Adarsh Mahavidyalaya,
Omerga, Dist. Osmanabad

Program outcomes, program specific outcomes and course outcomes for all programs offered by the Institution

Program Outcomes (POs): It represents the knowledge, skills and attitudes that students should have at the end of a course completion of their respective program.

Program Specific Outcomes (PSOs): These are statements that define outcomes of a program which make students realize the fact that the knowledge and techniques learnt in this course has direct implication for the betterment of society and its sustainability.

Course Outcomes (COs): It gives the resultant knowledge and skills that student acquires at the end of each course. It defines the cognitive processes a course provides.

Program Outcomes (POs) , Program Specific Outcomes (PSOs) and course outcomes are communicated to the stake holders of the program by the following procedures--

- POs and PSOs are approved by the Department Advisory Board
- POs and PSOs are available in the Institute website (www.adarshcollege.in).
- POs and PSOs are kept in prominent locations of the campus for staff, students and public view.
- POs and PSOs are displayed in Department office and Laboratories
- POs and PSOs are communicated to employers and alumni by sending mail and during the Alumni Meeting.
- During the class committee meeting and faculty meeting POs and PSOs are reviewed among the students and staff members.
- The course outcomes and their mapping with program outcomes and program specific outcomes are elaborately discussed and derived by the course committee members.
- COs are communicated to the students during the introduction class itself.
- During the discussion of the course, the outcomes of the course are also focused. During the commencement of each unit and after the completion of the unit, the course outcomes are reviewed.

Program Outcomes (POs) of Faculty of Arts

- **PO1:** Provide knowledge and understanding of various fields of study in core disciplines in the humanities, social sciences and languages.
- **PO2**: Develop critical and analytical skills to the identification and resolution of problems within complex changing social, linguistic and literary contexts.
- **PO3**: Understanding of the general concepts and principles of selected areas of study outside core disciplines of the humanities, social sciences and languages.
- **PO4:** Follow independence in learning appropriate theories and methodologies with intellectual honesty and an understanding of ethical and human values.
- **PO5**: Encourage students to analyse the problems and apply their knowledge for remedies thereof.
- **PO6:** Enhance student's skills of effective communication and language learning i.e. reading, writing, listening and speaking another language with fluency and understand its cultural value.
- **PO7:** Become well informed and updated member of the community and responsible citizens.
- **PO8:** Work with self esteem, self reliance, self-reflection and creativity to face adversities in the work and personal life
- **PO9:** Articulate the relationship between diverse forms of knowledge and the social, historical and cultural contents that produced them. Communicate effectively and in the case of those students undertaking a language major, need, write, listen to and speak another language with fluency and appreciate its cultural context.
- **PO10: Reading, Writing skills and Process: -** Students will become accomplished, active readers to appreciate ambiguity and complexity and who can articulate their own interpretations with an awareness and curiosity for other perspectives. Students will be able to write effectively for a variety of professional and social setting. They will develop an awareness and confidence in their own voice as a writer and analyse complex social and natural problems with the help of their degree specialisation.
- **PO11: Sense of Genre: -** Student will develop an appreciation of how the formal elements of language and genre shape meaning and they will develop a facility at writing in appropriate genres for research and other variety of purposes.
- **PO12: Critical Approaches: -** Students will develop the ability to read works of literary, rhetorical, research, cultural criticism and develop idea with the help of their specialisation. They will express their own ideas as informed opinions, small projects, practical & research papers and understand how their own approach compares to variety of critical and theoretical approaches.
- **PO13: Oral communication skills: -** Student will demonstrate the skill needed to participate in conversation that builds knowledge collaboratively. Listening carefully and respectfully to others view points. Articulating their own ideas and questions clearly and situating their own ideas in relation to other voices and ideas. Student will be able to prepare, organise and deliver and engaging oral presentation.
- **PO14: Ethics: -** Apply ethical principles and commit to professional ethics and responsibilities and norms of the living practice.
- **PO15: Environment Awareness:** Understand the issues and problems of environmental context and develop environmental awareness in the mind.

Program outcomes of Faculty of Science

- **PO1:** Introduce the fundamentals of science education.
- **PO2:** Enrich students' knowledge in all basic sciences.
- **PO3:** Develop interdisciplinary approach amongst students.
- **PO4:** Inculcate sense of scientific responsibilities and social & environment awareness
- **PO5:** Help students to build-up a progressive and successful career in academics and industry
- **PO6:** Motivate the students to contribute in the development of Nation.
- **PO7:** Articulate the methods of and science and explain why current scientific knowledge is both contestable testable by future inquiry.
- **PO8:** Apply appropriate methods of research, investigation and design, to solve problem in science and technology including the planning and conduct of a significant project problem or investigation.
- **PO3:** Articulate the relationship between different science communities of practice, the international scope of science and technology knowledge and methods and the contributions to their development that have been made by people with diverse perspectives, culture and backgrounds.
- **PO4:** Students will develop the ability to read works of literary, rhetorical, research, cultural criticism and develop idea with the help of their specialisation. They will express their own ideas as informed opinions, small projects, practical & research papers and understand how their own approach compares to variety of critical and theoretical approaches.
- **PO5: Environment Awareness:** Understand the issues and problems of environmental context and develop environmental awareness in the mind.

Program outcomes of Faculty of Commerce

- **PO1:** Build conceptual foundation and application skills in the areas of Accountancy, Finance, Management, research and higher education.
- **PO2:** Sharpen the students' analytical and decision making skills.
- **PO3:** Provide the students with a unique ability to manage accounts, people and organizations across the world with a combination of B.Com Degree.
- **PO4:** Build life skills through value based education and service oriented programs.
- **PO5:** Provide the students a competitive edge in the job market by equipping them with financial and management accounting techniques covering the technical areas that accountants are required to master.
- **PO6:** Demonstrate knowledge of major theories and models in key areas of organizational behaviour.
- **PO7:** Analysis Organisational problems and generate realistic solutions based on current academic research in organisational behaviour.
- **PO8:** Apply basic mathematical and statistical skills necessary for analysis of a range of problems in economics actuarial studies, Accounting, Marketing, Management and Finance.
- **PO9: Consumer Movement:** Make people aware about consumer movement, rights & duties, laws relating to consumers.
- **PO10: Sound knowledge of various laws:** Impart the knowledge of basic concepts, terms & provisions of company law, mercantile law, Income tax and other laws affecting business, trade and commerce.
- **PO11: Environment Awareness:** Understand the issues and problems of environmental context and develop environmental awareness in the mind.

Department of English

Program Outcome (PO)

On Completion of the course students will be able

- **PO1:** To use English language thoroughly. To achieve better communication skills in English. To Introduce English language as the beginning of modernization.
- **PO2:** To introduce various streams in literary criticism for literary analysis. To undertake various academic activities through literature. To introduce diverse cultures reflected in English writings.
- **PO3:** To use modern tools and conventional library to continue research. To construct nationality through literature.
- **PO4:** To develop a research oriented attitude in further education. Make students English Language proficient to improve their employability.
- **PO5:** To train them in the use and application of English language to overcome their day to day difficulties. Tribal can preserve and popularize their language and culture through English. Imbibing moral and human values through study of language and literature. Learning of Characteristics of literature in English, diverse literary historical periods and cultures.
- **PO6**: To give them a broader picture of the world through making learn English language and literatures of the world. Introduce them with technological advancement in English language. Promotion of cultural values through English language.
- **PO7:** To skill analytical and interpretive arguments; become careful and critical readers, Practice writing in a variety of genres as a process of intellectual inquiry, creative expression and ultimately to become more effective thinkers and communicators who are well equipped for a variety of careers in our information intensive society.
- **PO8:** Read articles of a general kind in magazines and newspapers. Participate effectively in informal conversations; introduce themselves and their friends and express opinions in English. Comprehend conversations and short talks delivered in English. Write short essays of a general kind and personal letters and emails in English.
- **PO9:** English Literature helps the students to build the skills of creative and intellectual ideas and makes them to enrich their career. To develop and acquire great opportunities that is needed in their future career (i.e.) makes oneself to get good job and soon.
- **PO10:** English make the students to enrich themselves in all aspects and make them to explore and demonstrate an ability to cope up the life with stylistic clarity.

Program Specific Outcome (PSO)

On Completion of the course students will be able

- **PSO1:** To strengthen students' ability in listening, speaking, reading and writing both at practical and theoretical level.
- **PSO2:** To introduce students to the grammatical properties in order to enable them to write and speak English consciously.
- **PSO3:** To train them both in precision and in appropriate use of language through prose reading.

- **PSO4:** To acquaint students with a keen and subtle way in which the English language is used.
- **PSO5:** On pursuing an emphasis in Literature, English gain a deeper understanding of the resources of the written word.
- **PSO6:** It helps students to explore the entire range of human experience in the resources of language in Fiction, Poetry, Non-Fiction, Prose and Drama.
- **PSO7:** It helps students to build skills of analytical and interpretive arguments; become careful and critical readers, Practice writing in a variety of genres as a process of intellectual inquiry, creative expression and ultimately to become more effective thinkers and communicators who are well equipped for a variety of careers in our information intensive society.
- **PSO8:** It offers students the opportunity to study influential writings from the British, American and global Anglophone traditions.
- **PSO9:** It focuses on a historical period, an issue or theme, a critical approach or a literary genre.
- **PSO10:** It provides imagination and critical insights into all areas of human experience- war and peace, nature and culture, love and sexuality, selfhood and social identity, justice and atrocity, the burdens of history and the dreams of the future.
- **PSO11:** Studying Literature encourages the graduates to view the reading of challenging and imaginative texts as an essential and rewarding part of a life –long commitment to learning and growth.
- **PSO12:** Read complex texts actively recognize key passages, raise questions, appreciate complexity and ambiguity, and comprehend the literal and figurative uses of language.
- **PSO13:** Increases confidence in speaking publicly, articulate clear questions and ideas in class discussion; listen thoughtfully and respectfully to other ideas and prepare, organize and deliver engaging oral presentations.
- **PSO14:** Enjoy the experience of reading challenging Literature, appreciate literature's ability to elicit feeling, cultivate the imagination and call us to account as humans.
- **PSO15: S**trengthen students' ability in listening, speaking, reading and writing both at practical and theoretical level.
- **PSO16: I**ntroduce students to the grammatical properties in order to enable them to write and speak English consciously. To train them both in precision and in appropriate use of language through prose reading. To acquaint students with a keen and subtle way in which the English language is used.

Course Outcome (CO): English

Course name: - B.A. , B.Sc. B. Com. Compulsory English

Course Outcome: LEARNING LANGUAGE SKILLS-I (Paper-I)

- **CO1:** PROSE - 1) *Happy Prince*- Oscar Wilde 2) *Good Manners*- J.C. Hill 3) *The Eyes Are Not Here*- Ruskin Bond 4) *Forgetting*- Robert Lynd 5) *Home Coming*- Rabindranath Tagore.
- **CO2:** POETRY - 1) *One Day I Wrote Her Name upon the Strand*- Edmund Spenser 2) *Ode on Solitude*- Alexander Pope 3) *If*- Rudyard Kipling 4) *My Love Is Like Red Red Rose*- Robert Burns 5) *Stopping by Woods on a Snowy Evening*- Robert Frost.

- **CO3:** GRAMMAR - 1) Parts of Speech 2) Nouns: classes and gender; number and case. 3) Adjectives: kinds of adjectives; comparison of adjectives; the correct use of some adjectives and articles. 4) Pronouns: personal pronouns, reflexive pronouns, demonstrative pronouns, interrogative pronouns, distributive pronouns, relative pronouns. 5) Verbs: transitive and intransitive; verbs and mood: indicative mood, imperative mood, subjunctive mood; the auxiliaries: be, have, do, shall, can, must; modal auxiliaries. 6) Adverbs: kinds: simple, interrogative and relative; formation of adverbs; position of adverbs. 7) Prepositions: phrase prepositions; object of prepositions; relations shown by prepositions; correct use of prepositions. 8) Conjunctions: phrase conjunctions; coordinating and subordinating conjunctions; correct use of some conjunctions. 9) Interjections.

