polynomial interpolation, Finite Differences, Forward differences, Backward differences, Central Differences, Symbolic relations, Detection of errors by use of Differences Tables, Differences of a polynomial, Newton’s formulae for interpolation.

UNIT – III: (12 hours)

**Interpolation – II:** Central Difference Interpolation Formulae, Gauss’s central difference formulae, Stirling’s central difference formula.

UNIT – IV: (12 hours)

**Interpolation – III:** Interpolation with unevenly spaced points, Lagrange’s formula, Error in Lagrange’s formula, Divided differences and their properties, Relation between divided differences and forward differences, Relation between divided differences and backward differences Relation between divided differences and central differences, Newton’s general interpolation Formula.

UNIT – V: (12 hours)

**Numerical Differentiation and Integration:** Numerical differentiation, The Cubic Spline method, Numerical integration, Trapezoidal Rule, Simpson’s 1/3 Rule, Simpson’s 3/8 Rule.

Reference Books :

1. Numerical Analysis by S.S.Sastry, published by Prentice Hall of India Pvt. Ltd., New Delhi. (Latest Edition)
2. Numerical Analysis by G. Sankar Rao published by New Age International Publishers, New – Hyderabad.
3. Finite Differences and Numerical Analysis by H.C Saxena published by S. Chand and Company, Pvt. Ltd., New Delhi.
4. Numerical methods for scientific and engineering computation by M.K.Jain, S.R.K.Iyengar, R.K. Jain.

B.A./B.Sc. MATHEMATICS SYLLABUS  
SEMESTER – VI

Cluster Elective – Paper VIII -A3 : LINEAR ALGEBRA - II

**UNIT- I: (12 hours)**

**Rank of a Matrix :** Sub-matrix and Minors of a Matrix, Rank of a Matrix, Elementary transformations, Reduction to Normal Form, Inverse of a Matrix using elementary transformations, Echelon form.

**UNIT – II: (12 hours)**

**Linear Equations:** Consistency, System of Homogeneous Linear equations, System of Non-homogeneous Linear equations.

**UNIT – III: (12 hours)**

**Characteristic roots and Vectors of a Square Matrix:** Characteristic roots, characteristic vectors, Properties of characteristic vectors, Cayley - Hamilton Theorem, Inverse of a matrix by using Cayley - Hamilton Theorem.

**UNIT –IV (12 hrs) : Inner product space - I**

Inner product spaces, Euclidean and unitary spaces, Norm or length of a Vector, Schwartz inequality, Triangle Inequality, Parallelogram law.

**UNIT –V (12 hrs) : Inner product space - II**

Orthogonality, Ortho normal set, complete ortho-normal set, Gram – Schmidt orthogonalisation process. Bessel's inequality and Parseval's Identity.

**Reference Books :**

1. Linear Algebra by J.N. Sharma and A.R. Vasista, published by Krishna Prakashan Mandir, Meerut-250002.
2. Linear Algebra by Kenneth Hoffman and Ray Kunze, published by Pearson Education (low price edition), New Delhi.
3. Linear Algebra by Stephen H. Friedberg et al published by Prentice Hall of India Pvt. Ltd. 4<sup>th</sup> Edition 2007.
4. A Text Book on Matrices by P.K.Mittal, S.Chand Co.
5. A Text Book on Matrices by A.R. Vasistha, A.K.Vasistha, Krishna Prashan Media.
6. A Text Book on Matrices by Santhi Narayan, S.Chand Co.



**SKR & SKR GOVT. COLLEGE FOR WOMEN, KADAPA.**

**(AUTONOMOUS)**

Reaccredited with 'B' Grade by NAAC

**Y.S.R. Kadapa District – 516001, Andhra Pradesh, India.**

**Affiliated to Yogi Vemana University**

**2021-22**

**Core papers**

**ZOOLOGY**



**ZOOLOGY SYLLABUS FOR I SEMESTER**

**PAPER – I: ANIMAL DIVERSITY – BIOLOGY OF NONCHORDATES**

**HOURS:60 (5X12)**

**Max. Marks: 100**

**UNIT I**

- 1.1 Principles of Taxonomy – Binomial nomenclature – Rules of nomenclature
- 1.2 Whittaker's five kingdom concept and classification of Animal Kingdom.

**Phylum Protozoa**

- 1.3 General Characters and classification of protozoa up to classes with suitable examples
- 1.4 Protozoan – Pathogenicity (Trypanosoma, Plasmodium, Giardia, Leishmania, Trichomonas – causative agent, mode of infection, symptoms, Prevention and Controlling measures)
- 1.5 *Elphidium (type study)*

**UNIT –II**

**Phylum Porifera**

- 2.1 General characters and classification up to classes with suitable examples
- 2.2 Skelton in Sponges
- 2.3 Canal system in sponges

**Phylum Coelenterata**

- 2.4 General characters and classification up to classes with suitable examples
- 2.5 Metagenesis in *Obelia*
- 2.6 Polymorphism in coelenterates
- 2.7 Corals and coral reefs

**Phylum Ctenophora :**

- 2.8 General Characters and Evolutionary significance (affinities)

**Unit – III**

**Phylum Platyhelminthes**

- 3.1 General characters and classification up to classes with suitable examples
- 3.2 Life cycle and pathogenicity of *Fasciola hepatica*

- 3.3 Parasitic Adaptations in helminthes

**Phylum Nemathelminthes**

- 3.4 General characters and classification up to classes with suitable examples  
3.5 Life cycle and pathogenecity of *Ascarislumbricoides*

**Unit – IV**

**Phylum Annelida**

- 4.1 General characters and classification up to classes with suitable examples  
4.2 Evolution of Coelom and Coelomoduets  
4.3 Vermiculture - Scope, significance, earthworm species, processing,  
Vermicompost, economic importance of vermicompost

**Phylum Arthropoda**

- 4.4 General characters and classification up to classes with suitable examples  
4.5 Vision and respiration in Arthropoda  
4.6 Metamorphosis in Insects  
4.7 *Peripatus* - Structure and affinities  
4.8 Economic Impotance of insects- Silkworms, Honey bee and Lac insect.

**Unit – V**

**Phylum Mollusca**

- 5.1 General characters and classification up to classes with suitable examples  
5.2 Pearl formation in Pelecypoda  
5.3 Sense organs in Mollusca

**Phylum Echinodermata**

- 5.4 General characters and classification up to classes with suitable examples  
5.5 Water vascular system in star fish  
5.6 Larval forms of Echinodermata

**Phylum Hemichordata**

- 5.7 General characters and classification up to classes with suitable examples

**5.8 *Balanoglossus* - Structure and affinities**

**ZOOLOGY SYLLABUS FOR II SEMESTER**  
**PAPER – II: ANIMAL DIVERSITY – BIOLOGY OF CHORDATES**  
**HOURS: 60 (5X12) Max. Marks: 100**

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**Unit - I**

- 1.1 General characters and classification of Chordata upto classes
- 1.2 Protochordata- Salient features of Cephalochordata , Affinities of Cephalochordata.
- 1.3 Salient features of Urochordata
- 1.4 Structure and life history of *Herdmania* (Retrogressive metamorphosis)

**Unit - II**

- 2.1 Cyclostomata, General characters, Comparison of *Petromyzon* and *Myxine*
- 2.2 Pisces : General characters of Fishes
- 2.3 *Scoliodon*: External features, Digestive system, Respiratory system, Structure and function of Heart, Structure and functions of the Brain.
- 2.4 Migration in Fishes
- 2.5 Types of Scales
- 2.6 Dipnoi

**Unit - III**

- 3.1 General characters of Amphibia
- 3.2 Classification of Amphibia up to orders with examples.
- 3.3 *Rana hexadactyla*: External features, Digestive system, Respiratory system, Structure and function of Heart, structure and functions of the Brain
- 3.4 Reptilia: General characters of Reptilia, Classification of Reptilia upto orders with examples
- 3.5 *Calotes*: External features, Digestive system, Respiratory system, Structure and function of Heart, structure and function of Brain
- 3.6 Identification of Poisonous and Non-poisonous snakes.

#### **Unit - IV**

- 4.1 Aves General characters and classification (**Ratitae and Carinatae**)
- 4.2 *Columba livia*: External features, Digestive system, Respiratory system, Structure and function of Heart, structure and function of Brain
- 4.3 Migration in Birds
- 4.4 Flight adaptation in birds

#### **Unit - V**

- 5.1 General characters of Mammalia
- 5.2 Classification of Mammalia upto sub - classes with examples
- 5.3 Comparison of Prototherians, Metatherians and Eutherians
- 5.4 Dentition in mammals

#### ***Co-curricular activities (suggested)***

- Preparation of charts on Chordate classification (with representative animal photos) and retrogressive metamorphosis
- Thermocol or Clay models of Herdmania and Amphioxus
- Visit to local fish market and identification of local cartilaginous and bony fishes
- Maintaining of aquarium by students
- Thermocol model of fish heart and brain
- Preparation of slides of scales of fishes
- Visit to local/nearby river to identify migratory fishes and prepare study notes
- Preparation of Charts on above topics by students (Eg: comparative account of vertebrate heart/brain/lungs, identification of snakes etc.)
- Collecting and preparation of Museum specimens with dead frogs/snakes/lizards etc., and/or their skeletons
- Additional input on types of snake poisons and their antidotes (student activity).
- Collection of bird feathers and submission of report on Plumology

**ZOOLOGY SYLLABUS FOR III SEMESTER**  
**PAPER – III: CELL BIOLOGY, GENETICS, MOLECULAR BIOLOGY AND**  
**EVOLUTION**

**HOURS: 60 (5X12)**

**Max. Marks: 100**

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**Unit – I Cell Biology**

- 1.1 Definition, history, prokaryotic and eukaryotic cells, virus, viroids, mycoplasma
- 1.2 Electron microscopic structure of animal cell.
- 1.3 Plasma membrane –Models and transport functions of plasma membrane.
- 1.4 Structure and functions of Golgi complex, Endoplasmic Reticulum and Lysosomes
- 1.5 Structure and functions of Ribosomes, Mitochondria, Nucleus, Chromosomes

**(Note: 1. General pattern of study of each cell organelle – Discovery, Occurrence, Number, Origin, Structure and Functions with suitable diagrams)**

**2. Need not study cellular respiration under mitochondrial functions)**

**Unit – II Genetics - I**

2. 1 Mendel's work on transmission of traits
2. 2 Gene Interaction – Incomplete Dominance, Codominance, Lethal Genes
2. 3 Polygenes (General Characteristics & examples); Multiple Alleles (General Characteristics and Blood group inheritance)
2. 4 Sex determination (Chromosomal, Genic Balance, Hormonal, Environmental and Haplo-diploidy types of sex determination)
2. 5 Sex linked inheritance (X-linked, Y-linked & XY-linked inheritance)

**Unit – III Genetics - II**

- 3.1 Mutations & Mutagenesis
- 3.2 Chromosomal Disorders (Autosomal and Allosomal)
- 3.3 Human Genetics – Karyotyping, Pedigree Analysis (basics)
- 3.4 Basics on Genomics and Proteomics