Course Outcome: LEARNING LANGUAGE SKILLS-II (Paper-II)

- **CO1:** PROSE - 1) *The Bet*- Anton Chekov 2) *The Three Questions*- Leo Tolstoy 3) *With the Photographer*- Stephen Leacock 4) *National Prejudices*- Oliver Goldsmith 5) *Playing the English Gentleman*- Mahatma Gandhi
- **CO2:** POETRY - 1) *Where the Mind is Without Fear*- Rabindranath Tagore 2) *The Solitary Reaper*- William Wordsworth 3) *Ozymandias of Egypt*- P.B.Shelly 4) *Laugh and be Merry*- John Masefield 5) *The Toys*- Coventry Patmore.
- **CO3:** GRAMMAR - 1) Tenses; the Simple Present, the Present Continuous, and the Simple Past 2) The Present Perfect and the Simple Past 3) The Past Continuous and the Past Perfect 4) The Present Perfect Continuous and the Past Perfect Continuous 5) Future Tense 6) The Uses of the Tenses.
- **CO4:** PARAGRAPH WRITING

Course Outcome: LEARNING LANGUAGE SKILLS-II (Paper-III)

- **CO1:** PROSE - 1) *The Importance of English*-Mulk Raj Anand 2) *How to Make a Speech*-Edgar I. Baker 3) *The Night Train at Deoli*-Ruskin Bond 4) *The Conjuror's Revenge*-Stephen Leacock 5) *The Luncheon*-W.Somerset Maugham.
- **CO2:** POETRY - 1) *First Love*-John Clare 2) *All the World's a Stage*-William Shakespeare 3) *Next, Please*-Philip Larkin 4) *Father Returning Home*-Dilip Chitre 5) *Dover Beach*-Matthew Arnold.
- **CO3:** GRAMMAR - 1) The Sentence and its Classes. 2) The Sentence Kinds: Simple Sentence, Compound Sentence, Complex Sentence and Compound- Complex Sentence. 3) Simple Sentences: Subject and Predicate. 4) Clauses and its Kinds. 5) Complex Sentences: Principal Clause and Subordinate Clause. 6) Compound Sentences and Compound-Complex Sentences.
- **CO4:** WRITING SKILLS - 1) Use of Punctuations and Capital Letters.

Course Outcome: LEARNING LANGUAGE SKILLS-II (Paper-IV)

- **CO1:** PROSE - 1) *How to Avoid an Argument*-Sam Horn 2) *The Avenger*-Anton Chekhov 3) *On Not Answering the Telephone*-W.Plomer 4) *The Sporting Spirit*- George Orwell 5) *The Old Man at the Bridge*-Ernest Hemingway
- **CO2:** POETRY- 1) *Gather Ye Rosebuds*-Robert Herrick 2) *Mirror*-Sylvia Plath 3) *Sonnet 43*-Elizabeth Barrett Browning 4) *Nobody Loves Me*-Albert J. Nimeth 5) *Night of the Scorpion*-Nissim Ezekiel.

- **CO3:** GRAMMAR - 1) Sentence Synthesis: Combining two or more Simple Sentences into one Simple Sentence, Combining two or more Simple Sentences into one Compound Sentence, Combining two or more Simple Sentences into one Complex Sentence. 2) Sentence Transformation/Conversion-I: Changing Exclamatory Sentence into Assertive Sentence and vice versa, Changing an Interrogative Sentence into an Assertive Sentence and vice versa, Changing an Imperative Sentence into an Interrogative Sentence and vice versa, Interchange of the Degrees of Comparison, Changing Active into Passive voice and vice versa, Changing Negative Sentences into Affirmative Sentences and vice versa. 3) Sentence Transformation/Conversion-II: Conversion of Simple Sentences to Compound Sentences, Conversion of Compound Sentences to Simple Sentences, Conversion of Simple Sentences to Complex Sentences, Conversion of Complex Sentences to Simple Sentence. 4) Sentence Patterns/Structures: a) Subject + Intransitive Verb b) Subject+ Transitive Verb + Direct Object c) Subject +Verb + Object + Adverb Particle d) Subject + Verb + Indirect Object + Direct Object e) Subject + Verb +Direct Object +Preposition + Indirect Object f) Subject + Verb + Object + Complements g) Subject + to be + Complement.
- **CO4:** BUILDING VOCABULORY- 1) Word-Formation: Use of Prefixes and Suffixes 2) Prepositional Verbs 3) Synonyms and Antonyms.

Course Outcome: ADDITIONAL ENGLISH (Paper-III)

- **CO1:** Short Stories Byjames Joyce - 1) ***The Sisters*** 2) ***Araby*** 3) ***Eveline*** 4) ***Clay.***
- **CO2:** Writing Story From Outlines
- **CO3:** Writing Job Application

Course Outcome: ADDITIONAL ENGLISH (Paper-IV)

- **CO1:** One Act Play By J. M. Synge - ***Riders to the Sea***
- **CO2:** Dialogues Writing (On Imaginary Situation)
- **CO3:** Answering Questions From An Unseen Passage

Course name: - B. Com. II yr. Compulsory English Course,

Course Outcome: English For Entrepreneurs (Paper-III)

- **CO1:** Business Communication - (A) Trasactional Writing: *1. Standard Business Letters 2. Handling Letters Of Complaint* (B)Discussions/Meetings/Team Skils *1. Preparing Agenda For Meetings 2. Writing Minutes For Meetings* (C)Jobs And Careers *1. Applying For Jobs 2. Writing Cover Letters For Resumes*.
- **CO2:** Prose For Business Inspiration - 1) *On The Education Of A Man Of Business*-Arthur Helps 2) *In The Office*-A. S. Hornby 3*) When Ideas Make Money*-Shamila Ganeshan 4) *Appro Jrd*-Sudha Murthy 5) *The Man Who E-Mailed The World*-Po Bronson.
- **CO3:** Grammar: Writing Skill - 1) The Sentences: i) *Simple Sentences*. ii) *Clauses and its Kinds*. iii) *Complex Sentences*. iv) *Compound Sentences*. 2) Use Of Punctuations And Capital Letters

Course Outcome: English For Entrepreneurs (Paper-IV)

- **CO1:** Business Communication - (A)Trasactional Writing: 1. *Drafting E-Mail For Business Correspondence* 2. *Writing Short Reports* (B) Discussions/Meetings/Team Skills 1. *Making Notes Of Business Conversations* 2. *Business Promotions And Language For Advertising* (C) Jobs And Careers 1. *Preparing For Interviews* 2. *Taking Interviews.*
- **CO2:** Prose For Business Inspiration - 1) *India's Tech King*-From Www.Wipro.Com 2) *A Speech By N.R. Narayana Murthy*---------- 3*) Saving Money*-M. Leafe 4) *The Beauty Industry*-Aldous Huxley 5) *Face Book Is Making Us Miserable*-Daniel Gulati.
- **CO3:** Grammar: Writing Skill 1. Sentence Patterns/Structures A) *Subject + Intransitive Verb* B) *Subject+ Transitive Verb + Direct Object* C) *Subject +Verb + Object + Adverb Particle* D) *Subject + Verb + Indirect Object + Direct Object* E) *Subject + Verb +Direct Object +Preposition + Indirect Object* F) *Subject + Verb + Object + Complements* G) *Subject + To Be + Complement* 2) Word Formation A) Use Of Prefixes B) Use Of Suffixes.

Course name: - B.A. , Optional English

Course Outcome: *THE STRUCTURE OF ENGLISH* (Paper-I)

- **CO1:** PHONETICS - 1) Phonetic Symbols. 2) The Articulation of Speech Sounds. 3) Classification of Speech Sounds: Description of Consonants and Vowels. 4) The Syllable 5) Pure Vowels and Diphthongs; the Consonants of English.
- **CO2:** 1) Simple Sentence Pattern: subject and predicate; form and function; the basic patterns; sentence types. 2) Phrases: noun phrase, verb phrase, adjective phrase, adverb phrase, prepositional phrase.

Course Outcome: *READING LITERATURE* (Paper-II)

- **CO1:** METHODOLOGY OF LITERATURE - 1) Poetical types: the lyric, the sonnet. 2) The novel: the novel and the other forms, its structure, purpose and meaning.
- **CO2:** SHAKESPEARE'S SONNETS - 1) Sonnet no. 29: *'When in Disgrace…'* 2) Sonnet no. 60: *'Like as the Waves…'* 3) Sonnet no. 73: *'That Time of Year…'* 4) Sonnet no.116: *'Let me Not…'* 5) Sonnet no. 130: *'My Mistress's Eyes…'*

Course Outcome: *THE STRUCTURE OF ENGLISH* (Paper-III)

- **CO1:** PHONETICS - 1) Word Accent in English 2) Accent and Rhythm in Connected Speech 3) Intonation 4) Phonetic Transcription.
- **CO2:** GRAMMAR - 1) Complex Sentences-I 2) Complex Sentences-II 3) Word Formation

Course Outcome: *READING LITERATURE* (Paper-IV)

- **CO1:** METHODOLOGY OF LITERATURE - 1) Poetical types: Odes 2) Dramatic types: tragedy and comedy.
- **CO2:** JOHN KEATS' ODES - 1) *Ode to Nightingale* 2) *Ode to Autumn* 3) *Ode on a Grecian Urn.*
- **CO3:** DRAMA - *ARMS AND THE MAN* BY G.B. SHAW.

Course Outcome: ***LITERATURE IN ENGLISH 1550-1750*** **(Paper-V)**

- **CO1:** BACKGROUND STUDY - 1) The Essay-Its Definition, Origin and Kinds 2) The Epic- Its Definition, Conventions, and Kinds-Epic of Growth, Epic of Art and Mock Epic.
- **CO2:** FRANCIS BACON'S ESSAYS - 1) Of Friendship 2) Of Love 3) Of Studies 4) Of Revenge 5) Of Parents and Children.
- **CO3:** Alexander pope's poem - The Rape of the Lock

Course Outcome: ***LITERATURE IN ENGLISH 1750-1900*** **(Paper-VI)**

- **CO1:** BACKGROUND STUDY - 1) The Ballad- Its Origin, Features, and Kinds 2) Features of Romantic Literature (all genres)
- **CO2:** SAMUEL TAYLOR COLERIDGE'S POEM - *Rime of the Ancient Mariner.*
- **CO3:** THOMAS HARDY'S NOVEL - *Far from the Madding Crowed.*

Course Outcome: ***LITERATURE IN ENGLISH 1550-1750*** **(Paper-VII)**

- **CO1:** BACKGROUND STUDY - 1) Shakespearean Tragedy- Its Characterization and Plot 2) Features of Restoration Literature (all genres)
- **CO2:** WILLIAM SHAKESPEARE'S PLAY- ***Julius Caesar.***
- **CO3:** DANIEL DEFOE'S NOVEL- ***Robinson Crusoe***

Course Outcome: ***LITERATURE IN ENGLISH 1750-1900*** **(Paper-VIII)**

- **CO1:** BACKGROUND STUDY- 1) The Dramatic Monologue-Its Characteristics, and Nature 2) Features of Victorian Literature (all genre)
- **CO2:** ROBERT BROWNING'S POEM- ***Last Ride Together***
- **CO3:** OSCAR WILDE'S PLAY- ***Importance of Being Ernest***

Course Outcome: Twentieth Century English Literature (Subsidiary) (Paper-IX)

- **CO1:** Poetry - Text: Eliot's Poems: I) *The Love Song Of J. Alfred Prufrock* (1917) II) *Preludes* (1917).
- **CO2:** Drama - Text: G.B. Shaw's Play: *Pygmalion: A Romance In Five Acts* (First Staged In 1914 & Pub. In1916) Unit Three: Fiction Text: D. H. Lawrence's Fiction: *Sons And Lovers* (1913)

Course Outcome: Introduction To Literary Criticism And Terms (Subsidiary) (Paper-X)

- **CO1:** Aristotle - Text: His *Observations On Tragedy.*
- **CO2:** Sir Philip Sidney - Texts: His *Classicism* And The Value His Criticism.
- **CO3:** Literary Terms - I) *Allegory* Ii) *Bathos* Iii) *Burlesque* Iv) *Caricature* V) *Flat And Round Character* Vi) *Genre* Vii) *Imagery* Viii) *Irony* Ix) *Metaphor* X) *Myth*

Course Outcome: Indian Writing In English (Main) (Paper-XI)

- **CO1:** Poetry - Text: Nissim Ezekiel's Poems: I)Very Indian Poem In Indian English II) Night Of The Scorpion
- **CO2:** Drama: - Text: Vijay Tendulkar's Play: *Silence! The Court Is In Session* (1978).
- **CO3:** Fiction - Text: Raja Rao's Fiction: *Kanthpura* (1938).

Course Outcome: Project work on History Of English Literature (Main) (from Renascence Age to the Age of T.S. Eliot) (Paper-XII)

Course Outcome: Twentieth Century English Literature (Subsidiary) (Paper-XIII)

- **CO1:** Poetry - Text: W.B. Yeats's Poems: I) *Easter 1916* II)*The Second Coming* III) *Among School Children*
- **CO2:** Drama Text: John Osborne's Play: *Look Back In Anger* (First Staged In1956 & Pub. In 1957)
- **CO3:** Fiction - Text: Kingsley Amis's Fiction: *Lucky Jim* (1954)

Course Outcome: Introduction To Literary Criticism And Terms (Subsidiary) (Paper-XIV)

- **CO1:** William Wordsworth Texts: I) His *Concept Of Poetic Diction* II) His *Concept Of Poetry.*
- **CO2:** F. R. Leavis Texts: I) His *Conception Of Literature* Ii) His *Conception Of Business Criticism.*
- **CO3:** Literary Terms I) *Paradox* II) *Personification* III) *Realism* IV) *Satire* V)*Sentimentality* VI) *Style* VII) *Symbol* VIII) *Theme* IX) *Technique* X) *Wit*

Course Outcome: Indian Writing In English (Main) (Subsidiary) (Paper-XV)

- **CO1:** Poetry - Text: Arun Kolatkar's Poems I)*The Boat Ride*
- **CO2:** Drama: Text: Girish Karnad's Play: *Tughlaq*
- **CO3:** Fiction - Text: U.R. Ananthamurthy's: *Samskara* Or *A Rite For A Dead Man*

Course Outcome: Project work on History Of English Literature (Main) (from Renascence Age to the Age of T.S. Eliot) (Paper-XVI)

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Department of Hindi

Program Outcomes (PO)

On Completion of the course students will be able to

- **PO1: हिंदी भाषा का सामान्य परिचय:-** चीनी भाषा के बाद हिंदी विश्व में सर्वाधिक बोली जाने वाली भाषा है। भारत और विदेश में करीब 50 करोड़ लोग हिंदी बोलते हैं तथा इस भाषा को समझने वाले लोगों की कुल संख्या करीब 90 करोड़ है।
- **PO2: राजभाषा के रूप में हिंदी** : भारत के संविधान में देवनाग री लिपि में हिंदी को संघ की राजभाषा घोषित किया गया है | राज्य स्तर पर हिंदी भारत के निम्नलिखित राज्यों की राजभाषा है: बिहार, झारखण्ड, उत्तराखण्ड, मध्य-प्रदेश, राजस्थान, उत्तर प्रदेश, छत्तीसगढ़, हिमाचल प्रदेश, हरियाणा और दिल्ली ये प्रत्येक राज्य अपनी सह-राजभाषा भी बना सकते हैं।
- **PO3: वैश्विक भाषा के रूप में हिंदी-भाषा :** यह उल्लेख करना उचित होगा कि विदेशियों में भी भारत की धनी संस्कृति को समझने की रुचि बढ़ी है। यही वजह है कि कई देशों ने अपने यहां भारतीय भाषाओं को प्रोत्साहन देने के लिए शिक्षण केंद्रों की स्थापना की है। भारतीय धर्म, इतिहास और संस्कृति पर विभिन्न पाठ्यक्रम संचालित करने के अलावा इन केंद्रों में हिंदी, उर्दू और संस्कृत जैसी कई भारतीय भाषाओं में भी पाठ्यक्रम संचालित किए जाते हैं। वैश्वीकरण और निजीकरण के इस परिदृश्य में अन्य देशों के साथ भारत के बढ़ते व्यापारिक संबंधों को देखते हुए संबंधित व्यापारिक साझेदार देशों की भाषाओं की अन्तर-शिक्षा की जरूरत महसूस की जाने लगी है। हिंदी भाषा ना केवल भारत में बोली जाती है बल्कि मॉरीशस, फिजी, गयाना, सूरीनाम, संयुक्त राज्य अमेरिका, दक्षिण अफ्रीका, यमन, युगांडा, सिंगापुर, नेपाल, न्यूजीलैंड और जर्मनी जैसे देशों के एक बड़े वर्ग में भी प्रचलित है।
- **PO4: हिंदी भाषा में रोजगार के अवसर:** हमारी राष्ट्रीय भाषा की अत्यधिक लोकप्रियता और बढ़ते अंतर्राष्ट्रीय महत्व के साथ-साथ, हिंदी भाषा के क्षेत्र में रोजगार के अवसरों में भी जबर्दस्त प्रगति हुई है। केंद्र सरकार, राज्य सरकारों (हिंदी भाषी राज्यों में) के विभिन्न विभागों में, हिंदी भाषा में काम करना अनिवार्य है। अतः केंद्र/राज्य सरकारों के विभिन्न विभागों और इकाइयों में हिंदी अधिकारी, हिंदी अनुवादक, हिंदी सहायक, प्रबंधक (राजभाषा) जैसे विभिन्न पदों की भरमार है।
- **PO5: हिंदी भाषा में रोजगार के अवसर:** निजी टीवी और रेडियो चैनलों की शुरूआत और स्थापित पत्रिकाओं/ समाचार-पत्रों के हिंदी रूपान्तर आने से रोजगार के अवसरों में कई गुणा वृद्धि हुई है। हिंदी मीडिया के क्षेत्र में संपादकों, संवाददाताओं, रिपोर्टरों, न्यजरीडर्स, उप-संपादकों, प्रूफ रीडरों, रेडियो जॉकी, एंकसे आदि। रॉकी, एंकर्स आदि की बहुत आवश्यकता है। इनमें रोजगार की इच्छा रखने वालों के लिए पत्रकारिता/जन-संचार में डिग्री/डिप्लोमा के साथ-साथ हिंदी में अकादमिक योग्यता रखना महत्वपूर्ण है। इसमें प्रमुख अंतर्राष्ट्रीय लेखकों के कार्यों का हिंदी में अनुवाद तथा हिंदी लेखकों की कृतियों का अंग्रेजी और अन्य विदेशी भाषाओं में अनुवाद कार्य करना भी सम्मिलित होता है। फिल्मों की स्क्रिप्टों/ विज्ञापनों को हिंदी/अंग्रेजी में अनुवाद करने का भी कार्य होता है। भारत में स्कूलों, कालेजों और विश्वविद्यालयों में शिक्षक के तौर पर भी परंपरागत शिक्षण व्यवसाय को चुना जा सकता है।

- **PO1:** Students will get the knowledge of Hindi Writers & Poets. They value the national unity through Hindi language.
- **PO2:** Students will understand the correct language to write and speak.
- **PO3:** Good language will make their personality special among others.
- **PO4:** Through this study they become a very good writer, poet, novelist, dramatist etc.
- **PO5:** They can go for journalism course also which will provide jobs for them.
- **PO6:** Through Writer's Autobiography student will learn the lessons of great lives. They will understand about the poetic concept of Drama.

Program Specific Outcomes (PSO)

On Completion of the course students will be able to

- **PSO1: भावों और विचारों की अभिव्यक्ति का साधन** - ध्वनि इकाइयों के सहारे व नए-नए शब्दों को सीखता है और जोड़ता है यह इकाइयां मातृभाषा की होती हैं । विचारों की जननी - मातृभाषा से विचारों को ग्रहण करता है और आदान प्रदान करता है ।
- **PSO2: भावात्मक विकास का उत्तम साधन -** बच्चे अपनी मातृभाषा से बड़ा जुड़ाव महसूस करते हैं । इसीलिए जिन बच्चों की मातृभाषा एक होती है, वे एक-दूसरे से मित्रता करना पसंद करते हैं ।
- **PSO3: सृजनात्मकता का विकास** - मातृभाषा संस्कृति का हस्तांतरण करने में प्रमुख भूमिका निभाती है । अन्य भाषा की अपेक्षा बालक मातृभाषा पर जल्दी अधिकार प्राप्त कर लेता है ।
- **PSO4: बौद्धिक एवं संज्ञानात्मक विकास -** मातृभाषा हमारे मन व चिंतन तथा अनुभूति का साधन है । "मातृभाषा द्वारा शिक्षा देने की स्थिति ने निश्चित रूप से बौद्धिक एवं संज्ञानात्मक विकास कर लेता है|
- **PSO5: सांस्कृतिक जीवन और मातृभाषा -** मातृभाषा में ही देश संस्कृति नहीं होती है अतः मात्र भाषा शिक्षण में भारतीयों में चार पुरुषार्थ आदि के भाव जागृत होते हैं।
- **PSO6: जीवन तथा मातृभूमि के प्रति स्वस्थ दृष्टिकोण -** मातृभाषा और उसका साहित्य अपनी धरती और परिवेश के प्रति आत्मीयता के भाव उत्पन्न करता है । मातृभाषा के साहित्य में सामाजिक एवं राष्ट्रीय जीवन का परिचय मिलता है ।
- **PSO7:** हिंदी साहित्य की विभिन्न विधाओं, व्याकरण, मूल्यांकन, पठन कौशल, शिक्षा, साहित्य शिक्षण में जनसंचार माध्यमों के उपयोग पर जानकारी ।

- **PSO1**. Understand basic concepts of Hindi.
- **PSO2**. Know depth Knowledge of Literature of Hindi.
- **PSO3.** Know the great writers.
- **PSO4**. Promote cultural values in them through Marathi language.
- **PSO5.** Understand the value of nation and society plus health relation with everyone.
- **PSO6:** Promote Hindi as our national language and a symbol of nationality.
- **PSO7:** Make students understand its simplicity and lucidity.
- **PSO8:** Study and understand Literature in Hindi and significance of its translation.
- **PSO9:** Popularize Hindi and promote people to adopt Hindi along with their mother tongue.
- **PSO10:** Study Hindi along with local tribal languages.
- **PSO11:** Promote regional language translation with the help of study of Hindi.
- **PSO12:** Students will understand the various aspects of Hindi Language and literature.

- **PSO13:** Hindi is a national language and students will understand and comprehend its significance and relevance.
- **PSO14:** They will learn Hindi language and its usage in day to day and professional life.
- **PSO15:** Students will develop imaginative and language skills during study of Hindi and Hindi literature.

Course Outcome (CO): Hindi

Course name: - B.A. , B.Sc. B. Com. I year Hindi (SL)

Course Outcome: Samanya Hindi - 1 (Paper- I)

प्रश्नपत्र 1 : सामान्य हिंदी - I

➢ **उद्देश्य :**

1. संवेदना का विकास
2. भाषा कौशल का विकास

➢ **अध्ययन-अध्यापन पद्धति :**

1. व्याख्यान
2. दृक-श्रव्य साधनों का प्रयोग
3. स्वाध्याय/परियोजना

➢ **पाठ्यक्रम :**

अ) कहानी साहित्य :

पाठ्यपुस्तक :

1. कथा संसार : सम्पादक/समन्वयक : डॉ. माधव सोनटक्के हिंदी पाठ्य समिति वाणी प्रकाशन, नई दिल्ली (पाठ्यक्रम में समाविष्ट कहानियाँ : स्त्री और पुरुष, हार की जीत, दो बाँके, गौरी, एटम बम, पंचलाईट, अपरिचित)

आ) हिंदी भाषा :

1. हिंदी भाषा : उद्‌भव और विकास : सामान्य परिचय
2. देवनागरी लिपि : स्वरूप एवं विकास
3. हिंदी वर्तनी का मानक रूप
4. पारिभाषिक शब्दावली : स्वरूप और समस्याएँ

Course Outcome: Samanya Hindi – 2 (Paper- II)

प्रश्नपत्र 2 : सामान्य हिंदी - 2

➤ **उद्देश्य :**

1. संवेदना का विकास
2. भाषा कौशल का विकास

➤ **अध्ययन-अध्यापन पद्धति :**

1. व्याख्यान
2. दृक-श्राव्य सामग्री का प्रयोग
3. स्वाध्याय/परियोजना

➤ **पाठ्यक्रम :**

अ) कहानी साहित्य :

1. कथा संसार : सम्पादक/समन्वयक : डॉ. माधव सोनटक्के हिंदी पाठ्य समिति, वाणी प्रकाशन, नई दिल्ली

(पाठ्यक्रम में समाविष्ट कहानियाँ : घर की तलाश, कलवे का आदमी, पोस्टमैन, छुट्टी का दिन, गुमशुदा की तलाश, दूध का टीका, मैं, शहर और वो)

आ) व्यावहारिक हिंदी:

1. व्यावहारिक लेखन : संक्षेपण, पल्लवन
2. पत्राचार : निजी, सामाजिक, सरकारी, अर्धसरकारी
3. कम्प्यूटर में हिंदी का प्रयोग
4. अनुवाद : स्वरूप और भेद

Course Outcome: Samanya Hindi – 3 (Paper- III)

उद्देश्य :

१) साहित्य आस्वादन अभिरुचि का परिष्कार
२) जीवन मूल्यों के प्रति आस्था
३) अत्याधुनिक इलेक्ट्रॉनिक माध्यमों का परिचय

अध्ययन -अध्यापन प्रक्रिया

१) व्याख्यान पद्धति
२) लेखन एवं पठन कौशल वृद्धि हेतु अभ्यास
३) दृक-श्राव्य माध्यम का प्रयोग

पाठ्यपुस्तक :

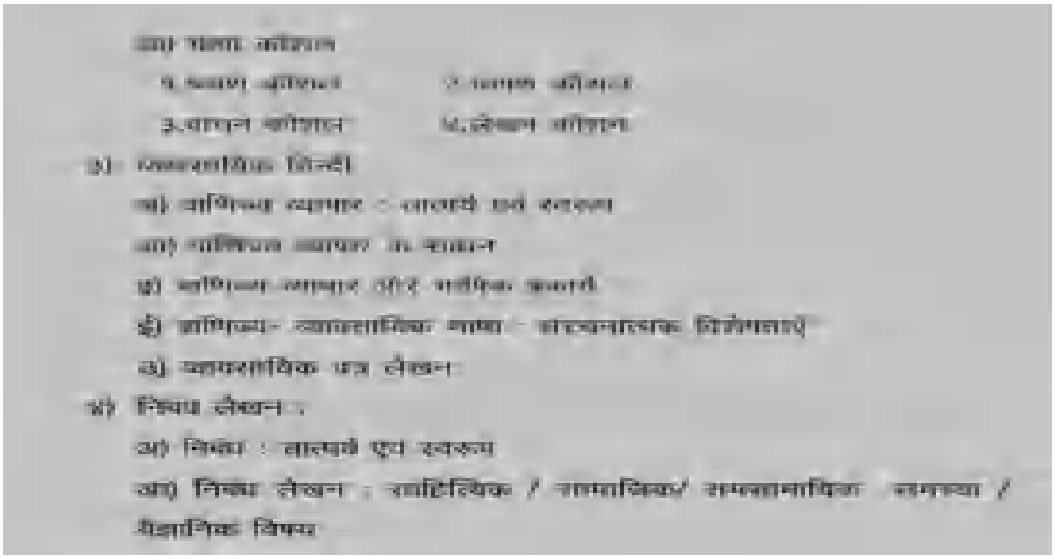
अ.गद्य के विविध आयाम, सपा.-प्रो.जयमोहन एम.एस., वाणी प्रकाशन, नई दिल्ली