**UNIT IV: Molecular Biology**

- 4.1 Central Dogma of Molecular Biology

#### 4.2 Basic concepts of -

- a. DNA replication – Overview (Semi-conservative mechanism, Semi-discontinuous mode, Origin & Propagation of replication fork)
- b. Transcription in prokaryotes – Initiation, Elongation and Termination, Post-transcriptional modifications (basics)
- c. Translation – Initiation, Elongation and Termination

#### 4.3 Gene Expression in prokaryotes (Lac Operon); Gene Expression in eukaryotes

### **Unit - V**

#### 5.1 Origin of life

#### 5.2 Theories of Evolution: Lamarckism, Darwinism, Germ Plasm Theory, Mutation Theory

#### 5.3 Neo-Darwinism: Modern Synthetic Theory of Evolution, Hardy-Weinberg Equilibrium

#### 5.4 Forces of Evolution: Isolating mechanisms, Genetic Drift, Natural Selection, Speciation

### **Co-curricular activities (Suggested)**

- Model of animal cell
- Working model of mitochondria to encourage creativity among students

**ZOOLOGY SYLLABUS FOR IV SEMESTER**  
**PAPER – IV: ANIMAL PHYSIOLOGY, CELLULAR METABOLISM AND**  
**EMBRYOLOGY**

**HOURS: 60 (5X12)**

**Max. Marks: 100**

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**UNIT I      Animal Physiology - I**

- 1.1 Process of digestion and assimilation
- 1.2 Respiration - Pulmonary ventilation, transport of oxygen and CO<sub>2</sub>

(Note: Need not study cellular respiration here)

- 1.3 Circulation - Structure and functioning of heart, Cardiac cycle
- 1.4 Excretion - Structure and functions of kidney urine formation, counter current Mechanism

**UNIT II      Animal Physiology - II**

- 2.1 Nerve impulse transmission - Resting membrane potential, origin and propagation of action potentials along myelinated and non-myelinated nerve fibers
- 2.2 Muscle contraction - Ultra structure of muscle, molecular and chemical basis of muscle contraction
- 2.3 Endocrine glands - Structure, functions of hormones of pituitary, thyroid, parathyroid, adrenal glands and pancreas
- 2.4 Hormonal control of reproduction in a mammal

**UNIT III      Cellular Metabolism – I (Biomolecules)**

- 3.1 Carbohydrates - Classification of carbohydrates. Structure of glucose
- 3.2 Proteins - Classification of proteins. General properties of amino acids
- 3.3 Lipids - Classification of lipids
- 3.4 Enzymes: Classification and Mechanism of Action

**UNIT IV      Cellular Metabolism – II**

- 4.1 Carbohydrate Metabolism - Glycolysis, Krebs cycle, Electron Transport Chain, Glycogen metabolism, Gluconeogenesis
- 4.2 Lipid Metabolism –  $\beta$ -oxidation of palmitic acid

#### 4.3 Protein metabolism - Transamination, Deamination and Urea Cycle

#### **Unit – V      Embryology**

- 5.1 Gametogenesis
- 5.2 Fertilization
- 5.3 Types of eggs
- 5.4 Types of cleavages
- 5.5 Development of Frog upto formation of primary germ layers
- 5.6 Types of Placenta

#### **Co-curricular activities (Suggested)**

- Chart on cardiac cycle, human lung, kidney/nephron structure etc.
- Working model of human / any mammalian heart.
- Chart of sarcomere/location of endocrine glands in human body
- Chart affixing of photos of people suffering from hormonal disorders
- Student study projects such as identification of incidence of hormonal disorders in the local primary health centre, studying the reasons thereof and measures to curb or any other as the lecturer feels good in nurturing health awareness among students
- Chart on structures of biomolecules/types of amino acids (essential and non-essential)Chart preparation by students on Glycolysis / kreb's cycle/urea cycle etc.
- Model of electron transport chain
- Preparation of models of different types of eggs in animals
- Chart on frog embryonic development, fate map of frog blastula, cleavage etc.

**ZOOLOGY SYLLABUS FOR SEMESTER - IV**  
**COURSE – 5: IMMUNOLOGY AND ANIMAL BIOTECHNOLOGY**

**HOURS : 60 (5X12)**

**Max. Marks: 100**

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**Unit – I Immunology – I (Overview of Immune system)**

- 1.1 Introduction to basic concepts in Immunology
- 1.2 Innate and adaptive immunity, Vaccines and Immunization programme
- 1.3 Cells of immune system
- 1.4 Organs of immune system

**Unit – II Immunology – II (Antigens, Antibodies, MHC and Hypersensitivity)**

- 2.1 Antigens: Basic properties of antigens, B and T cell epitopes, haptens and adjuvants; Factors influencing immunogenicity
- 2.2 Antibodies: Structure of antibody, Classes and functions of antibodies
- 2.3 Structure and functions of major histocompatibility complexes
- 2.4 Exogenous and Endogenous pathways of antigen presentation and processing
- 2.5 Hypersensitivity – Classification and Types

**Unit – III Techniques**

- 2.1 Animal Cell, Tissue and Organ culture media: Natural and Synthetic media,
- 2.2 Cell cultures: Establishment of cell culture (primary culture, secondary culture, types of cell lines; Protocols for Primary Cell Culture); Established Cell lines (common examples such as MRC, HeLa, CHO, BHK, Vero); Organ culture; Cryopreservation of cultures
- 2.3 Stem cells: Types of stem cells and applications
- 2.4 Hybridoma Technology: Production & applications of Monoclonal antibodies (mAb)

**Unit – IV Applications of Animal Biotechnology**

- 3.1 Genetic Engineering: Basic concept, Vectors, Restriction Endonucleases and Recombinant DNA technology
- 3.2 Gene delivery: Microinjection, electroporation, biolistic method (gene gun), liposome and viral-mediated gene delivery
- 3.3 Transgenic Animals: Strategies of Gene transfer; Transgenic - sheep, - fish; applications
- 3.4 Manipulation of reproduction in animals: Artificial Insemination, *In vitro* fertilization, super ovulation, Embryo transfer, Embryo cloning

#### **Unit - V**

- 1.1. PCR: Basics of PCR.
- 4.2 DNA Sequencing: Sanger's method of DNA sequencing- traditional and automated sequencing (2 hrs)
- 4.3 Hybridization techniques: Southern, Northern and Western blotting
- 4.4 DNA fingerprinting: Procedure and applications
- 4.5 Applications in Industry and Agriculture: Fermentation: Different types of Fermentation and Downstream processing; Agriculture: Monoculture in fishes, polyploidy in fishes

#### **Co-curricular activities (suggested)**

- Organizing awareness on immunization importance in local village in association with NCC and NSS teams
- Charts on types of cells and organs of immune system

ZOOLOGY SYLLABUS FOR V SEMESTER  
ZOOLOGY - PAPER - V  
ANIMAL BIOTECHNOLOGY

Periods:60

Max. Marks:100

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Unit 1: Tools of Recombinant DNA technology - Enzymes and Vectors

Restriction modification systems: Types I, II and III. Mode of action, nomenclature, applications of Type II restriction enzymes in genetic engineering

Cloning Vectors: Plasmid vectors: pBR and pUC series, Bacteriophage, Cosmids.

Unit 2 Techniques of Recombinant DNA technology

Cloning: Use of linkers and adaptors

PCR: Basics of PCR.

Hybridization techniques: Southern, Northern and Western blotting,

Genomic and cDNA libraries: Preparation and uses

UNIT 3 Animal Cell Technology

Cell cultures: primary culture, secondary culture, Organ culture; Cryopreservation of cultures.

Hybridoma Technology: Production of Monoclonal antibodies (mAb), Applications of mAb Stem

cells: Types of stem cells, applications of stem cell technology in cell based therapy.

Unit 4 Reproductive Technologies & Transgenic Animals

Manipulation of reproduction in animals: Artificial Insemination, In vitro fertilization, super ovulation, Embryo transfer

Transgenic Animals: Transgenic - sheep, - fish; applications

Unit 5 Applied Biotechnology

Industry: Fermentation: Different types of Fermentation: Short notes on - Submerged & Solid state; batch, Fed batch & Continuous;

Agriculture: fisheries – monoculture in fishes, polyploidy in fishes; DNA fingerprinting

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ZOOLOGY SYLLABUS FOR V SEMESTER

ZOOLOGY - PAPER - VI

ANIMAL HUSBANDRY

Periods:60	Max. Marks: 100
UNIT – I	10 Hours
<u>General introduction</u> to poultry farming. Principles of poultry housing. Poultry houses. <u>Systems of poultry farming</u> . Management of chicks, growers and layers. Management of Broilers.	
UNIT – II:	10 Hours
Poultry feed management – Principles of feeding. Methods of feeding. Poultry <u>diseases</u> – viral, bacterial, fungal and parasitic (two each); symptoms, control and management.	
UNIT – III:	10 Hours
Selection, care and handling of hatching eggs. Egg testing. Methods of hatching. Brooding and rearing. Sexing of chicks.	
UNIT- IV:	20 Hours
Breeds of Dairy Cattle and Buffaloes – Definition of breed; Classification of Indian Cattle breeds, exotic breeds and Indian buffalo breeds. (Three each category). Housing of <u>dairy animals</u> – Selection of site for dairy farm; systems of housing – loose, housing system. Conventional dairy barn. Cleaning and sanitation of dairy farm. Weaning of calf. <u>Castration and</u> dehorning. Deworming.	
UNIT - V:	10 Hours
Care and management of dairy animals - Care and management of calf, heifer, milk animal, dry and pregnant animal, bulls and bullocks.	

ZOOLOGY SYLLABUS FOR VI SEMESTER

ZOOLOGY –ELECTIVE PAPER-VII

IMMUNOLOGY

Periods:60

Max. Marks:100

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Unit - I

Overview of Immune system  
Introduction to basic concepts in Immunology  
Innate and adaptive immunity  
Cells and organs of Immune system  
Cells of immune system  
Organs of immune system

Unit - II

Antigens  
Basic properties of antigens  
B and T cell epitopes, ~~haptens~~  
Factors influencing immunogenicity

Unit - III

Antibodies  
Structure of antibody  
Classes and functions of antibodies  
3.1.3 Monoclonal antibodies

Unit - IV

Working of Immune system  
Structure and functions of major histocompatibility complexes  
~~Exogenes and Endogenes~~ pathways of antigen presentation and processing  
Basic properties and functions of cytokines

Unit - V

Immune system in health and disease  
Classification and brief description of various types of hyper sensitivities  
Introduction to concepts of autoimmunity and immunodeficiency  
Vaccines  
General introduction to vaccines  
Types of vaccines

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VI SEMESTER  
ZOOLOGY SYLLABUS FOR CLUSTER ELECTIVE –VIII-A:  
AQUACULTURE

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Cluster Elective Paper: VIII-A-1

PRINCIPLES OF AQUACULTURE

Periods:60

Max.Marks:100

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Unit – I

Introduction / Basics of Aquaculture

Definition, Significance and History of Aquaculture

Major cultivable species for aquaculture: freshwater, brackish water and marine.

Criteria for the selection of species for culture

Unit – II

Types of Aquaculture

Freshwater, Brackishwater and Marine

Concept of Monoculture, Polyculture, Composite culture, Monosex culture and Integrated fish farming

Culture practices

Traditional, extensive, modified extensive, semi-intensive and intensive cultures of fish.

Unit – III

Design and construction of aquafarms

Criteria for the selection of site for freshwater and brackish water pond farms

Design and construction of fish and shrimp farms

Nutrition and feeds

Natural food and Artificial feeds and their importance in fish and shrimp culture

Unit – IV

Management of carp culture ponds

4.1.1 Culture of Indian major carps: Pre-stocking management – Dewatering, drying, ploughing/desilting; Predators, weeds and algal blooms and their control, Liming and fertilization; Stocking management – Stocking density and stocking; Post-stocking management – Feeding, water quality, growth and health care; and Harvesting of ponds

Unit – V

Culture of shrimp (Penaeus monodon or Litopenaeus vannamei)

Culture of pearl oysters

Culture of ornamental fishes – Setting up and maintenance of aquarium.

REFERENCES BOOKS

1. Bardach, JE et al. 1972. Aquaculture – The farming and husbandry of freshwater and marine organisms, John Wiley & Sons, New York.
2. Bose AN et al.1991. Coastal aquaculture Engineering. Oxford & IBH Publ.Co.Pvt.Ltd.
3. Chakraborty C & Sadhu AK. 2000. Biology Hatchery and Culture Technology of Tiger Prawn and Giant Freshwater Prawn. Daya Publ. House.
4. FAO. 2007. Manual on Freshwater Prawn Farming.
5. Huet J. 1986. A text Book of Fish Culture. Fishing News Books Ltd.
6. ICAR. 2006. Hand Book of Fisheries and Aquaculture. ICAR.
7. Ivar LO. 2007. Aquaculture Engineering. Daya Publ. House.

Cluster Elective Paper: VIII-A-2  
AQUACULTURE MANAGEMENT

Periods : 60

Max.Marks : 100

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Unit – I

Breeding and Hatchery Management

Bundh Breeding and Induced breeding of carp by Hypophysation:  
and use of synthetic hormones  
Types of fish hatcheries; Hatchery management of Indian major carps  
Breeding and Hatchery management of *Penaeus monodon*

Unit – II

Water quality Management

Water quality and soil characteristics suitable for fish and shrimp culture  
Identification of oxygen depletion problems and control mechanisms in culture ponds  
Liming materials, Organic manures and Inorganic fertilizers commonly used and their  
implications in fish ponds

Unit – III

Feed Management

Live Foods and their role in shrimp larval nutrition.  
Supplementary feeds: Principal foods in artificial diets; Types of feeds; Feed additives  
and Preservatives; role of probiotics.  
Feed formulation and manufacturing; Feed storage

Unit – IV

Disease Management

Principles of disease diagnosis and health management;  
Prophylaxis, Hygiene and Therapy of fish diseases  
Etiology, Symptoms, prophylaxis and therapy of common fish diseases in fish ponds

Unit – V

Economics and Marketing

5.1.1 Principles of aquaculture economics – Capital costs, variable costs, cost-benefit analysis  
5.1.2 Fish marketing methods in India; Basic concepts in demand and price analysis  
Fish Genetics  
Genetic improvement of fish stocks – Hybridization of fish.  
Cryopreservation of gametes, Production of monosex and sterile fishes and their significance in  
aquaculture.

REFERENCE BOOKS

1. Boyd CE. 1979. Water Quality in Warm Water Fish Ponds. Auburn University
2. Boyd, CE. 1982. Water Quality Management for Pond Fish Culture. Elsevier Sci. Publ. Co.

Cluster Elective Paper: VIII-A-3  
POST HARVEST TECHNOLOGY

Periods : 60

Max.Marks : 100

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Unit – I

Handling and Principles of fish Preservation

Handling of fresh fish, storage and transport of fresh fish, post mortem changes (rigor mortis and spoilage).

Principles of preservation– cleaning, lowering of temperature, rising of temperature, denudation, use of salt, use of fish preservatives, exposure to lowradiation of gamma rays.

Unit – II

Methods of fish Preservation

Traditional methods - sun drying, salt curing, pickling and smoking.

Advanced methods – chilling or icing, refrigerated sea water, freezing, canning, Irradiation and Accelerated Freeze drying (AFD).

Unit – III

Processing and preservation of fish and fish by-products

Fish products – fish minced meat, fish meal, fish oil, fish liquid (ensilage), fish protein concentrate, fish chowder, fish cake, fish sauce, fish salads, fish powder, pet food from trash fish, fish manure.

Fish by-products – fish glue, ising glass, chitosan, pearl essence, shark fins, fish leather and fish maws.

Unit – IV

Sanitation and Quality control

Sanitation in processing plants - Environmental hygiene and Personal hygiene in processing plants.

Quality Control of fish and fishery products – pre-processing control, control during processing and control after processing.

Unit – V

Quality Assurance, Management and Certification

Seafood Quality Assurance and Systems: Good Manufacturing Practices (GMPs); Good Laboratory Practices (GLPs); Standard Operating Procedures (SOPs); Concept of Hazard Analysis and Critical Control Points (HACCP) in seafood safety.





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2021-22

Core papers

DEPARTMENT OF TOURISM AND TRAVEL MANAGEMENT

Paper-II: PRINCIPLES AND PRACTICES OF TOURISM

SEMESTER – II

**Module 1**

**Tourism development and state intervention National economic goals-political legislation, equity and social needs, social investment, regulation and government controls, regional development in Tourism-**

**Module 2**

**Tourist motivation Factors types Push and Pull factors - Determinants of tourism- Theories of Motivation - psychological, cultural, economic, personal and social barriers to travel**

**Module 3**

**Impact of tourism Meaning, positive and negative Social, cultural, economic and environmental impacts of tourism - Employment and Revenue generation Tourist impact analysis**

**Module 4**

**Components of Tourism- Types of transportation Railways, airways, waterways and roadways Role of railways in promoting tourism in India Accommodation and food**

**Module 5**

**Tourism finance Introduction, meaning, nature, scope and functions of finance Application of financial management in tourism industry Tourism Finance Corporation of India and other Organizations Aims, objectives and functions**

**References:**

- 1. Pran Nath Seth (2006): Successful tourism Management, Sterling, New Delhi (Vol. 1 & 2)**
- 2. Mill and Morrison, (1992). The Tourism System: An Introductory Text, Prentice**

**Hall. London**

**3. Cooper. Fletcher et al. (1993). Tourism Principles and Practices. Pitman.**

**4. Bhatia, A.K. (2010): International Tourism Management, Sterling, New Delhi 5.**

**Burkart and Medlik. (1981). Tourism: Past, Present and Future. Heinemann,**

**ELBS.**

**1. Christopher. Hallway: Longman (2012): The Business of Tourism. Pearson.**



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2021-22

Core papers

DEPARTMENT OF TOURISM & TRAVEL MANAGEMENT

Semester III Syllabus

Paper - II TOURISM PRODUCTS

**Module-1**

Definitions – concept, types and characteristics of tourism products, elements of tourism products – geographical elements and other tourist attractions – different levels of models and layers – product lifecycle.

**Module-2**

Geography of tourism – definition. scope and content of geography of tourism – major landforms – mountains, plains, plateaus; natural regions of the world – Impact of weather and climate on tourism, seasonal rhythm – geographical components and tourism development linkages.

**Module-3**

Natural tourist resources – important national parks and wild life sanctuaries – examples from south INDIA. Beaches and islands, waterfalls: desert tourism, deserts, safaris and festivals, recreation and adventure tourism (land, water and air based)

**Module-4**

Concept of tourism pilgrimage in India – select Hindu, Buddhist, Jain, Sikh, Islam and Christian pilgrim centres and related circuits

**Module-5**

Performing arts and Handicrafts of India – music and dance (tribal, folk, & classical) tourism festivals – introduction to medical, health and wellness tourism – world heritage sites in India.

**References: -**

1. **RangaMukesh, tourismprotentionalinIndia.**
2. **SarkarH,museumsandprotectionsofmonumentsandantiquities inIndia.**
3. **VijayaLakshmik.shistorytourism.**
4. **WilliamsS(1998) Tourismgeography, Routledge,London.WWW.Unwto.org.**
5. **http://www.buzzle.com**
6. **[www.international.icomos.org](http://www.international.icomos.org)**
7. **[www.unesco.org](http://www.unesco.org)**
8. **[www.pondiuni.edu.in](http://www.pondiuni.edu.in)**
9. **[www.globalpropertyguide.com](http://www.globalpropertyguide.com)**
10. **[www.amazon.in](http://www.amazon.in)**



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Core papers

DEPARTMENT OF TOURISM & TRAVEL MANAGEMENT

Semester IV – Syllabus

Paper IV:- CULTURAL TOURISM IN ANDHRA PRADESH

Module -1

Definition to History and culture (Tangible and Intangible) – Brief History of – Salient Features of A.P Culture

Module - 2

Pre and Proto History – Art and Architecture of A.P as Tourism Products – Major Museums and Art Galleries – Major pilgrim Centres (Temple, Church and Mosque) in A.P

Module -3

Performing Arts and Handicrafts – Andhra Paintings and Stone Crafts – Music and Dance (Tribal, Folk and Classical)

Module -4

Language and Literature – Dress and Ornaments – Food (cuisine) and Health (Medical Systems)

Module-5

Tribal Culture of A.P – Tribes of A.P – Geographical spread – Identity – Society – Economy – Religion and Culture – Need for Conservation of Cultural heritage – UNESCO Initiatives – Field Visits.

References:

APTDC Publications

Shivangi Reddy, E, - Andhra Pradesh Tourism Vana ulu – Akcakale (Telugu), Hyderabad, 2003

[www.aptdc.gov.in](http://www.aptdc.gov.in)

[www.aptourism.gov.in](http://www.aptourism.gov.in)

[www.tavell.in/Andhra](http://www.tavell.in/Andhra)





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2021-22

Core papers

DEPARTMENT OF TOURISM & TRAVEL MANAGEMENT

Paper-V: GUIDING AND INTERPRETATION SKILLS FOR TOURISM

SEMESTER – IV

**Module 1**

Introduction to Guiding and escorting- Meaning; concept and types of tour guide, duties and responsibilities of Guides and Escorts, various role of tour guide, the business of guiding, organizing a guiding business

**Module 2**

The guiding techniques- leadership and social skills, presentation and communication skills - The guide's personality - working with different age groups, working under difficult circumstances

**Module 3**

Guest Relationship Management- Handling emergency situations- medical, personal, official, VISA/passport, Death, handling guest with special needs/different abilities; Skills required for adventure tours; Knowledge of local security, route chart; Personal hygiene and grooming, tour responsibilities, checklist, leading a group, code of conduct

**Module 4**

Conducting tours: Pre tour planning, modes of transportation, conducting various types of tours, understanding client needs, security measures, relationship with fellow guides, Coordination with hospitality institutions; points to remember while guiding and escorting

**Module 5**

Professional development; Interpretative planning; training staff for interpretation; evaluation techniques; negotiation skills-types of negotiating techniques; negotiating a business deal in tourism.