■ **पाठ्यक्रम में समाविष्ट रचनाएँ**

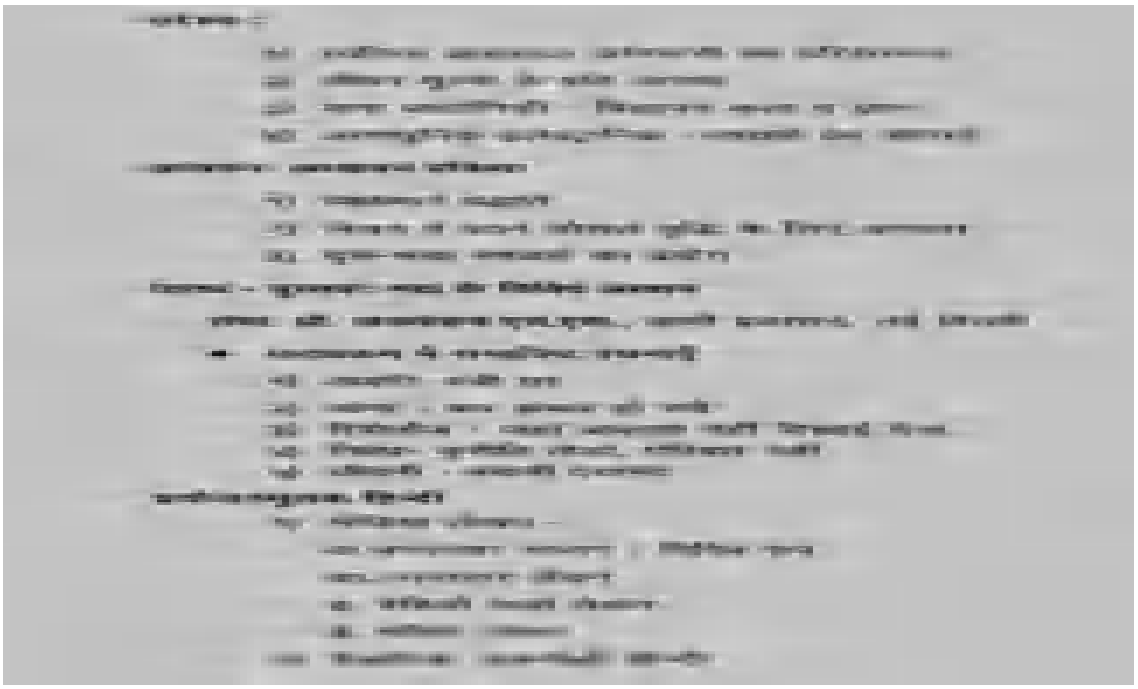
१) आत्मकथा - मेरा जीवन
२) रेखाचित्र - नीलकंठ मोर
३) संस्मरण - कमला
४) निबंध - शिरीष के फूल
५) यात्रावृत्त - चीड़ों पर चाँदनी

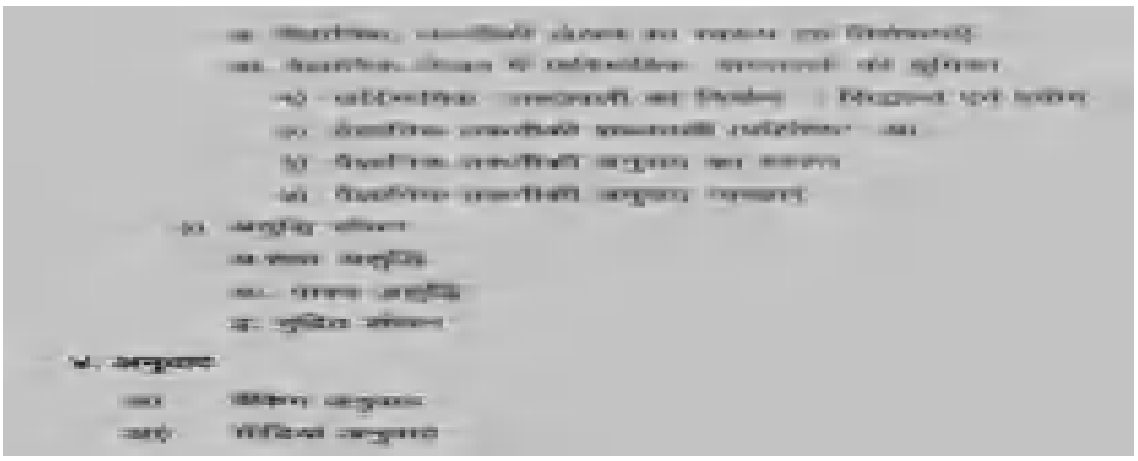
आ. प्रयोजनमूलक हिंदी

१) प्रयोजनमूलक भाषा
अ) भाषा का स्वरूप एवं महत्त्व
आ) भाषा की परिभाषा, विशेषताएँ एवं प्रकार
इ) वैश्वीकरण के परिप्रेक्ष्य में हिंदी भाषा का महत्त्व
२) भाषा शिक्षण : स्वरूप एवं प्रक्रिया
अ) भाषा शिक्षण की प्रक्रिया,

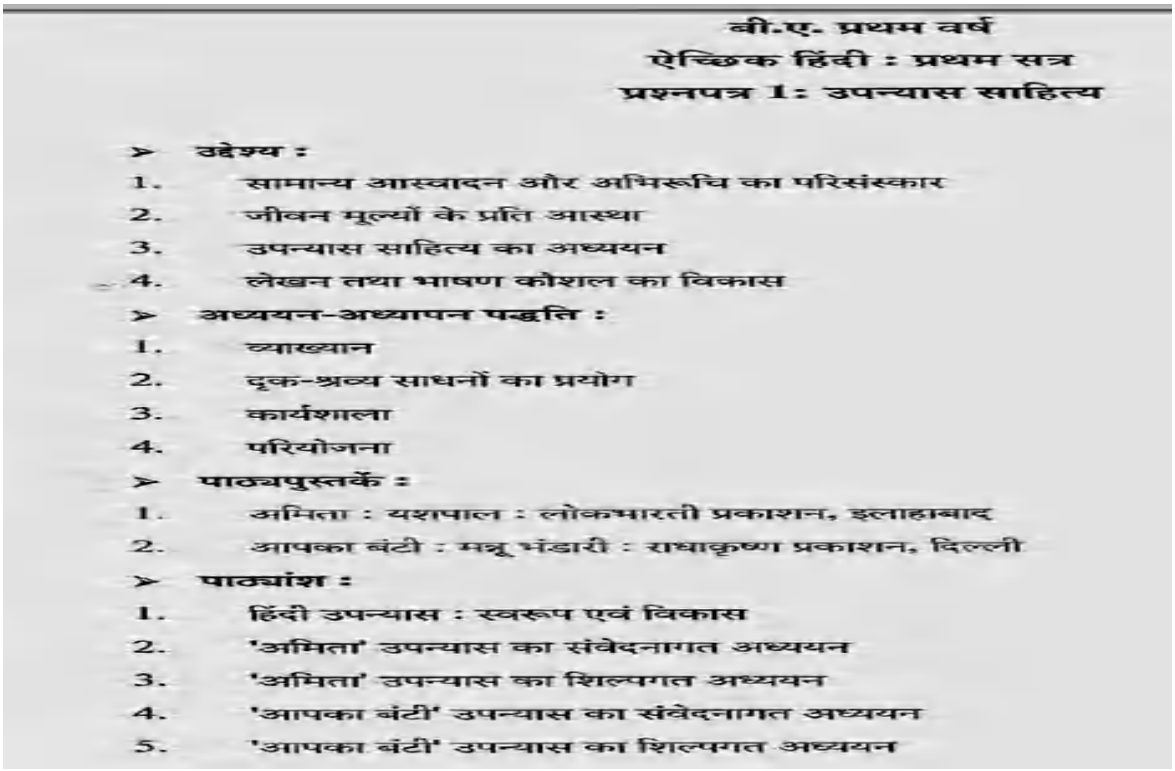


Course Outcome: Samanya Hindi – 4 (Paper- IV)





Course: B.A. Optional
Course Outcome: Upanyas sahitya (Paper- I)



बी.ए. प्रथम वर्ष
ऐच्छिक हिंदी : प्रथम सत्र
प्रश्नपत्र 1: उपन्यास साहित्य

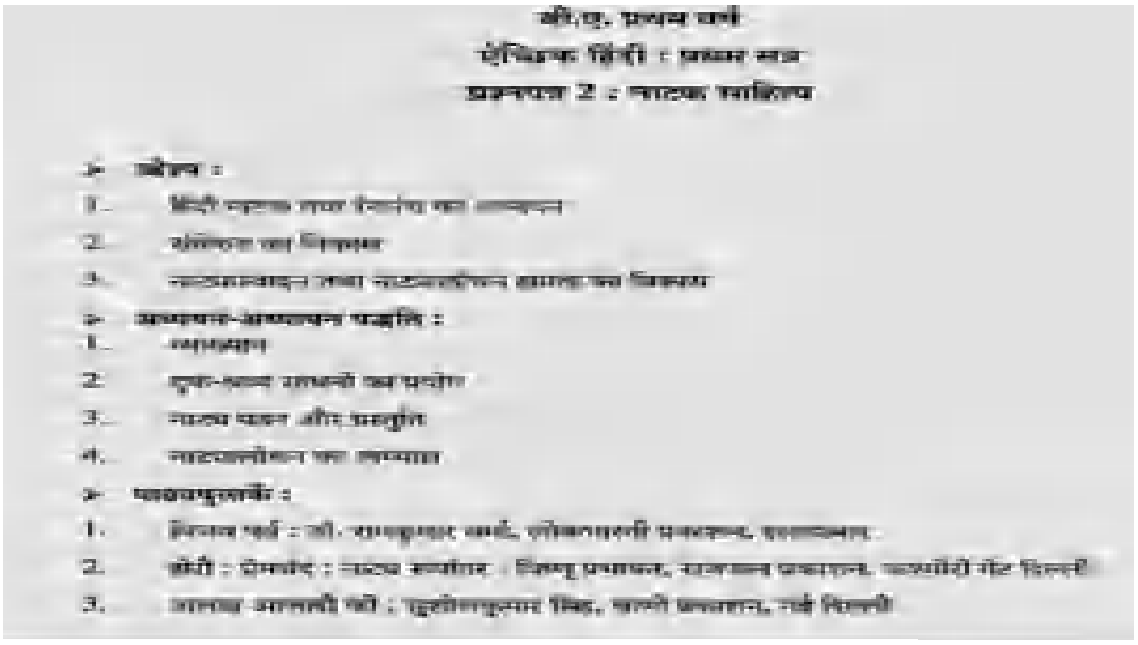
➢ उद्देश्य :
1. सामान्य आस्वादन और अभिरूचि का परिसंस्कार
2. जीवन मूल्यों के प्रति आस्था
3. उपन्यास साहित्य का अध्ययन
4. लेखन तथा भाषण कौशल का विकास

➢ अध्ययन-अध्यापन पद्धति :
1. व्याख्यान
2. दृक-श्रव्य साधनों का प्रयोग
3. कार्यशाला
4. परियोजना

➢ पाठ्यपुस्तकें :
1. अमिता : यशपाल : लोकभारती प्रकाशन, इलाहाबाद
2. आपका बंटी : मन्नू भंडारी : राधाकृष्ण प्रकाशन, दिल्ली

➢ पाठ्यांश :
1. हिंदी उपन्यास : स्वरूप एवं विकास
2. 'अमिता' उपन्यास का संवेदनागत अध्ययन
3. 'अमिता' उपन्यास का शिल्पगत अध्ययन
4. 'आपका बंटी' उपन्यास का संवेदनागत अध्ययन
5. 'आपका बंटी' उपन्यास का शिल्पगत अध्ययन

Course Outcome: Natak sahitya (Paper- II)



बी.ए. प्रथम वर्ष
ऐच्छिक हिंदी : प्रथम सत्र
प्रश्नपत्र 2 : नाटक साहित्य

➢ उद्देश्य :
1. हिंदी नाटक तथा रंगमंच का आस्वादन
2. संवेदना का विकास
3. नाट्यलेखन तथा नाट्यप्रस्तुतन क्षमता का विकास

➢ अध्ययन-अध्यापन पद्धति :
1. व्याख्यान
2. दृक-श्रव्य साधनों का प्रयोग
3. नाटक पाठन और प्रस्तुति
4. नाट्यप्रस्तुतन का अभ्यास