**References:**

1. Jagmohan Negi (2006); Travel Agency and Tour Operations, Kanishka Publishers, New Delhi

**2. Mohinder Chand (2009); Travel Agency and Tour Operations: An Introductory Text, Anmol Publications Pvt. Limited, New Delhi**

**3. Dennis L Foster - Introduction to Travel Agency Management 4. Pat Yale (1995); Business of Tour Operations, Longman Scientific & Technical, New Delhi**

**5. Pond K-L(1993); The professional guide: Dynamics of tour guiding**

**6. [www.tourism.gov.in](http://www.tourism.gov.in)**

**7. [www.qtic.com](http://www.qtic.com)**

**[www.cedeop.europa.eu](http://www.cedeop.europa.eu)**



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**Paper-V: GUIDING AND INTERPRETATION SKILLS FOR TOURISM**

**SEMESTER – V**

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**3. Dennis L Foster - Introduction to Travel Agency Management 4. Pat Yale (1995);  
Business of Tour Operations, Longman Scientific & Technical, New Delhi**

**5. Pond K-L(1993); The professional guide: Dynamics of tour guiding**

**6. [www.tourism.gov.in](http://www.tourism.gov.in)**

**7. [www.qtic.com](http://www.qtic.com)**



#### **4. Ticket booking using online travel seats**

##### **Tour operations**

**1. preparation of tour Itinerary – In bound and out bound**

**2. model costing of tour packages**

**3. preparation of special interest tours in your region**

**4. sample tour grocery steady and preparations**

**5. vouchers preparation and filling**

**6. visit to travel / tour company.**

##### **References**

**1. Jag Negimohan (2006)., Travel agency and tour operations ,kanishka publishers ,New Delhi.**

**2. Mohandar chand (2009)., Travel agency and tour operations :and introduction text ,amol publication pvt .limited ,New Delhi.**

**3. Jane archer ,(2006)., Manule of travel agency practice – Butterworth Heinemann, pub, London**

**4. <https://www.tichk.org>**

**5. [www.growourregion.com](http://www.growourregion.com).**

**6. [www.usaidg.gov.com](http://www.usaidg.gov.com)**



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2021-22

Core papers

DEPARTMENT OF TOURISM & TRAVEL MANAGEMENT

Semester VI – Syllabus

**PAPER –VII: TOURISM MARKETING & HOSPITALITY MANAGEMENT**

**Module - 1**

Definition of Tourism marketing characteristics –philosophies of marketing management  
customer relationship management –relationship between hospitality and tourism  
industry –service culture

**Module - 2**

Micro environment –company, suppliers, marketing intermediaries, customers, public–  
environmental forces and trends–Marketing information system & research process –  
promotion

**Module - 3**

Introduction to hospitality industry –Nature, scope and components –Accommodation  
types and forms –Important departments of hotel –front office Housekeeping, Food and  
Beverage, maintenance and engineering –function and co-ordination with other  
departments –classification, categorization, registration and approval –handling  
emergencies

**Module - 4**

Guest cycle – Guest stays process in a hotel major processes and stages associated with it  
–Reservation, Registration, Guest complaints etc.–study of the working of selected  
hotels/motels/restaurants–Different types of catering establishments –Managerial issues

**MODULE - 5**

Tourism practical (few examples are given below – the faculty can include many more  
items)

## **Transportation management**

- 1. Ticket booking for Indian railways using IRCTC and bus services like red bus**
- 2. Study and simple costing of vehicle rates for package tours –cars, medium, size vehicles and buses**

## **Hospitality Management**

- 1. case study of important hotel properties**
- 2. practical accepts of bed making**
- 3. service etiquette**
- 4. Venue card preparation**
- 5. visit to hotels/resorts**

## **References:**

- 1. Ravi Shankar (2002)., service marketing, excel books India. New Delhi**
- 2. Phillips Kolter, Bowens and James makes (2010)., marketing for tourism and hospitality, Pearson, New Delhi.**
- 3. Naresh Malhotra (2000); Marketingresearch, person prentice Hall, New Delhi**
- 4. Janet Macdonald (2000), Travel writing. RobberHale, London**
- 5. [www.ilo.org](http://www.ilo.org)**
- 6. [https://ringinstitute .com](https://ringinstitute.com)**
- 7. <https://alison.com>**



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**2021-22**

**Core papers**

**Horticulture**

**Semester-I Paper-I**



**CBCS / Semester System (w.e.f. 2020-'21 Admitted Batch)**

**I Semester /Horticulture Core Course - I**

**Fundamentals of Horticulture and Soil Science**

(Total hours of teaching – 60 @ 04 Hrs./Week)

**Theory :**

**Learning Outcomes:** On successful completion of this course, the students will be able to:

- Understand the scope and potential of horticulture products in India and Andhra Pradesh.
- Classify the horticulture plants based on soil and climate.
- Illustrate different systems of planting in orchard and predict the number of plants in a given land.
- Demonstrate the methods and types of training and pruning.
- Explain the basics of soil science and justify the role of soil as a medium for plant growth.
- Explain about integrated nutrient management and demonstrate the skills of soil testing.

**Unit I : Introduction to Horticulture**

**12 Hrs.**

1. Horticulture: Definition, importance of horticulture in terms of economy, production, employment generation, environmental protection and human resource development.
2. Divisions of horticulture with suitable examples and their importance.
3. Area, production of Horticultural crops in A.P. and India.
4. Fruit and vegetable zones of India and Andhra Pradesh.
5. Export scenario and scope for Horticulture in India.

**Unit II : Classification Horticulture Crops**

**12 Hrs.**

1. Classification of horticultural crops based on soil and climatic requirements.
2. Vegetable crop gardens – Nutrition and kitchen garden – tracer garden – vegetable forcing – market garden – roof garden.
3. Gardens in floriculture – flower gardens – soil and mixed gardens; land scape Horticulture.

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**Unit III :Characteristics of Orchards****12 Hrs.**

1. Orchard: Definition, different systems of planting orchards – square, rectangular Quincunx, hexagonal and contour.
2. Calculation of planting densities in different systems of planting.
3. Different types and methods of pruning.
4. Training: Definition, principles and objectives; merits and demerits of open and close centered, and modified leader systems.

**Unit IV :Physico-chemical characteristics of Soil****12 Hrs.**

1. Soil: Definition, minerals and weathering to form soils; factors of soil formation.
2. Soil taxonomy; soil color, texture and structure; other physical properties and stability.
3. Soil colloids and charges; ion adsorption and exchange; soil temperature and soil air.
4. Soil pH and acidity; soil alkalinity and salinity.

**Unit V :Soil as a living matter****12 Hrs.**

1. Soil organic matter – composition and decomposability.
2. Humus – fractionation of organic matter.
3. Soil biology: Soil microorganisms and fauna –beneficial and harmful roles.
4. Integrated nutrient management and soil tests.

**Text books:**

- **Prasad and Kumar ,2014.**: Principles of Horticulture 2<sup>nd</sup> Edition Agribios India
  - **Kumar, N., 1990** Introduction to Horticulture. Rajyalakshmi Publications, Nagarkoil, Tamilnadu
  - **Jithendra Singh, 2002.** Basic Horticulture. Kalyani Publishers, Hyderabad
  - **KausalkumarMisra and Rajesh Kumar, 2014** Fundamentals of Horticulture
-



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2021-22

**Core papers**

**II Semester /Horticulture Core Course - 2**  
**Plant Propagation and Nursery Management**  
(Total hours of teaching – 60 @ 04 Hrs./Week)

**Theory :**

**Learning Outcomes:** On successful completion of this course, the students will be able to:

- Explain sexual and asexual propagation methods of plants.
- Demonstrate skills on vegetative propagation of plants.
- Demonstrate the techniques on raising of different types of nursery beds
- Justify the role of various propagation structures used to raise horticulture plants.
- Understand the regulation to establish a plant nursery and quality parameters to be maintained.
- Implement different routine/regular activities in a nursery.
- Understand the economics of a plant nursery and can maintain necessary records.

**Unit -1: Sexual propagation**

**12 Hrs.**

1. Sexual propagation – advantages and disadvantages.
2. Seed germination, process of seed germination; factors affecting seed germination;
3. Pre-germination treatments and viability tests; sowing methods of seeds.
4. Polyembryony in propagation of *Opuntia*, trifoliolate orange, mango and *Citrus*.

**Unit -2: Asexual propagation**

**12 Hrs.**

1. Asexual propagation – advantages and disadvantages.
2. Using bulbs, corms, tubers and rhizomes to raise nursery.
3. Stolons, runners and offsets in raising nursery.
4. Apomixis : Definition; role of apomictics in propagation of apple, mangosteen and *Citrus*.

**Unit- 3 : Vegetative propagation techniques**

**12 Hrs.**

1. Cuttings: Definition, propagation by root, leaf and stem cuttings.
2. Layering : Definition, techniques of simple, serpentine, mound, trench and air layering.
3. Grafting : Definition; approach and detached scion (Veneer, whip, cleft, side and bark) grafting techniques.
4. Budding :Definition; techniques of T- , patch and chip budding.

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**Unit – 4 :Basic requirements of a nursery**

**12 Hrs.**

1. Plant nursery: Definition, importance; Basic facilities for a nursery; layout and components of a good nursery.
2. Nursery beds – types, their merits and demerits; precautions to be taken during preparation.
3. Brief account of growing media; nursery tools and implements.
4. Containers for plant nursery.
5. Brief account of plant propagation structures.

**Unit -5: Nursery management**

**12 Hrs.**

1. Bureau of Indian Standards (BIS-2008) related to nursery; guidelines for nursery raising.
2. Nursery accreditation and Certification.
3. Seasonal activities and routine operations in a nursery; watering, weeding and control of pests and diseases.
4. Common possible errors in nursery activities.
5. Economics of nursery development and record maintenance; online nursery information and sales systems.



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2021-22

**Core papers**

**III Semester /Horticulture Core Course - 3**  
**Basics of Vegetable Science (Olericulture)**  
(Total hours of teaching – 60 @ 04 Hrs./Week)

**Theory :**

**Learning Outcomes:** On successful completion of this course, the students will be able to:

- Distinguish the growing of vegetables according to season and climate
- Get detailed knowledge on cultivation aspects of different vegetables
- Understand and explain the special intercultural operations done in vegetable crops
- Study of morphology and taxonomy of different vegetable crops
- Study of different varieties of vegetable crops
- Identify the diseases and pests of vegetable crops and their management

**Unit – 1 : Introduction to Vegetable crops** **12 Hrs.**

1. Importance of vegetable cultivation in India and Andhra Pradesh.
2. Classification and Nutritive value of vegetables.
3. Area and production of vegetables in India and Andhra Pradesh.
4. Export and import potential of vegetables in India. Constraints in vegetable production and remedies to overcome them.

**Unit – 2 : Solanaceous and Leafy vegetables** **12 Hrs.**

Importance, morphology and taxonomy, varieties, climate and soil, seeds and sowing, manuring, irrigation, intercultural operations, diseases and their control, harvesting and yield of following crops:

Cultivation of (a) Brinjal (b) Tomato (c) *Capsicum* (d) Spinach (e) Coriander and (d) *Mentha*

**Unit – 3 : Root and Tuber crops** **16 Hrs.**

Importance, morphology and taxonomy, varieties, climate and soil, seeds and sowing, manuring, irrigation, intercultural operations, diseases and their control, harvesting and yield of following crops:

Cultivation of (a) Carrot (b) Beet root (c) Tapioca and (d) *Colocasia*

**Unit – 4 : Cole crops**

**08 Hrs.**

Importance, morphology and taxonomy, varieties, climate and soil, seeds and sowing, manuring, irrigation, intercultural operations, diseases and their control, harvesting and yield of following crops:

Cultivation of (a) Cabbage and (b) Cauliflower

**Unit – 5 : Leguminous vegetables**

**12 Hrs.**

Importance, morphology and taxonomy, varieties, climate and soil, seeds and sowing, manuring, irrigation, intercultural operations, diseases and their control, harvesting and yield of following crops:

Cultivation of (a) Cluster bean (b) Cow pea and (d) *Dolichos*



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2021-22

**Core papers**

**IV Semester /HorticultureCore Course - 4**  
**Basics of Fruit Science (Pomology)**  
(Total hours of teaching – 60 @ 04 Hrs./Week)

**Theory :**

**Learning Outcomes:** On successful completion of this course, the students will be able to:

- Realize the value of fruits in terms of human nutrition and economy of nation.
- Explain the potential fruit zones in various states of our country.
- Classify the fruiting plants based on temperature requirements.
- Acquire knowledge related to various cultivation practices for different fruit crops
- Demonstrate the special intercultural operations done in fruit crops
- Comprehend the knowledge on varieties of different fruit crops.
- Examine the pests and diseases of fruit crops and develop skills to manage the same,
- Explain about Integrated Orchard Management
- Develop knowledge on various entrepreneurial skills related to fruit science.

**Unit – 1 : Introduction to Fruit crops**

**12 Hrs.**

1. Importance of fruit growing in India and Andhra Pradesh.
2. Nutritive value of fruits.
3. Area and production of India and Andhra Pradesh.
4. Export and import potential of fruits in India. Constraints in fruit production and remedies to overcome them.

**Unit – 2 : Tropical Fruit Crops**

**12 Hrs.**

Origin, history, distribution, area and production, uses and composition, varieties, soil and climatic requirements, propagation, planting, training and pruning, manuring and fertilizer application, irrigation, intercropping, harvesting and yield, diseases and pests of the following tropical fruit crops:

(a) Mango (b) Guava and (c) Papaya

**Unit – 3 : Sub-tropical and temperate fruit crops**

**12 Hrs.**

Origin, history, distribution, area and production, uses and composition, varieties, soil and climatic requirements, propagation, planting, training and pruning, manuring and fertilizer application, irrigation, intercropping, harvesting and yield,

diseases and pests of the following sub-tropical and temperate fruit crops:

(a) Grapes (b) Pomegranate (c) Citrus and (d) Apple

**Unit – 4 : Arid and minor fruit crops**

**12 Hrs.**

Origin, history, distribution, area and production, uses and composition, varieties, soil and climatic requirements, propagation, planting, training and pruning, manuring and fertilizer application, irrigation, inter cropping, harvesting and yield, diseases and pests of the following arid fruit crops:

(a) Amla (b) Dates and (c) Wood apple

**Unit – 5 : Management practices for fruit crops**

**12 Hrs.**

1. Sustainable Production Practices for Local Fruit Production.
2. Integrated Orchard Management/Principles of IPM.
3. Harvesting and Labor Concerns
4. Grading, packing, storage and marketing of fruits.



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2021-22

**Core papers**

**V Semester /Horticulture Core Course - 5  
Pests and Diseases of Horticulture Plants and their Management  
(Total hours of teaching – 60 @ 04 Hrs./Week)**

**Theory :**

**Learning Outcomes:** On successful completion of this course, the students will be able to:

- Develop a critical understanding of insect pests and plant disease symptoms.
- Examine and identify the pests and diseases of vegetable crops and their management
- Examine and identify the pests and diseases of ornamental crops and their management
- Examine and identify the pests and diseases of fruit crops and their management
- Identify and classify various insect pests on horticulture plants.
- Justify the significance of Integrated Plant Disease Management for horticultural crops.
- Classify the pesticides based on use, chemical nature, formulation, toxicity and action.

**Unit – 1 :Basics of Entomology and Plant Pathology**

1. Classification of Insects upto orders and families of economic importance; Study of insect pests (Distribution, host range, biology, nature of damage and management) in horticultural crops.
2. Disease triangle and disease pyramid; Plant Pathology : Definition
3. A general account on symptoms of plant diseases caused by Viruses and Bacteria.
4. A general account on symptoms of plant diseases caused by Fungi.

**Unit – 2 :Pests and diseases of Vegetables crops**

1. Bhendi: Spotted boll worms, Red cotton bug, Yellow vein mosaic.
2. Cucurbits: Fruit flies, Pumpkin beetles; Downy and powdery mildews.
3. Potato: Potato tuber moth, Golden cyst nematode; Late blight.
4. Sweet Potato: Sweet potato weevil, Vine borer; Mottled necrosis.

**Unit – 3 :Pests and diseases of Fruit crops**

1. Coconut :Rhinoceros beetle, Burrowing nematode; Ganoderma root rot, Grey blight
2. Banana :Banana weevil, banana aphids; Panama wilt. Bunchy top
3. Cashew : Tea mosquito bug. Cashew stem borer; Anthracnose, 2.Pink disease
4. Custard apple : Mealy bug, Fruit boring caterpillar; Anthracnose, Glomerella fruit rots.

### **Unit – 3 :Pests and diseases of Commercial Flower crops**

1. Rose :Rose aphid,Dieback, and black spot
2. Marigold :Aphids, leaf spot, and bud rot
3. Gerbera :Thrips, white flies and Blossom blight
4. Gladiolus :Cut worms, leaf eating caterpillar and corm rot.

### **Unit – 4 :Management of Pests and Diseases**

1. Principles and methods of plant disease management.
2. Integrated Plant disease management.
3. Fungicides classification based on chemical nature; commonly used insecticides, fungicides, bactericides and nematicides.
4. Preparation of fungicidal solutions, slurries, pastes and their application.



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**AUTONOMOUS SYLLABUS**

**PG**

**2021-2022**



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DEPARTMENT OF ENGLISH



**FIRST SEMESTER**

**MA English**

**2021-2022**

**With effect from 2020 - 21 (Under CBCS Pattern)**

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**ENG 101: POETRY-I**

**UNIT – 1**

**Background Study**

**Literary History – Genres – Movements – Ideas – Trends - Concepts**

**UNIT – 2**

**1. Chaucer : The Prologue to the Canterbury Tales (The Knight,  
The Square, The Wife of Bath, The Friar)**

**2. John Donne : The Flea,  
The Canonization,**

**The Sunrising**

**UNIT – 3**

**3. Milton : Paradise Lost, Book II**

**4. Alexander Pope : The Rape of the Lock (canto I and II)**

**5. Thomas Gray : Elegy Written in a Country Church Yard**

**UNIT – 4**

**6. Wordsworth : Tintern Abbey, Ode on Intimations of Immortality**

**7. John Keats : Ode to a Nightingale, Ode on a Grecian Urn**

**8. P.B. Shelley : Ode to the West Wind,  
The Cloud**



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**DEPARTMENT OF ENGLISH**

**FIRST SEMESTER**

**MA English**

**2021-2022**

**With effect from 2020 - 21 (Under CBCS Pattern)**

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**ENG 102: DRAMA-I**

**UNIT – 1**

**Background Study**

**Literary History – Genres – Movements – Ideas – Trends – Concepts**

**UNIT – 2**

**1. Christopher Marlowe : Edward-II**

**2. Ben Jonson : Volpone**

**UNIT – 3**

**3. William Shakespeare : Hamlet**

**4. William Shakespeare : The Merchant of Venice**

**UNIT – 4**

**5. Sheridan : The School for Scandal**

**6. Oscar Wilde : The Importance of Being Earnest**



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**DEPARTMENT OF ENGLISH**

**FIRST SEMESTER**

**MA English**

**2021-2022**

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**ENG 103: FICTION-I**

**UNIT – 1**

**Background Study**

**Literary History – Genres – Movements – Ideas – Trends – Concepts**

**UNIT – 2**

**1. Daniel Defoe : Robinson Crusoe**

**2. Henry Fielding : Tom Jones**

**UNIT – 3**

**3. Jane Austen : Pride and Prejudice**

**4. George Eliot : The Mill on the Floss**

**UNIT – 4**

**5. Charles Dickens : A Tale of Two Cities**

**6. Thomas Hardy : The Mayor of Casterbridge**



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**ENG 104: PROSE-I**

**UNIT – 1**

**Background Study**

**Literary History – Genres – Movements – Ideas – Trends – Concepts**

**UNIT – 2**

**1. Francis Bacon : Of Studies, Of Truth, Of Youth and Age**

**2. Joseph Addison : The Coverley Papers (Selected Essays)**

**1. The Mischief's of the Club**

**2. Labour and Exercise**

**3. Rural Manner**

**UNIT – 3**

**1. Jonathan Swift : Gulliver's Travels Voyage I& II**

**2. Charles Lamb : 1. Dream Children**

**2. The South-Sea House**

**UNIT – 4**

**1. Milton : Of Education**

**2. Bertrand Russell: The Conquest of Happiness**



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**DEPARTMENT OF ENGLISH**

**MA English**

**2021-2022**

**FIRST SEMESTER**

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**ENG 105: ENGLISH LANGUAGE**

**UNIT – 1**

**Language – Definition – features – Human Language vs. Animal**

**Language - Definition and Scope of Linguistics - Dimensions of Study.**

**UNIT – 2**

**1. Origin and Growth of English Language – Influences (Latin, French, and**

**Indian) – Standard English – British and American English**

**UNIT – 3**

**Sounds – Speech Mechanism – Stress/ Rhythm – Intonation – Phones – Phonemes – Allophones.**

**UNIT – 4**

**Morphology – Morphs – Allomorphs – Word formation processes – Simple, Complex and Compound Words.**



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**DEPARTMENT OF ENGLISH**

**SECOND SEMESTER**

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**ENGLISH 201: POETRY – II**

**UNIT – I**

**Background Study**

**Literary History – Genres – Movements – Ideas – Trends -  
Concepts**

**UNIT – 2**

- 1. Robert Browning : My Last Duchess**
- 2. G.M. Hopkins : Wind Hover, Pied Beauty**
- 3. Matthew Arnold : Dover Beach**

**UNIT – 3**

- 3. W.B. Yeats : The Second Coming, Byzantium,  
A Prayer for my daughter**
- 4. T.S. Eliot : The Waste Land**

**UNIT – 4**

- 5. W.H. Auden : The Unknown Citizen,  
The Shield of Achilles**
- 6. Alexander Pope : The Happy Man**
- 7. John Milton : On His Having arrived at the Age of  
Twenty Three.**



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**PAPER II: DRAMA – II**

**ENGLISH 202**

**UNIT - I**

**Background Study**

**Literary History – Genres – Movements – Idea – Trends – Concepts**

**UNIT – 2**

- 1. G.B. Shaw : St. Joan**
- 2. T S Eliot : The Murder in the Cathedral**

**UNIT – 3**

- 3. John Osborne : Look Back in Anger**
- 4. Harold Pinter : The Birthday Party**

**UNIT – 4**

- 5. Samuel Beckett : Waiting for Godot**
- 6. J.M. Synge : Riders to the Sea**



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**ENGLISH 203: FICTION – II**

**UNIT – I**

**Background Study**

**Literary History – Genres – Movements – Ideas – Trends –  
Concepts**

**UNIT – 2**

- 1. Virginia Woolf : Mrs. Dalloway**
- 2. James Joyce : The Portrait of the Artist as a Youngman**