➢ पाठ्यपुस्तकें :
1. अंधायुग : डॉ. धर्मवीर भारती, लोकभारती प्रकाशन, इलाहाबाद
2. खोटी : देवमणि : नाटक समीक्षा : विनयू प्रकाशन, राजकमल प्रकाशन, कश्मीरी गेट दिल्ली
3. आलम आरानी की : खुशीलालकुमार सिंह, खानी प्रकाशन, नई दिल्ली

➢ पाठ्यांश :
1. [illegible]
2. [illegible]
3. [illegible]
4. [illegible]
5. [illegible]
6. [illegible]

Course Outcome: Hindi Gadya Sahitya (Paper- III)

बी.ए. प्रथम वर्ष
ऐच्छिक हिंदी : द्वितीय सत्र
प्रश्नपत्र 3 : हिंदी गद्य साहित्य

➢ उद्देश्य :

1. कहानी तथा व्यंग्य का अध्ययन
2. संवेदना का विकास
3. साहित्य आस्वादन तथा मूल्यांकन क्षमता का विकास

➢ अध्ययन-अध्यापन पद्धति :

1. व्याख्यान
2. दृक-श्रव्य साधनों का प्रयोग
3. स्वाध्याय/परियोजना

➢ पाठ्यपुस्तकें :

1. [illegible] : [illegible] : डॉ. [illegible], हिंदी [illegible], वाणी प्रकाशन, नई दिल्ली
2. [illegible] : हरिशंकर परसाई, वाणी प्रकाशन, नई दिल्ली
(पाठ्यक्रम में समाविष्ट व्यंग्य : [illegible])

➢ पाठ्यांश :

1. कहानी : स्वरूप एवं विकास
2. '[illegible]' की कहानियों का [illegible] तथा शिल्पगत अध्ययन
3. व्यंग्य : स्वरूप एवं विकास
4. '[illegible]' के व्यंग्यों का [illegible] और शिल्पगत अध्ययन

Course Outcome: Ekanki Sahitya (Paper- IV)

बी.ए. प्रथम वर्ष
ऐच्छिक हिंदी : द्वितीय सत्र
प्रश्नपत्र 4 : एकांकी साहित्य

➢ उद्देश्य :

1. हिंदी [illegible] का अध्ययन
2. संवेदना का विकास
3. [illegible] क्षमता का विकास

➢ अध्ययन-अध्यापन पद्धति :

1. [illegible]
2. दृक-श्रव्य साधनों का प्रयोग
3. एकांकी पठन तथा मंचन
4. [illegible] का अभ्यास

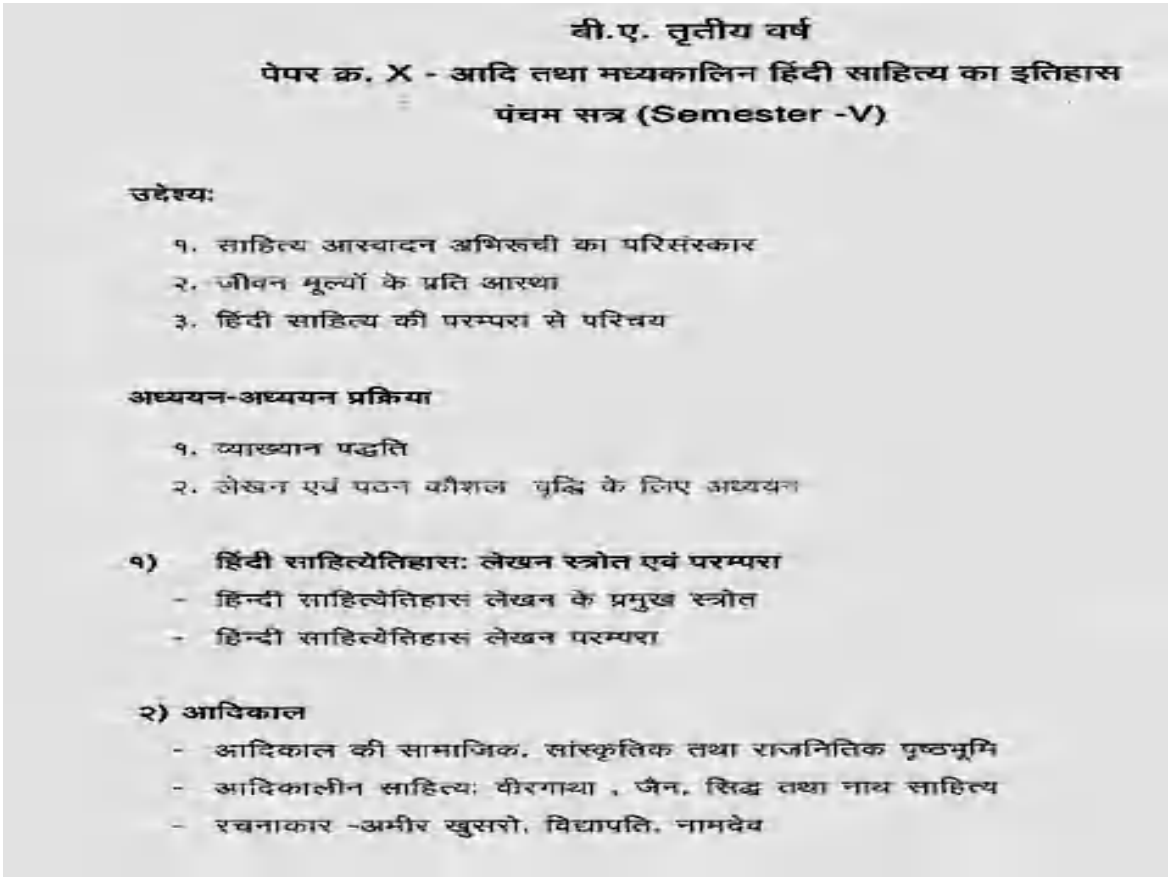
➢ पाठ्यपुस्तकें :

1. एकांकी नये पुराने : संपादक - [illegible], [illegible] प्रकाशन, [illegible] ([illegible] छोड़कर शेष एकांकी)
2. [illegible] एकांकी : संपादक - डॉ. [illegible], [illegible] प्रकाशन, [illegible] ([illegible] छोड़कर शेष एकांकी)

➢ पाठ्यांश :

1. एकांकी : स्वरूप एवं [illegible]
2. हिंदी एकांकी : विकास
3. एकांकी नये पुराने के एकांकी का [illegible] एवं शिल्पगत अध्ययन
4. [illegible] एकांकी के एकांकी का [illegible] एवं शिल्पगत अध्ययन

Course Outcome: (Paper- X)



बी.ए. तृतीय वर्ष

पेपर क्र. X - आदि तथा मध्यकालिन हिंदी साहित्य का इतिहास

पंचम सत्र (Semester -V)

उद्देश्य:

१. साहित्य आस्वादन अभिरूची का परिसंस्कार
२. जीवन मूल्यों के प्रति आस्था
३. हिंदी साहित्य की परम्परा से परिचय

अध्ययन-अध्ययन प्रक्रिया

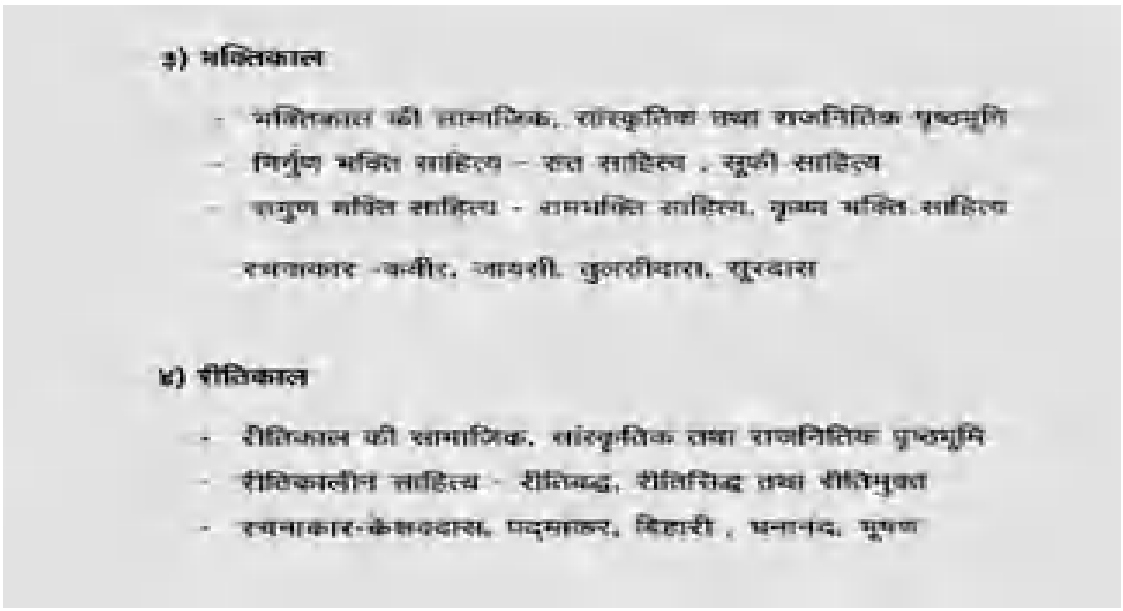
१. व्याख्यान पद्धति
२. लेखन एवं पठन कौशल वृद्धि के लिए अध्ययन

१) हिंदी साहित्येतिहास: लेखन स्त्रोत एवं परम्परा

- हिन्दी साहित्येतिहास लेखन के प्रमुख स्त्रोत
- हिन्दी साहित्येतिहास लेखन परम्परा

२) आदिकाल

- आदिकाल की सामाजिक, सांस्कृतिक तथा राजनितिक पृष्ठभूमि
- आदिकालीन साहित्य: वीरगाथा , जैन, सिद्ध तथा नाथ साहित्य
- रचनाकार -अमीर खुसरो, विद्यापति, नामदेव



३) भक्तिकाल

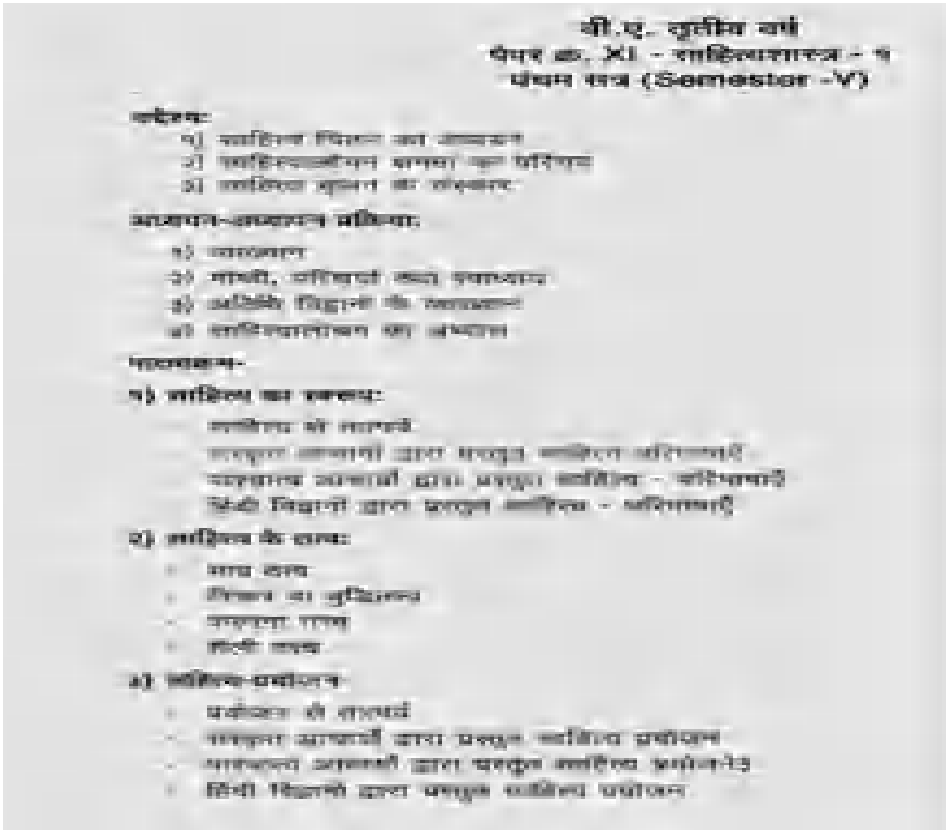
- भक्तिकाल की सामाजिक, सांस्कृतिक तथा राजनितिक पृष्ठभूमि
- निर्गुण भक्ति साहित्य – संत साहित्य , सूफी साहित्य
- सगुण भक्ति साहित्य - रामभक्ति साहित्य, कृष्ण भक्ति साहित्य

रचनाकार -कबीर, जायसी, तुलसीदास, सूरदास

४) रीतिकाल

- रीतिकाल की सामाजिक, सांस्कृतिक तथा राजनितिक पृष्ठभूमि
- रीतिकालीन साहित्य - रीतिबद्ध, रीतिसिद्ध तथा रीतिमुक्त
- रचनाकार-केशवदास, पद्माकर, बिहारी , घनानंद, भूषण