**UNIT – 3**

- 3. D.H. Lawrence : Son and Lovers**
- 4. William Golding : Lord of the Flies**

**UNIT – 4**

- 5. Graham Greene : The Power and the Glory**
- 6. Thomas Hardy : Tess of the D'Urbervilles**



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**2021-2022**

**With effect from 2020 - 21 (Under CBCS Pattern)**

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**ENGLISH 204: Prose-II**

**UNIT – I**

**Background Study**

**Literary History – Genres – Movements – Ideas – Trends – Concepts**

**UNIT – 2**

**1. Bertrand Russell : Knowledge and wisdom**

**2. John Ruskin : Sesame and Lilies**

**UNIT – 3**

**3. Virginia Woolf : A Room of One's own**

**4. George Orwell : Politics and English Language**

**UNIT – 4**

**5. Winston Churchill : Blood, Toil, Tears and Sweat**

**6. G.K. Chesterton : The Fallacy of Success.**



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**DEPARTMENT OF ENGLISH**

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**MA English**

**2021-2022**

**With effect from 2020 - 21 (Under CBCS Pattern)**

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**ENGLISH 205: ENGLISH LANGUAGE TEACHING**

**UNIT – 1**

- 1. Language Acquisition and Language Learning**
- 2. Problems of Teaching / Learning English as a Second Language in the Indian Context**
- 3. Current Trends of Teaching English in India.**

**UNIT – 2**

**Teaching of English Language – Theories, - Concepts- Methods – Direct, Grammar Translation – Bilingual – Audio lingual – Desuggestopedia.**

**UNIT – 3**

**Teaching poetry & Prose from Language Perspective**  
**Teaching LSRW Skills**

**UNIT – 4**

**Materials and tools – Development of Sources for Teaching – News Papers- Advertisements – Magazines – Utility of Language lab for teaching English.**

**as a part of practical work.**



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**M.Sc. Zoology**

**2021-2022**

**Revised Syllabus Effective from the Academic Year 2021-22  
Based on New Education Policy (NEP) 2020 and  
Choice based credit system (CBCS)**

Program Educational Objectives (PEOs)	
PEO1	The programme has been designed to have a mix of both classical and modern aspects of Zoology for better understanding of animal world.
PEO2	Make students understand the importance of biodiversity for sustainable development
PEO3	Appearing for NET, SET, GATE, ASRB and other competitive examinations of APPSC and UPSC
PEO4	To develop trained and knowledgeable human resources for academic research labs and industry
PEO5	To develop self-employability in animal produce related ventures like pearl, honey, silk, wax etc.,

Program Specific Outcomes (PSOs); The Students at the Completion of programme will have	
PSO1	Can understand and appreciate life environment interaction
PSO2	The ability to understand the intricacies of the subject at advanced level and hone up skills to opt for research programme
PSO3	Students can Venture into industry as various animals and their produce such as Coral, pearl, honey, wax, silk, lac, shell of turtles, bones, feather, tusk and fur have high demand now a days
PSO4	Equip them to disseminate the knowledge at different levels of education.
PSO5	As students have hands on training in biochemical and molecular biology techniques, helping them to get employment opportunities in R&D of pharmaceutical industry.
PSO6	Know the applications of biotechnology in various fields like agriculture, industry and human health.
PSO7	Understand the basic principle of computational biology to extract information from large databases and to construct computer modeling. Get employment in healthcare industry
	Understand the role of environmental conservation process in pollution control and biodiversity and protection of endangered species.

Program Outcomes (POs)	
PO1	At the end of the programme students should understand and appreciate the importance of animals for sustainable development.
PO2	The students also understand basic concepts of life sciences and their relevance in their day to day life.
PO3	Learn, how to exploit animals of economic importance for betterment of human life such as aquaculture, sericulture, vermiculture, poultry etc.
PO4	With gained skill set in molecular biology techniques, can have scope to start diagnostic labs, besides getting opportunities in pharma industries.



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**M.Sc. Zoology**

**2021-2022**

**Semester- I**

**ZOO15101 : STRUCTURAL ANATOMY OF INVERTEBRATA & VERTEBRATA**

**Course outcome:** It gives scope to learn, understand and appreciate diversity of anatomical features of invertebrates and vertebrates with respect to various physiological functions.

**UNIT -I**

- 1.1 Species concept, International code of Zoological nomenclature, Taxonomical procedures, New trends in taxonomy
- 1.2 Acoelomata, Pseudocoelomata, Coelomata, Protostomia and Dueterostomia
- 1.3 Patterns of feeding and digestion in Porifera and Coelenterata
- 1.4 Feeding in Polychaeta, Mollusca and Echinodermata

**UNIT-II**

- 2.1 Structure of Gill, Lungs and Trachea
- 2.2 Circulatory system in Annelids, Arthropods and Mollusca
- 2.3 Advanced nervous system- Annelida, Arthropoda and Mollusca
- 2.4 Larval forms of Crustacea and Echinodermata

**UNIT-III**

- 3.1 Vertebrate integument and its derivatives: skin structure and functions, glands, scales, horns, claws, nails, hoofs, feathers and hairs
- 3.2 Evolution of heart
- 3.3 Evolution of aortic arches
- 3.4 Comparative account of respiratory organs

**UNIT-IV**

- 4.1 Evolution of Urinogenital system in vertebrate series
- 4.2 Organs of Olfaction, taste and lateral line system
- 4.3 Comparative anatomy of the brain in relation to its functions
- 4.4 Spinal cord and cranial nerves in mammals

### List of Practicals

1. Museum study of all phylum wise representatives (Protozoa to Echinodermata)
2. Museum study of all class wise representatives (Cyclostomes & Mammals)
3. Virtual dissection of crab nervous system
4. Virtual dissection of *Poiceloceros* digestive, reproductive and nervous system
5. Virtual dissection of cockroach reproductive and nervous system
6. Virtual dissection of weberian ossicle and brain in *Labeo rohita*
7. Virtual dissection of cranial- Nerves of *Labeo rohita*
8. Virtual dissection of cranial Nerves of frog/ toad
9. Virtual dissection of circulatory (arterial & venous) system in *Calotes*
10. Virtual dissection of Urinogenital system in *Calotes*.

### **SUGGESTED READING MATERIAL**

1. Hyman, L.H. The Invertebrates. Vol.1. Protozoa through Ctenophora, Mc Graw HillCo., New York.
2. Barrington, E.J.W. Invertebrate structure and function. Thomas Nelson and Sons Ltd., London.
3. Jagerstein, G. Evolution of Metazoan life cycle, Academic Press, New York & London.



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**M.Sc. Zoology**

**ZOO15102: GENETICS & EVOLUTION**

**Course outcome:** Students will learn about Mendelian and non-Mendelian inheritance. Understand the concepts multiples alleles, genetic disorders and karyotyping etc. Students acquire knowledge regarding different evolutionary theories and speciation.

**UNIT – I**

- 1.1 Principles of Mendelian Inheritance- Identification of DNA as a genetic material, Gene as a unit of expression.
- 1.2 Interaction of genes: Multiple alleles, ABO groups & Rh factor, Epistasis; Incomplete dominance, codominance; Complementary genes, duplicate genes, lethal genes
- 1.3 Linkage, Recombination and gene mapping
- 1.4 Mutations: a) spontaneous and b) induced mutations; c) Molecular basis of mutations

**UNIT – II**

- 2.1 a) Numerical and Structural abnormalities of human chromosomes and syndromes  
b) Human karyotype and human genome
- 2.2 Sex linked inheritance
- 2.3 Pedigree analysis
- 2.4 Eugenics: a) Positive eugenics, Artificial insemination, sperm banks  
b) Negative eugenics, Amniocentesis, consanguinity, Genetic counseling

**UNIT – III**

- 3.1 Theories of organic evolution- Emphasis on Darwinism and Lamarckism
- 3.2 Neo-Darwinism
- 3.3 Role of isolating mechanisms
- 3.4 Models of speciation (Allopatric, sympatric and parapatric)

**UNIT – IV**

- 4.1 A detailed account on destabilizing forces (i) Natural selection (ii) Mutation (iii) Genetic drift
- 4.2 Phylogenetic gradualism & punctuated equilibrium
- 4.3 Micro & Macro evolution
- 4.4 Gene Evolution and Amino acid sequence and phylogeny

## List of Practical:

1. Blood grouping
2. Rh factor demonstration
3. Mendelian ratios and its related Problems
4. Karyotyping
5. Syndrome charts – demonstration
6. Demonstration of Barr bodies
7. Problems on Hardy Weinberg's law

## SUGGESTED READING MATERIAL

1. Genetics – Monrye W. Strickberger, 3<sup>rd</sup> Ed., May, 2000.
2. Genetics – K.B. Ahluwallia – 1985.
3. Principles of Genetics – E.J. Gardner, M.J. Simmons & D.P. Snustad.
4. Molecular Biology of genes – Watson, J.D., N.H. Hopkins, J.W. Roberts, J.A. Steitz & A.M.
5. Weiner. The Benjamin Cummings publishing company. Inc. Tokyo.
6. Basic Human Genetics – E.J. Mange, Arthur P. Mange. Indian Print, 1997.
7. Genetic disorders of Man by M.R. Goodman.
8. An introduction to modern genetics by Ch. Waddington.
9. Dobzhansky, Th. Genetics and origin of species, Columbia University press.
10. Dobzhansky, Th., F.J. Ayala, G.L. Stebbins and J.M. Valentine  
EVOLUTION: Surjeet publications, New Delhi latest edition.
11. P.A. Moody Introduction to Evolution II ed/latest: Kalyani publishers, New Delhi.
12. Hartl, D.L. A primer of population genetics, Sinauer Associates Inc.,  
Massachusetts.
13. Peter Volpe E. Understanding Evolution, University Book stall, New Delhi.
14. An introduction to genetic analysis. Griffiths, A.J.F., J.H. Miller, D.T. Suzuki, R.C. Lewontin & W.M. Gelbark. W.H. Freeman and Company, New York.

## ZOO15103: CELL BIOLOGY & MICROBIOLOGY

**Course outcome:** Students learn and gain knowledge on cellular structure and functional organization of prokaryotes and eukaryotes. It gives scope to understand types of cell divisions and appreciate the mechanisms underlying cell death and proliferation. Students would learn about modes of cell signaling besides understanding cell surface receptor and intracellular signal transduction pathways. Students gain knowledge on the basics of microbiology, microbial diseases, growth and their control. Gain knowledge on applications of microbes in industry and learn the methods of production of some industrially important products.

### UNIT – I

- 1.1 Cell organelles- Ultrastructure and functions: Cell Membrane, ER and Golgi complex,
- 1.2 Cell organelles- Ultrastructure and functions: Nucleus, Mitochondria, Ribosomes and Lysosomes
- 1.3 Cell Division and Regulation- Mitosis, Meiosis, Cell Cycle and its regulation
- 1.4 Cell death and proliferation – Apoptosis: definition, morphological and biochemical differences between apoptosis and necrosis, mechanism (internal and external signals) and significance.