Course Outcome: (Paper- XI)



बी.ए. तृतीय वर्ष
पेपर क्र. XI - साहित्यशास्त्र - १
पंचम पत्र (Semester -V)

४) साहित्य-हेतु:

- हेतु से तात्पर्य
- संस्कृत आचार्यों द्वारा प्रस्तुत साहित्य हेतु
- पाश्चात्य आचार्यों द्वारा प्रस्तुत साहित्य हेतु
- हिंदी विद्वानों द्वारा प्रस्तुत साहित्य हेतु

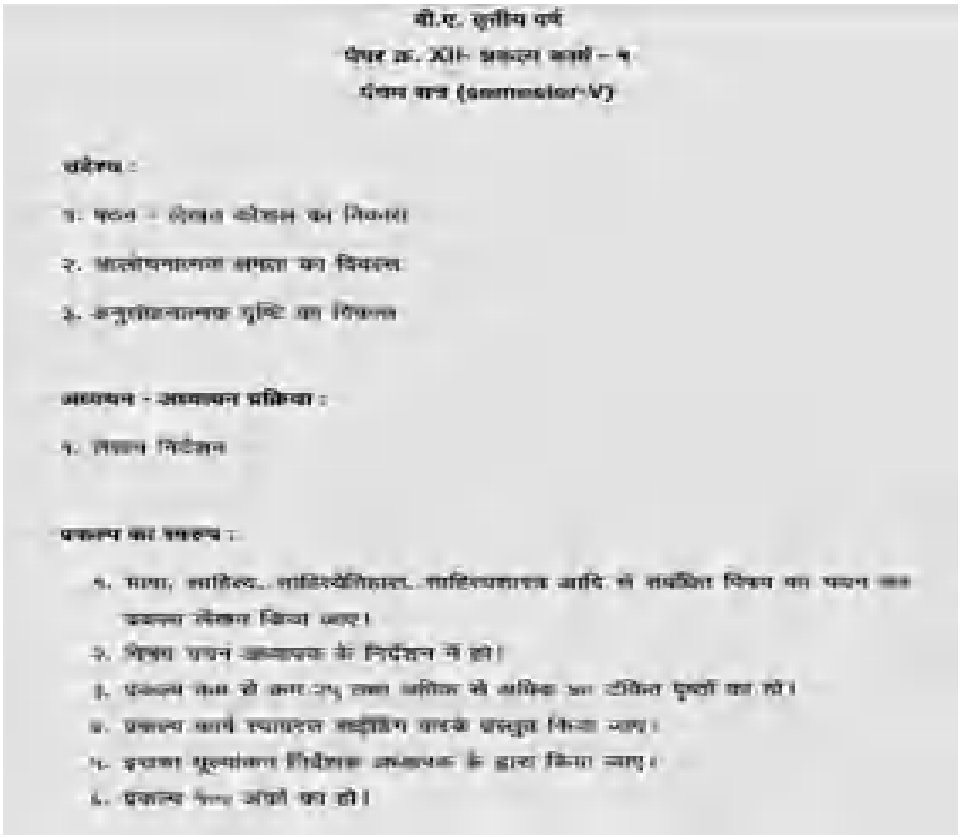
५) शब्दशक्ति विचार

- शब्दशक्ति से तात्पर्य
- शब्दशक्ति के प्रमुख भेद

६)रस विचार

- रस का स्वरूप
- रस: भारतीय दृष्टिकोण
- रस: पाश्चात्य दृष्टिकोण
- रस-निष्पत्ति: रस सूत्र की प्रमुख व्याख्याएँ
- रस भेद-सामान्य परिचय : श्रृंगार, वीर, करुणा, रौद्र, भयानक, बीभत्स, अद्‌भुत, शांत, भक्ति, वात्सल्य

Course Outcome: (Paper- XII)



बी.ए. तृतीय वर्ष

पेपर क्र. XII- प्रकल्प कार्य – १

पंचम सत्र (semester-V)

उद्देश्य :

१. चयन - क्षेत्रात्मक कौशल का निर्धारण

२. अन्वेषणात्मक क्षमता का विकास

३. अनुसंधानात्मक वृत्ति का विकास

अध्ययन - अध्यापन प्रक्रिया :

१. निर्देशन निर्देशन

प्रकल्प का स्वरूप :

१. भाषा, साहित्य, साहित्येतिहास, साहित्यशास्त्र आदि से संबंधित किसी एक चयन का प्रकल्प तैयार किया जाए।

२. विषय चयन अध्यापक के निर्देशन में हो।

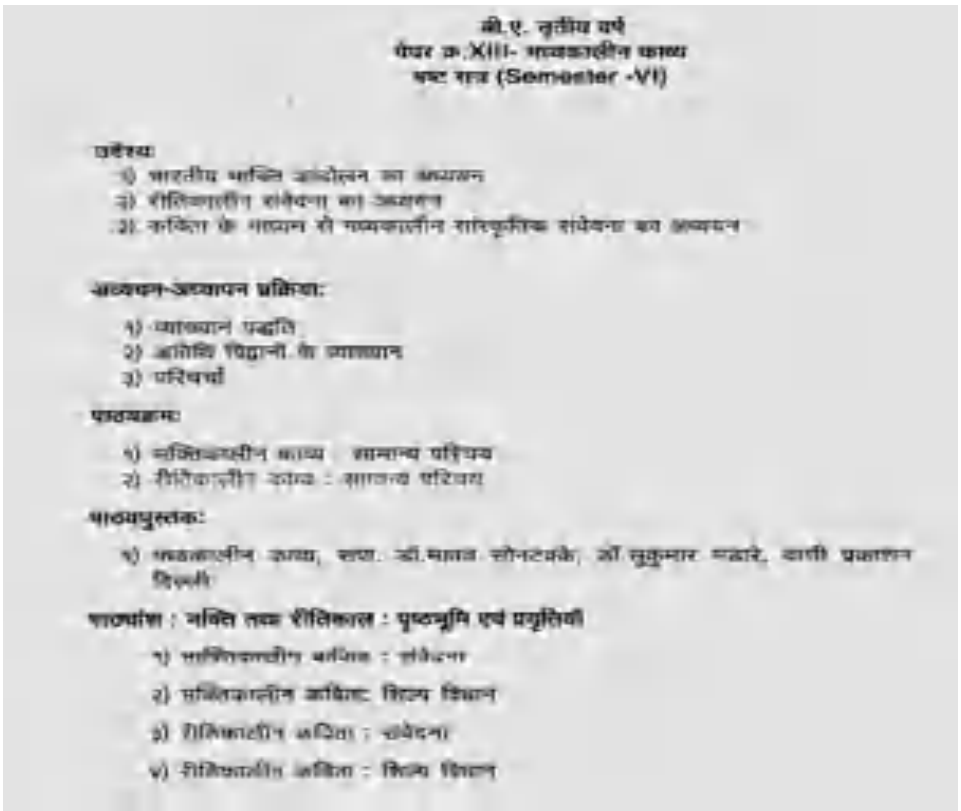
३. प्रकल्प १०० से कम २५ तथा अधिक ५० टंकित पृष्ठों का हो।

४. प्रकल्प कार्य स्थायीरूप सहीरूप करके प्रस्तुत किया जाए।

५. इसका मूल्यांकन शिक्षक अध्यापक के द्वारा किया जाए।

६. प्रकल्प भिन्न अंकों का हो।

Course Outcome: (Paper- XIII)



बी.ए. तृतीय वर्ष

पेपर क्र.XIII- समकालीन काव्य

षष्ट सत्र (Semester -VI)

उद्देश्य:

१) भारतीय भक्ति आंदोलन का अध्ययन

२) रीतिकालीन संवेदना का अध्ययन

३) कविता के माध्यम से समकालीन सांस्कृतिक संवेदना का अध्ययन

अध्ययन-अध्यापन प्रक्रिया:

१) व्याख्यान पद्धति

२) आलोचि सिद्धान्तों के व्याख्यान

३) परिचर्चा

पाठ्यक्रम:

१) भक्तिकालीन काव्य : सामान्य परिचय

२) रीतिकालीन काव्य : सामान्य परिचय

पाठ्यपुस्तक:

१) समकालीन काव्य, संपा. डॉ.मनोज सोनटक्के, डॉ सुकुमार गव्हारे, दादी प्रकाशन दिल्ली

पाठ्यांश : भक्ति तथा रीतिकाल : पृष्ठभूमि एवं प्रवृत्तियाँ

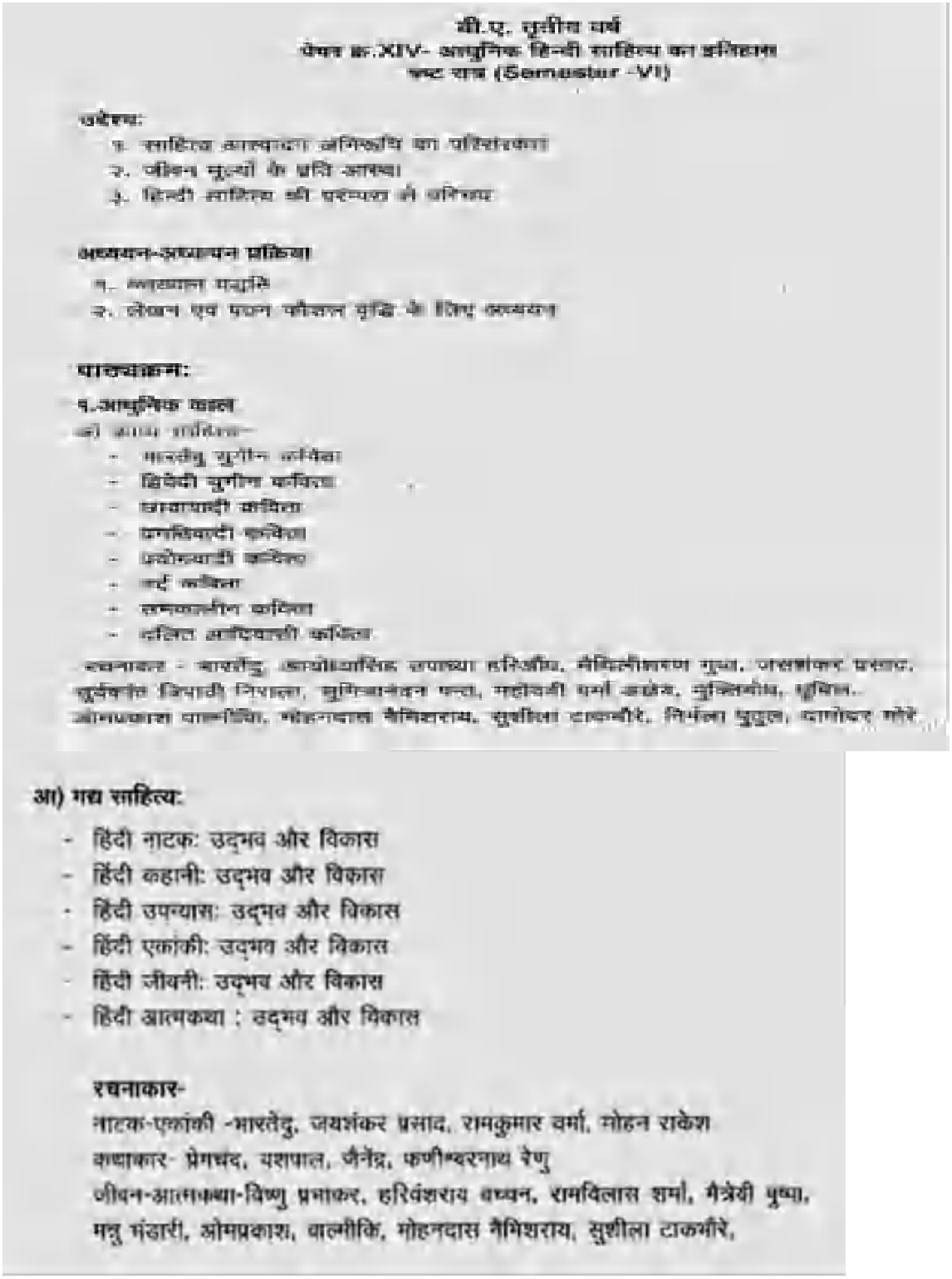
१) भक्तिकालीन कविता : संवेदना

२) भक्तिकालीन कविता: शिल्प विधान

३) रीतिकालीन कविता : संवेदना

४) रीतिकालीन कविता : शिल्प विधान

Course Outcome: (Paper- XIV)



बी.ए. तृतीय वर्ष
पेपर क्र.XIV- आधुनिक हिन्दी साहित्य का इतिहास
फ्रस्ट सत्र (Semester -VI)

उद्देश्य:

१. साहित्य आस्वादन अभिरुचि का परिष्कारकरण
२. जीवन मूल्यों के प्रति आस्था।
३. हिन्दी साहित्य की परम्परा से अभिज्ञ

अध्ययन-अध्यापन प्रक्रिया

१. व्याख्यान पद्धति
२. लेखन एवं पठन कौशल वृद्धि के लिए अभ्यास

पाठ्यक्रम:

१.आधुनिक खडी

- भारतेंदु युगीन कविता
- द्विवेदी युगीन कविता
- छायावादी कविता
- प्रगतिवादी कविता
- प्रयोगवादी कविता
- नई कविता
- समकालीन कविता
- दलित आदिवासी कविता

रचनाकार - भारतेंदु, अयोध्यासिंह उपाध्याय हरिऔध, मैथिलीशरण गुप्त, जयशंकर प्रसाद, सूर्यकांत त्रिपाठी निराला, सुमित्रानंदन पन्त, महादेवी वर्मा अज्ञेय, मुक्तिबोध, धूमिल, ओमप्रकाश वाल्मीकि, मोहनदास नैमिशराय, सुशीला टाकभौरे, निर्मला पुतुल, कात्यायनी सोरे

आ) गद्य साहित्य:

- हिंदी नाटक: उद्भव और विकास
- हिंदी कहानी: उद्भव और विकास
- हिंदी उपन्यास: उद्भव और विकास
- हिंदी एकांकी: उद्भव और विकास
- हिंदी जीवनी: उद्भव और विकास
- हिंदी आत्मकथा : उद्भव और विकास

रचनाकार-

नाटक-एकांकी -भारतेंदु, जयशंकर प्रसाद, रामकुमार वर्मा, मोहन राकेश
कथाकार- प्रेमचंद, यशपाल, जैनेंद्र, फणीश्वरनाथ रेणु
जीवन-आत्मकथा-विष्णु प्रभाकर, हरिवंशराय बच्चन, रामविलास शर्मा, मैत्रेयी पुष्पा, मन्नू भंडारी, ओमप्रकाश, वाल्मीकि, मोहनदास नैमिशराय, सुशीला टाकभौरे,

Course Outcome: (Paper- XV)

४) आलोचना: स्वरूप तथा भेद

आलोचना : स्वरुप एवं महत्व

आलोचना का कार्य

आदर्श आलोचक के गुण

आलोचना के भेद : सामान्य परिचय

- प्रमुख आलोचना भेदों का विशेष परिचय

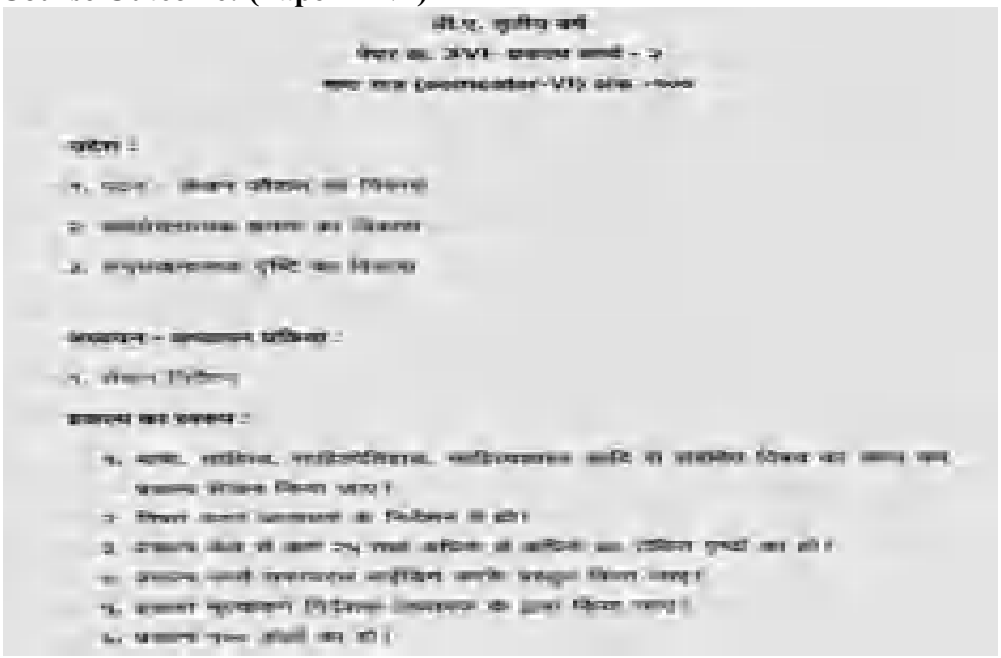
१) सैद्धांतिक आलोचना

२) ऐतिहासिक आलोचना

३) मार्क्सवादी आलोचना

४) मनोवैज्ञानिक आलोचना

Course Outcome: (Paper- XVI)



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Department of Marathi

Programme Outcomes (PO)

१. भाषाशुद्धता आणि विचार परिणामकारकरीत्या व्यक्त करण्याची योग्यता यांचा विकास करणे.

२. आकलन आणि अभिव्यक्ती यांची क्षमता वाढविणे.

३. विद्यार्थ्यांचे शब्दभांडार वाढविणे.

४. श्रवण, भाषण, संभाषण, वाचन, लेखन, आकलन आणि स्वतंत्र अभिव्यक्ती इ. कौशल्यात वाढ करणे.

५. ज्ञानप्राप्तीप्रमाणेच आनंदप्राप्तीसाठी वाचनाची आवड निर्माण करणे.

६. साहित्य आणि कलेचा आस्वाद घेण्याची क्षमता विकसित करणे.

७. विद्यार्थ्यांच्या ठिकाणी सौंदर्यास्वाद आणि चिकित्सिकता या वृत्तींची जोपासना करणे.

८. मातृभाषेद्वारे विद्यार्थ्यांच्या ठिकाणी मानवी जीवनमूल्यांचा संस्कार घडविणे.

९. मातृभाषेतील विविध साहित्यिकांची आणि विविध साहित्यप्रकाराची ओळख आणि कलात्मक मूल्यांची जोपासना करणे.

१०. विद्यार्थ्यांचे विचार आणि चिंतन करण्याची क्षमता वाढविणे.

११. विद्यार्थ्यांच्या ठिकाणी आपली भाषा, साहित्य, संस्कृती, राष्ट्र आणि मानवसमाज याविषयी आदर व प्रेमाची भावना निर्माण करणे.

१२. विद्यार्थ्यांमध्ये सन्य भाषाभगिनी तसेच मराठीच्या विविध बोलीभाषांबद्दल अभिरुची निर्माण करणे.

१३. स्वदेशभक्ती, राष्ट्रीय एकात्मता, विज्ञाननिष्ठा, सर्वधर्मसमभाव, नैतिक मूल्ये, निसर्गातील सौंदर्य आणि समाज जागीव इत्यादी गुणांची जोपासना करणे.

१४. चित्रपट, आकाशवाणी, दूरदर्शन इत्यादी माध्यमाद्वारे भाषिक अभ्यास वाढविणे.

- **PO1:** Students acknowledge with Marathi literature, language and culture. It helps them to develop the interest in understanding the Marathi literature, its various forms and aesthetic.
- **PO2:** Develop the communication and writing skills to face the modern era of globalization.
- **PO3:** Acquire the deep knowledge of literature its various forms, authors, critics, poetry, history of ancient and modern Marathi literature.
- **PO4:** Understand the process of creation of poetry, and methods of evaluation of poetry, conceptual theories, culture and philosophy.
- **PO5:** Introduce with the society, human values through the literature, which helps them to become a person with values.
- **PO6:** Introduce with linguistic and literature theories. Through the literary theories they got aware of the development and new aspects in literature as well as society.
- **PO7:** Prepare to read, understand the 'isms' movements, values, criticism through literature.
- **PO8:** Develop lingual skills. Through linguistics students got aware of communication skills. This course helps students to achieve basic skills of life.
- **PO9:** Introduces the commercial modern world, its demands, and opportunities of life.
- **PO10:** A biography, autobiographies, key models, successful personalities in society motivates them to set and achieve goals of life.
- **PO11:** Helps students to learn commercial aspects of literature and language. Media, newspapers, magazines, DTP skill, communication skills, public relations.

Programme Specific Outcomes (PSO)

- **PSO1:** Make students learn various literary streams, their nature, scope etc.
- **PSO2:** Go through the contemplation by numerous thinkers on human life, values, and human problems expressed in Marathi.
- **PSO3:** Enhance empathy, inclusiveness, tolerance and human values.
- **PSO4:** Make the students study multi disciplinary aspects of Marathi.
- **PSO5:** Learn about Marathi culture with its variety and plurality Indian culture.
- **PSO6:** Develop commutation skills.
- **PSO7:** Motivate students to make career in Marathi.
- **PSO8:** Understand basic concepts of Marathi.
- **PSO9:** Know depth Knowledge of Literature.
- **PSO10:** Know the great writers.
- **PSO11:** Promote cultural values in them through Marathi language.

अभ्यासक्रमाची उद्दिष्टे :

(१) विद्यार्थी हे केंद्र-बिंदू मानून त्याचे भाषिक आकलन व आविष्करण समृद्ध करणे.

(२) प्रथम वर्षाच्या विद्यार्थ्यांचे वय / मानसिकता / क्षमता लक्षात घेऊन त्यांचा विकास घडवून आणण्याच्या दृष्टीने अध्ययन सामुग्री देणे.

(३) प्रथम वर्ष हा पाया समजून पायाभूत कार्यालयीन व भाषिक कौशल्याचे ज्ञान उपलब्ध करून देणारा अभ्यास क्रम सिद्ध करणे.

(४) मराठीतील जुन्या , नव्या कवी / लेखकांच्या कलाकृतींचा परिचय व्हावा म्हणून निवडक काव्य / कथा/ ग्रंथांश सिद्ध करून देणे.

(५) पदवी पातळीवरील अभ्यासक्रमाची सिद्धता ही पदव्युत्तर अभ्यासाची पूर्वतयारी असते याचे भान ठेवून अध्यापन साधने पुरवणे.

(६) स्पर्धा परीक्षेच्या / व्यावहारिक भाषिक कौशल्याच्या दृष्टीने भाषिक कौशल्याचे ज्ञान देणे.

(७) दैनंदिन भाषा वापर , साहित्यातील उपयोग व कार्यालयीन उपयोजनांचा विचार.

(८) माध्यमांच्या दृष्टीने अध्ययनाची रचना करणे.

(९) भाषेतील संवाद / उच्चार /लेखन/ विस्तार / शब्दसंग्रह यांचा परिचय.

(१०) मराठी भाषेतील जुन्या / नव्या भाषेच्या वापराचा अर्थ , काव्यार्थ, सूचकता , तत्कालीन भाषिक संदर्भ ,परंपरा , पर्यावरण , मानवी मूल्य , सुसंस्कार , सामाजिक संदर्भ / सांस्कृतिकता यांचा काव्य / गद्य अंशाच्या निमित्ताने परिचय घडवणे.

घटक विश्लेषण :

१) अभ्यासक्रमात समाविष्ट करण्यात आलेल्या पाठाच्या लेखकांचा व कवितेच्या कवींचा परिचय करून देणे.

२) पाठातील व कवितेतील आशय समजावून देणे.

३) पाठातील सामाजिक मूल्य आकलन करून देणे.

४) कवितेतील सामाजिक,सांस्कृतिक मूल्य समजावून देणे.

५) विद्यार्थ्यांना नीटपणे लिहिता वाचता यावे,उच्चार स्पष्ट करता यावे,वाक्यरचना नीट करता यावी. यासाठी मराठी लेखन विषयक नियम समजावून सांगणे.

६) कार्यालयीन लेखन तंत्राविषयी माहिती करून देणे.

७) योग विद्याभ्यासाची माहिती सांगणे.

८) वाचन संस्कृती वृद्धिंगत होण्यासाठी विद्यार्थ्यांना ग्रंथालये व ग्रंथ यासंबंधीची माहिती सांगणे.

९) पत्र लेखनाचे व भाषांतराचे आकलन करून देणे.

अभ्यासक्रमाची उद्दिष्टये :

१) बी.ए. द्वितीय वर्षाच्या विद्यार्थ्यांना मराठी विषयाचे अध्ययन करण्यासाठी मराठी साहित्यातील विविध प्रवाह आणि प्रकार लक्षात आणून देणे. लेखक कवीचे व्यक्तिमत्त्व त्यांच्या साहित्यातील आशय अभिव्यक्तीचा परिचय करून देणे.

२) एकूणच मराठी साहित्याची आवड निर्माण करणे व आस्वाद घेण्याची क्षमता विकसित करणे.

३) साहित्याभ्यासातून जीवन जगण्याची कला विकसीत करणे,समाजाकडे डोळसपणे पाहता येण्याची क्षमता विकसीत करणे.

४) व्यवहार , विज्ञान, कार्यालयीन व वाङ्मयीन परिभाषेचे आकलन करता येणे.

५) विविध प्रसार माध्यमांची ओळख करून देणे.

६) माहिती तंत्रज्ञानाचा परिचय करून देणे.

घटक विश्लेषण (गद्य -पद्य व उपयोजित मराठी) :

१) अभ्यासक्रमात समाविष्ठ करण्यात आलेल्या पाठाचे लेखक व कवींचा परिचय करून देणे.

२) पाठातील आशय समजावून घेणे.