### UNIT – II

- 2.1 Cell signaling: Models of cell-cell signaling (steroid receptors, nitric oxide and carbon monoxide)
- 2.2 Functions of cell surface receptors (G-protein coupled receptors, Tyrosine kinases, cytokine receptors, receptors linked to other enzymatic activities).
- 2.3 Pathways of intracellular signal transduction (cAMP pathways, cyclic cGMP, phospholipids and Ca<sup>2+</sup>, Ras, Raf and MAP kinases)
- 2.4 Brief account of biology of cancer.

### UNIT-III

- 3.1 History and Scope of Microbiology
- 3.2 Microbial nutrition, growth and their control
- 3.3 Normal microbial flora of human body-skin, nose, respiratory tract, stomach, intestine, urinogenital tract.
- 3.4 Microbial diseases and their control
  - a) Bacterial diseases - Tuberculosis, Plague, Anthrax,
  - b) Viral diseases - AIDS, Rabies, Hepatitis
  - c) Fungal diseases - Cutaneous mycoses, Sub-cutaneous mycoses and Systemic mycoses,
  - d) Protozoan diseases - Amoebiasis and Malaria

### UNIT-IV

- 4.1 Microbiology of fermented food (Diary Products, Meat and Fish, Microorganisms as sources of food)
- 4.2 Industrial Microbiology (Types of fermentation process, Alcoholic beverages)
- 4.3 Industrial productions - Lactic acid and Glutamate
- 4.4 Therapeutic compounds – Antibiotics (Penicillin), Steroids and Industrial enzymes(Amylase and Protease).

### List of Practicals

1. Mitosis – Onion root tips
2. Meiosis in flower buds/  
Grasshopper testis
3. Giant chromosome in  
Chironomus Larva
4. Effect of colchicine on mitosis
5. Staining techniques—simple,  
Gram's staining
6. Isolation of microorganisms
7. Wet mount preparations
8. Antibiotic sensitivity tests

### SUGGESTED READING MATERIAL

1. Cell Biology (Fundamentals and Applications) By Gupta / Jangir, 2001; Agrobios, India.
2. Cell and Molecular Biology by EDR De Robertis and EMR De Robertis Jr,  
IndianEdition, B.I. Publications, Pvt. Ltd.
3. The Cell (A Molecular Approach) by Geoffrey M. Cooper, 2<sup>nd</sup> Edn. 2000, ISBN.
4. Text Book of Microbiology, by R. Aananthnarayan & C.K. Jayaram Panikar, 4<sup>th</sup>  
Edition, Orient Longmen, Hyderabad, 1990.
5. General Microbiology by C.B. Powar & H.F. Daginawala 1<sup>st</sup> Edition, Himalaya  
PublishingHouse, Bombay, 1982.
6. Elements of Microbiology, by M.J. Pelzar, Jr & E.C.S Chan International students  
Edition, 1981, MCGRAW-Hill international Book Company, New Delhi.
7. Microbiology C.M. Presscots, J.P. Harley & D.A Klein Mc Graw Hill. WCB

## ZOO15104A : TOOLS AND TECHNIQUES IN BIOLOGY (Internal Elective)

**Course outcome:** Students gain knowledge about various tools and techniques used in biological systems and gives them insights about their usage in research and various diagnostics. Students will gain knowledge on animal cell culture techniques.

### UNIT-I

- 1.1 Microscopy: Types of microscopes – Phase contrast microscope, Fluorescence microscope; Electron microscope – TEM and SEM
- 1.2 Centrifugation – basic principles, Types of rotors, high speed and ultracentrifuge
- 1.3 Principles of spectroscopy, Laws of Light absorption, applications of Colorimetry, Spectrophotometry
- 1.4 Measurement of pH and biological Buffers

### UNIT-II

- 2.1 Chromatography – paper chromatography – thin layer chromatography
- 2.2 Ion exchange chromatography and affinity chromatography
- 2.3 Introduction to FPLC and HPLC
- 2.4 Radio isotope techniques – types of radio isotopes, detection and measurement of radioactivity. Applications of radio isotopes in biological sciences and safety measures

### UNIT-III

- 3.1 Microtomy and staining procedures– types of microtomes, types of stains, staining procedures of biological materials
- 3.2 Electrophoresis: SDS-PAGE, Agarose gel electrophoresis
- 3.3 Blotting techniques
- 3.4 ELISA

### UNIT-IV

- 4.1 Design and functioning of tissue culture laboratory methodology
- 4.2 Culture media preparation
- 4.3 Cell proliferation measurements
- 4.4 Cell viability testing and cell harvesting methods

### List of Practicals

1. Separation of biological compounds by paper chromatography
2. Preparation of Buffers and measurement of pH
3. Separation of biological compounds by TLC
4. Absorption spectra of proteins and nucleotides
5. Separation of mitochondria and differential centrifugation
6. Separation of biomolecules using HPLC
7. Preparation of cell culture media
8. Separation of proteins by SDS-PAGE

## SUGGESTED READING MATERIAL (ALL LATEST EDITIONS)

1. Animal Cell Culture – A practical approach, Ed John. R.W Masters. IRL Press.
2. Introduction To Instrumental analysis, Ronert Braun. McGraw Hill International
3. A Biologists Guide to Principles and Techniques of Practical Biochemistry, K. Wilson & K.W. Goulding, ELBS Edn.
4. Advanced Micripipette Techniques for cell physiology. K.T. Brown and D.G. Flamming IBRO. Hand Book Series. A Wiley Interscience publications, John

## ZOO15104B: BIOLOGY OF PARASITISM (Internal Elective)

### Course Outcome:

Students will learn about the mode of entry, mode of infection and life-cycle of different metazoan parasites such as protozoans, digeneans, cestodes and nematodes in plants and animals. Students will learn about the zoonotic parasites and their impact on human beings.

### UNIT-I:

- 1.1. Introduction to parasitology; animal associations and host – parasite relationship
- 1.2. Distribution of diseases and Zoonosis caused by animal parasites
- 1.3. Morphology, life- cycle, mode of infection of *Plasmodium*, molecular biology of *Plasmodium* – drug targets, mechanism of drug resistance, vaccine strategies and proteomic approaches
- 1.4. Morphology, life-cycle, mode of infection of *Leishmania*, molecular biology of *Leishmania* – drug targets, drug resistance and vaccine strategies.

### UNIT-II:

- 2.1. Morphology, biology, life-cycle and mode of infection of *Entamoeba* and *Giardia*
- 2.2. Morphology, biology, life-cycle and Mode of infection of *Taenia*, *Diphyllobothrium*, *Diphylidium*
- 2.3. Morphology, biology, life-cycle and Mode of infection of *Schistosoma*, *Fasciola*, *Paragonimus*, *Opisthorchis*.
- 2.4. Gastro-intestinal nematodes, their morphology, biology and life-cycles.

### UNIT-III:

- 3.1. Modes of entry of *Schistosoma* and *Wuchereria*
- 3.2. Modes of entry of *Brugia* and *Ancylostoma*
- 3.3. Modes of entry of *Trichinella* and *Dracunculus*
- 3.4. Molecular biology of nematodes, vaccine strategies.

### UNIT-IV:

- 4.1. Immune response and self-defense mechanisms, immune evasion and biochemical adaptations of parasites
- 4.2. Parasites of veterinary importance
- 4.3. Parasites of insects and their significance
- 4.4. Nematode parasites of plants, morphology, biology, life-cycle and infection of crop plants by plant parasitic nematodes.

### Suggested Literature:

1. Foundations of Parasitology, Roberts L.S. and Janovy J., McGraw-Hill Publishers, New York, USA.
2. Modern Parasitology: A Textbook of Parasitology, FEG Cox., Wiley-Blackwell, U. K.

### Practicals

1. Study of prepared slides and museum specimens of selected parasites of representative groups of protozoans, helminths and arthropods.
2. Demonstration of *in vitro* culture of *Plasmodium*, infection of mice with *Plasmodium*, chasing the process of infection by histopathology and immunereactions.
3. Culturing insect parasitic nematode, and chasing the life-cycle of the nematode on the insect host.
4. Culturing an insect parasitoid and studying their infection on an insect host.
5. Studying the infection of tomato plant by root knot nematode.

## ZOO15104C: Principles of Ecology (Internal Elective)

### Outcome:

Students acquire knowledge on different ecological concepts: characteristics of several Ecosystems. Students will gain adequate knowledge on food chain system, Biochemical cycles, food web, energy flow etc.. Students learn latest topics on bio Indicators, Bio and phytoremediation. This paper gives complete knowledge on all aspects of Ecology.

### Unit I:

Introduction to ecology, evolutionary ecology, environmental concepts –laws and limiting factors, Ecological models. Characteristics of population, population size and exponential growth, limits of population growth, population dynamics, life history pattern, fertility rate and age structure. Competition and coexistence, intra-specific and inter-specific interactions, scramble and contest competition model, and commensalism, prey-predator interactions.

### Unit II:

Nature of ecosystem, production, food webs, energy flow through ecosystem, biogeochemical cycles, of ecosystem, ecosystem management. The biosphere, biomes and impact of climate on organisms. Stresses and their management, global climatic pattern, global warming, ozone, acid and nitrogen deposition, coping with limatic variations. Major classes of contaminants. Uptake, biotransformation, detoxification, and accumulation of toxicants.

### Unit III:

Factors influencing bioaccumulation from food and trophic transfer. Pesticides and other chemical in agriculture, industry and hygiene and their disposal. Impact of chemicals on biodiversity of microbes, animals and plants. Bioindicator and biomarkers of environmental health. Biodegradation and bioremediation of chemicals.

### Unit IV:

Biodiversity – assessment, conservation and management, biodiversity act and related international conventions. Sustainable development, natural resource management in changing environment. Molecular ecology, genetic analysis of single and multiple population, phylogeography, molecular approach to behavioural ecology, conservation genetics.

### Suggested Literature:

1. Field Sampling: Principles and Practices in Environmental Analysis, Conklin, A.R.Jr., (2004), CRC Press.
2. Principles and Standards for Measuring Primary Production, Fahey, T.J. and Knapp, A.K., (2007), Oxford University Press, UK
3. Ecological Modeling, Grant, W.E. and Swannack, T.M., (2008), Blackwell.
4. Fundamental Processes in Ecology: An Earth system Approach, Wilkinson, D.M., (2007), Oxford University Press, UK

## List of Practical:

### Habitat studies:

1. Physical and chemical characteristics of soil.
2. Assessing influence of light, temperature and moisture on plant germination and growth/animal behavior and growth.
3. Assessing influence of soil nutrient status on plant germination and growth.

### Community/ecosystem studies:

1. Assessment of density, frequency and abundance of plants/animal in a community using various techniques i.e. transect, quadrat etc.
2. Comparison of stands/communities and ordination.
3. Profile diagrams.
4. Biomass and reproductive allocation under various environments.
5. Nutrient uptake and budget for various communities/Food chain assessment.
6. Decomposition of various organic matters and nutrient release mechanisms/role of arthropods and other micro-, and macrofauna in decomposition.
7. Understanding ecosystem succession by studying various stages of vegetation/community assemblages development.
8. Molecular techniques in laboratory.
9. Insect diversity in soil.

### Landscape studies:

1. Principles of GIS, GPS and RS technology.
2. Interpretation (visual and automated) of remote sensing information for landscape differentiation

**ZOO15105 –Practical 1 (15101 and 15102)**

**ZOO15106 –Practical 2 (15103 and 15104A or B or C)**

## Semester- II

### ZOO25101: METABOLIC REGULATION & CELL FUNCTION

**Course outcome:** It enables to understand primary aspects of carbohydrate, protein, lipid and nucleotide metabolism. It also highlights their interplay and biological significance in energy metabolism and cell function. It also helps to understand the mechanisms involved in catabolism of nitrogenous wastes and clinical disorders associated with nucleotide metabolism.

#### UNIT – I

- 1.1 Chemical bonds (Covalent, Hydrogen bonds, Ionic bonds, Vanderwall's interactions)
- 1.2 Thermodynamic principles in biology
- 1.3 Outline classification of organic compounds (carbohydrates, proteins and lipids)
- 1.4 Orders of protein structure (primary, secondary, tertiary and quaternary)

#### UNIT – II

- 2.1 Glycolysis, TCA cycle and their biological importance
- 2.2 Pentosephosphate pathway, gluconeogenesis
- 2.3 Regulation of carbohydrate metabolism (Glycolysis and TCA cycle)
- 2.4 Mitochondrial electron transport system, Oxidative phosphorylation

#### UNIT – III

- 3.1 Beta-oxidation of palmitic acid; Biosynthesis of long chain fatty acids (Palmitic acid)
- 3.2 Oxidative deamination, decarboxylation and transamination of amino acids.
- 3.3 Biosynthesis of Urea and detoxification of ammonia
- 3.4 Biosynthesis of polyamines

#### UNIT – IV

- 4.1 Nucleotides and types
- 4.2 Biosynthesis of Nucleotides
- 4.3 Degradation of Nucleotides
- 4.4 Clinical disorders of purine metabolism

#### SUGGESTED READING MATERIAL

1. Robert K.Murrey, D.K. Granner, P.A. Mayes and V.W. Rodwell; Harper's Biochemistry McGraw Hill Publishers.
2. Biochemistry by A.L. Lehninger, Kalyani publishers, New Delhi.
3. D. Voet and J.G. Voet, Biochemistry, J. Wiley & Sons.
4. David L. Nelson and Michael M. Cox, Lehninger: Principles of Biochemistry, McMillan Worth Publications.

#### List of Practicals

1. Estimation of glucose
2. Estimation of soluble and structural proteins
3. Estimation of carbohydrates
4. Estimation of amino acids
5. Estimation of Glucose
6. Estimation of Blood glucose
7. Estimation of Lipids
8. Estimation of Triglycerides

## ZOO25102: DEVELOPMENTAL BIOLOGY

**Course outcome:** Students learn about germ cell determination, primordial germ cell migration, determination of germ layers in insects, nematodes, amphibians, reptilians, aves and mammals. They also learn about sex determination, oogenesis, fertilization and post fertilization events. Limb development, metamorphosis and morphogenesis also help in understanding of developmental biology very well.

### UNIT I

- 1.1 Germ line determination: Germ plasm and the determination of the primordial germcells.
- 1.2 Germ cell determination in Nematodes, Insects and Amphibians.
- 1.3 Germ cell migration in *Drosophila*
- 1.4 Germ cell migration in Amphibians, Reptiles, Birds and Mammals

### UNIT II

- 2.1 Gametogenesis: Morphological basis in animals, semen composition, formation, sperm function, Spermatogenesis
- 2.2 Leydig cells: Morphology, Differentiation, function and its regulation.
- 2.3 Oogenesis and Vitellogenesis: Ovulation, super ovulation and ovum transport in mammals.
- 2.4 Fertilization: Biochemistry of fertilization and post fertilization events.

### UNIT III

- 3.1 Creating Multi-cellularity: Cleavage types, comparative account of gastrulation, Neurulation
- 3.2 Germ layers: Ectoderm, Mesoderm and Endoderm
- 3.3 Tetrapod limb development
- 3.4 Metamorphosis in Insects and Amphibians

### UNIT IV

- 4.1 Biology of sex determination: Testis determining genes, ovarian development, secondarysex determination in mammals, Environmental sex determination
- 4.2 Body axes: Establishment of body axes in mammals
- 4.3 Proximate tissue interaction
- 4.4 Genes and Morphogenesis

### List of Practicals

1. Observation of developmental stages in frog and chick
2. Observation of different cleavage stages in the eggs of *Lymnaea* (fresh water snail)
3. Role of shell during developmental of chick
4. Protein turnover during development of chick
5. Phosphorous metabolism in developing chick embryo

### Reference Books:

1. Austen, C.R. and Short, R.V. Reproduction in Animals
2. Schatten and Schatten. Molecular Biology of Fertilization
3. F.T. Longo, Fertilization, Chapman & Hall
4. R.G. Edwards, Human Reproduction
5. S.F. Gillbert. Development Biology, Sinauer Associates Inc., Massachusetts
6. Ethan Bier the Coiled Spring Harlsor Laboratory Press, New York.

## ZOO25103: ANIMAL PHYSIOLOGY

**Course outcome:** Students will have scope to learn various concepts of physiological functions of the body such as digestion, respiration, excretion and the functions of nerves and muscles.

### UNIT – I

- 1.1 Feeding mechanisms and regulation
- 1.2 Comparative physiology of digestion of carbohydrates, protein and fats
- 1.3 Gastro-intestinal Hormones in regulation of digestion
- 1.4 Vitamins and their role in cellular metabolism

### UNIT – II

- 2.1 Respiration- Types of Respiration, Respiratory organs, Mechanism of Respiration
- 2.2 Circulation of body fluids and types of hearts
- 2.3 Patters of nitrogen excretion among different animal groups and their evolutionary significance
- 2.4 Osmoregulation in different animal groups (aquatic and terrestrial)

### UNIT – III

- 3.1 Principles of Thermoregulation
- 3.2 Homeothermic animals and Poikilothermic animals
- 3.3 Hibernation and Aestivation
- 3.4 Biological rhythms

### UNIT – IV

- 4.1 Bioluminescence- Chemistry and functional significance
- 4.2 Chromatophores and regulation of their function
- 4.3 Structure and function of muscles, Theories of muscle contraction.
- 4.4 Physiology of receptors (Photo, Phono and chemo receptors)

### List of Practicals

1. Assay of lipase
2. Assay of amylase
3. Assay of pepsin
4. Assay of ascorbic acid
5. Demonstration of cell fragility in different media (Iso, hypo and hyper)

### SUGGESTED READING MATERIAL

1. C.L. Prosser. Comparative Animal Physiology. W.B. Saunders & Company
2. R. Eckert. Animal Physiology. Mechanisms and Adaptation. W. H. Freeman & Company
3. W.S. Hoar. General and Comparative Animal Physiology
4. Schiemdt-Nielsen. Animal Physiology. Adaptation and Environment. Cambridge
5. C.L. Prosser. Environment and Metabolic Physiology Wiley-Liss. New York.

**ZOO25104A: Animal world and Economic Zoology (Open  
elective)**

**Course outcome:** Gives an outlook on characterization of Invertebrate and vertebrate phyla. Explain the role of various animals of economic importance. Gain knowledge on culture beneficial animals like earthworm, honeybees and fish and crustaceous. Gain knowledge on diseases causing organisms and its preventive mechanism.

**Unit I:** Characterization of Invertebrate phyla from Protozoa to Echinodermata

**Unit II:** Characterization of Vertebrate phyla from Fishes to Mammals

**Unit III:** Beneficial animals: Corals - Earthworm - Vermiculture - Beneficial Insects (Apiculture, Lac culture). Aquaculture – Prawns - Lobsters - Crabs - Pearloysters – Fishes)

**Unit IV:** Harmful animals: Disease causing organisms - Vectors – Poisonous organisms –Fouling organisms - Pests.

**Books:**

1. Hyman, L.H. The Invertebrates. Vol.8. Mc Graw Hall Co., New York and London
2. Hyman, L.H. The Invertebrates. Vol.2 Mc Graw Hall Co., New York and London
3. Kingsley, J.S. Outlines of Comparative Autonomy of Vertebrates. Central Book Depot, Allahabad
4. Economic Zoology, Dr. G. S. Sukla and Dr V.B. Upadhyay, Rastogi Publications, 5th Edition, 2013
5. Economic Zoology by Venkitaraman PR, Publication: Kottayam V. Publishers 1989
6. Text Book Of Economic Zoology by Venkitaraman P R, 1983

**Practicals:**

1. Different animals of the globe- endemic to parts of world
2. Museum study of some representatives from invertebrates to vertebrates
3. List out beneficial animals
4. List out harmful animals
5. Visit to near by Zoo, Butterfly park, Insect museum at Yogi Vemana university, and submit the reports as a part of practical work.

**ZOO25104B: Biodiversity and Wild Life Management  
(Open elective)**

**Course outcome:** Students learn about basic aspects and importance of biodiversity to maintain balanced ecosystem. Students also acquire knowledge on biodiversity hotspots and threats to hotspots. Students will also learn importance of establishing wildlife sanctuaries for conserving endangered species. They will get familiar with biodiversity and wild life.

**Unit: I**

1. Introduction to Biodiversity: Definition, History of Biodiversity
2. Maintaining Biodiversity - Importance of Biodiversity
3. Human impact on Biodiversity.
4. Types of Biodiversity: Species diversity, Genetic diversity, Ecosystem diversity & Functional diversity.

**Unit: II**

1. Biodiversity resources of India – Biodiversity hotspots in India
2. Biodiversity documentation and Nomenclature
3. Biodiversity laws and acts
4. Conservation threats to Biodiversity

**Unit: III**

1. Wild life - Importance of wild life management and wild life sanctuaries in India
2. Management of rare and endangered species
3. Types of wild life management practices in India
4. Deforestation and effects on wild life – Human impact on Wild life.

**Unit: IV**

1. Special management programme of wild animals in India
2. Wild life trade: assessment and documentation.
3. Wild life legislation and acts.
4. Wild life threats and preventions.

**Practicals:**

1. Characterization of different wild animals
2. Various wild life sanctuaries and its fauna
3. Museum study of endangered species
4. Biodiversity hot spots
5. Field visits
6. Visit to near by Zoo, Museum, forest Zones, nursery and aquaria and prepare and submit reports of these visits

**Reference Books:**

1. IUCN (1994), Guidelines for protected area management categories. Cambridge, UK and Gland, Switzerland: IUCN
2. IUCN-UNEP-WWF (1980), World conservation strategy, living Resources, conservation for sustainable development, international union for conservation of nature and natural resources.
3. Sharma, B.D. (1994), high altitude wild life of India, Oxford and IBH publication, New Delhi, 289.

4. Red data list of threaten animals, list part 1. Vertebrates, Govt. of India, Z. S. I. publ.
5. Gaston, K.J. and spicer, J.I. (1988), Biodiversity: An introduction, Blackwell science, Oxford.
6. Ghosh, A.K. (1986), India and world conservation strategy, Z.S.I., Govt of India Kolkata
7. Ghosh, A.K. (2008), Biodiversity conservation: Issues on concern In: Zool Res in Humanwelfare, Ramkrishna and Chatterjee (Eds.), Z.S.I., Govt of India, Kolkata, 19-22
8. Jeffries, M.J. (2006), Biodiversity and conservation, 2nd ed., Roulledge. London and NewYork.

#### **PRACTICALS**

**Practical – I (25101 and 25102)**

**Practical – II (25103 and 25104A or B)**