३) पाठ आणि कवितेतील सामाजिक मूल्ये, लोकशाही मूल्ये, औद्योगिक अनुभव, साहित्यिक मूल्ये, सांस्कृतिक मूल्ये यांचे आकलन करून घेणे.

४) विद्यार्थ्यांना व्यवहार ज्ञानाचे आकलन व्हावे व उपयोग करता यावा, नैसर्गिक संपत्तीचे संरक्षण करता यावे व तंत्रज्ञानाचा व्यवहारात उपयोग करता यावा यासाठी उपयोजित मराठी या घटकातील मुद्यांचा अभ्यास करणे.

५) पामन संस्कृती वृद्धिगत होण्यासाठी विविध वाङ्मय प्रकारातील ग्रंथाचा परिचय करून देणे.

आधुनिक मराठी वाङ्मयाचा इतिहास

(इ.स. १८०० ते इ.स.१९२०)

अभ्यासक्रमाची उद्दिष्टये :

१) इ.स. १८०० नंतरच्या वाङ्मयाचा इतिहासाचा सर्वांगीन अभ्यास करणे.

२) इ.स.१८०० ते इ.स. १८७४ या कालखंडाची सामाजिक व सांस्कृतिक पार्श्वभूमी,विचार प्रणाली, सामाजिक चळवळी यांचा वाङ्मयावरील प्रभावाचा अभ्यास करणे.

३) इ.स.१८०० ते इ.स. १९२० या कालखंडातील वाङ्मय निर्मितीची पार्श्वभूमी,तिच्या प्रेरणा,प्रवृत्ती प्रवाह, महत्त्वाचे ग्रंथकार व त्यांच्या साहित्यकृती या अनुषंगाने अभ्यास करणे.

४) भाषांतरीत वाङ्मय,नियतकालिके,निबंधमाला,वैचारिक व ललित निबंध,कथा, कादंबरी,नाटक, काव्य, चरित्र आणि आत्मचरित्र या वाङ्मय प्रकारातील ठळक ग्रंथकार व त्यांच्या वाङ्मयकृतींचा स्थूल अभ्यास करणे इत्यादी.

अभ्यासक्रमाची उद्दिष्टे :

१) दृक-श्राव्य माध्यमांसाठी लेखन कौशल्याचा अभ्यास करणे.

२) इलेक्ट्रॉनिक मिडीयाने अवघे विश्वच पादाक्रांत केले आहे.संपूर्ण जगातील माहिती नभोवाणी,दूरचित्रवाहिन्या आणि संगणकाद्वारे आपल्या घरा-दारात पोहचत आहेत.त्या विषयीचा अभ्यास करणे.

३) बातम्या,मुलाखती,रुपक,विविध मालिका,फॅशन शो, सिनेमा यांमुळे नवनवीन गोष्टीचे अकलन आभ्यासाद्वारे करणे.

४) नभोवाणिविषयक लेखन कौशल्यांचा अभ्यास करणे.

५) दूरचित्रवाणिविषयक लेखन कौशल्यांचा अभ्यास करणे.

६) संप्रेषणाची प्रगती,बोलीभाषेचे महत्व काय आहे हे अभ्यासाद्वारे सांगता येईल.

७) नभोवाणिवरील भाषण व सभेतील भाषण यांतील फरकाचा अभ्यास करणे.

८) नभोवाणी चर्चेतील सहभागी व्यक्ती व सूत्रधार यांच्या जबाबदाऱ्या कोणत्या त्यांचा अभ्यास करणे.

९) नभोवाणिवरील बातम्यांचे स्वरुप व त्यांची वैशिष्टे स्पष्ट करता येणे.

१०) नभोवाणिवरील बातम्या व वृत्तपत्रातील बातम्या यांतील फरकाचा अभ्यास करणे.

११) रुपकामध्ये नाटक,भाषण,मुलाखत,चर्चा,कविता,गीत,संगीत,निवेदन या आकाशवाणि-वरुन प्रसारीत होणाऱ्या इतर कार्यक्रम समावेशाचा अभ्यास करणे.

१२) रुपक आणि नाटक यातील फरकाचा अभ्यास करणे.

१३) नभोनाटयाची बांधणीकरताना मध्यवर्ती कल्पना, कथा, पात्रांचे संवाद, स्वभाव रेखाटन,ध्वनिसंकेत आणि संगीत यांचा विचार कसा करावा हे सांगण्याचा अभ्यास करणे.

१४) नभोनाटय आणि श्रुतिका यांतील फरक स्पष्ट करता येईल.

१५) नभोवाणीवरील जाहिरात लेखनाचा हेतू व त्याचे तंत्र अभ्यासणे.

१६) परिसंवाद स्वरुप,वैगल्पेपण आणि त्याचे तंत्र अभ्यासणे.

१७) दूरचित्रवाणी लेखनाची उद्दीष्टये व प्रकार कसे निश्चित करायचे याची माहिती सांगण्याचा अभ्यास करणे.

१८) दूरचित्रवाणी संहितेची भाषा कशी असायला हवी व संहितालेखनाचे तंत्र कोणते हे स्पष्ट सांगणे.

१९) दृक्-श्राव्य रुपात कार्यक्रमाची निर्मिती कशी होते,याची माहिती देणे.

२०) दूरचित्रवाणिवरील बातमीपत्रांचे स्वरुप स्पष्ट करुन सांगण्याचा अभ्यास करणे.

२१) दूरचित्रवाणिवरील बातमीपत्रांचे संपादन व लेखन कसे करावे हे स्पष्ट करण्याचा अभ्यास करणे.

२२) दृक्-श्राव्य रुपात कार्यक्रमाची निर्मिती कशी होते,याची कल्पना स्पष्ट करण्याचा अभ्यास करणे.

वाणिज्य व्यवहार, व्यवसाय आणि मराठी भाषा

अभ्यासक्रमाची उद्दिष्टे :

१) बी.कॉम. द्वितीय वर्षाच्या मराठी विषयाचे अध्ययन करण्याऱ्या विद्यार्थ्यांना वाणिज्य व्यवसायात मराठी भाषेचे आकलन करून देणे.

२) मराठी भाषेचा कार्यालयीन, व्यावसायीक कामकाजात होणारा वापर,गरज व स्वरूप विशेषांची माहिती करून देणे.

३) वाचन संस्कृतीच्या माध्यमातून व्यवसायाला पूरक आणि मूलभूत सहाय्य करणे

४) कार्यालयीन / व्यावसायिक भाषा व्यवहारासाठी आवश्यक लेखन कौशल्याचे उपयोजन करणे.

५) व्यावसायाच्या माध्यमातून मराठी भाषेला स्थान मिळवून देणे.

Course Outcome (CO): Marathi

Course outcome: - B.A. , B.Sc. B. Com. I Year Marathi (First Language) (Paper – I)

सत्र पहिले

कोड नं. MAR००१: अभ्यास पत्रिका गद्य-पद्य व उपयोजित मराठी

भाग १ ला

तासिका –

गद्य विभाग

अ- घटक

(१)	सखीक रक्षण	-	म्हाईंभट
(२)	अर्जदस्त	-	संत एकनाथ
(३)	राजाची कर्तव्ये	-	रामचंद्रपंत अमात्य
(४)	जिजाऊ आमची सून जाली	-	दत्ताजी त्रिमल वाकेनवीस
(५)	तुम्ही सदाचरणाने वागा	-	ताराबाई शिंदे
(६)	परमेश्वराचे भवितव्य !	-	श्री.म.माटे

पद्य विभाग

ब - घटक

(१)	धुळी आतील रत्न	-	मुकुंदराज
(२)	कुश्चळ भूमीवरी उगवली तुळसी	-	संत नामदेव
(३)	आनंदे वोवीया	-	संत निर्मळा
(४)	मारा बांधोनि मराठिया	-	फादर स्टिफन्स
(५)	पूर्वभाग्यदिशा	-	संत जनीजनार्दन
(६)	पाडसदेवा	-	संत दासोपंत
(७)	यातिभेद कुळकर्म गुरुषी मूळ नाहिरे	-	रामानंद स्वामी
(८)	ऐसे केलेया गोपाळे	-	संत शेख महंमद
(९)	मन करा रे प्रसन्न	-	संत तुकाराम
(१०)	तुझ्या प्रीतीचे	-	होनाजी -बाळा
(११)	सत्याग्रही बसव (अनु वचने)	-	जयदेवीताई लिंगाडे

उपयोजित मराठी

क-घटक

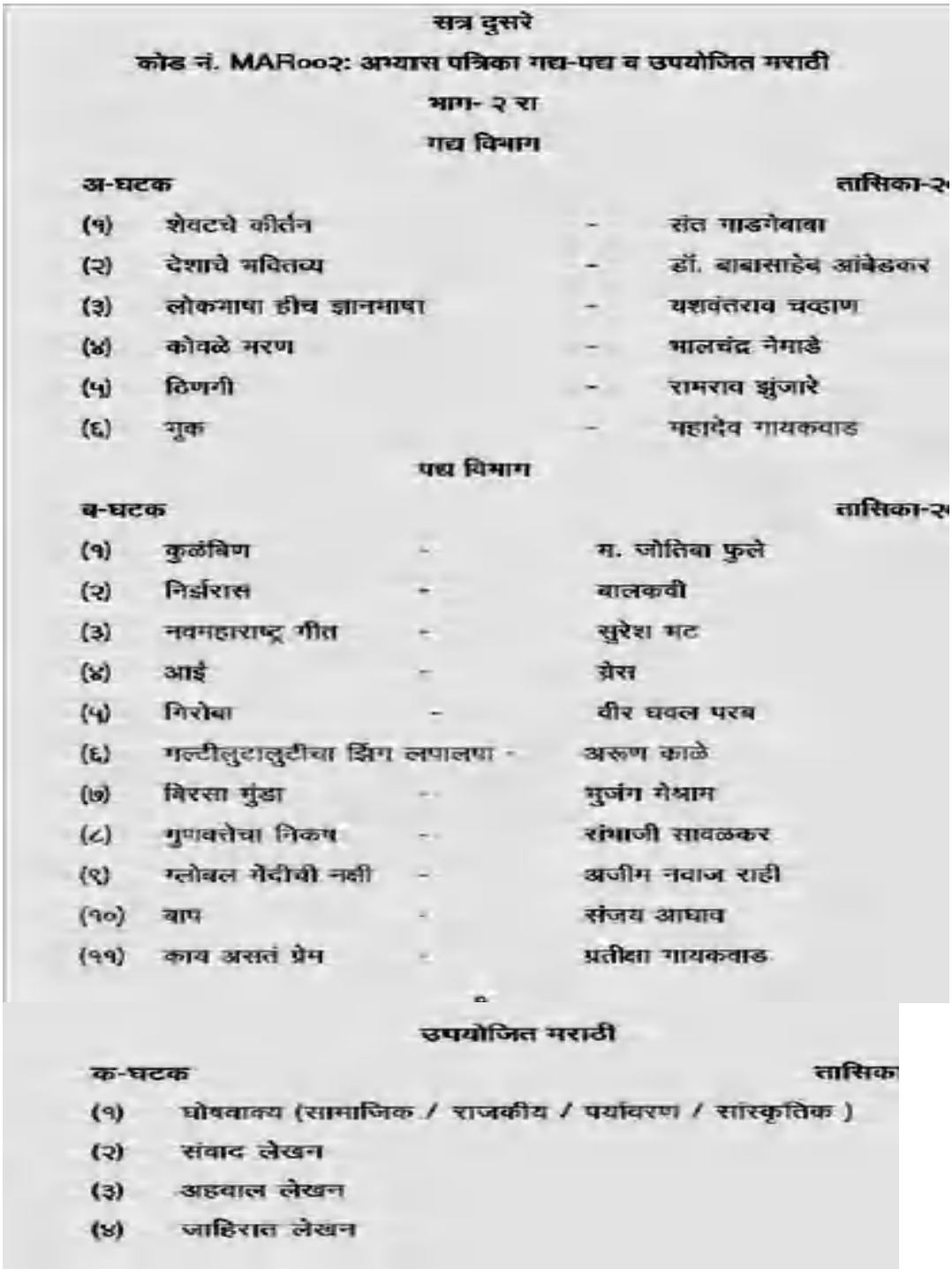
(१) लेखन-विशेष नियम

(२) पत्र-लेखन (वैयक्तिक व कार्यालयीन)

(३) निरोप-चिठ्ठी

(४) भाषांतर (इंग्रजी पत्रव्यवहार मराठी भाषांतर ५० ते ५० शब्दात)

Course outcome: - B.A. , B.Sc. B. Com. I Year Marathi (First Language) (Paper – II)



सत्र दुसरे

कोड नं. MAR००२: अभ्यास पत्रिका गद्य-पद्य व उपयोजित मराठी

भाग- २ रा

गद्य विभाग

अ-घटक — तासिका-२

(१)	शेवटचे कीर्तन	-	संत गाडगेबाबा
(२)	देशाचे भवितव्य	-	डॉ. बाबासाहेब आंबेडकर
(३)	लोकभाषा हीच ज्ञानभाषा	-	यशवंतराव चव्हाण
(४)	कोवळे मरण	-	भालचंद्र नेमाडे
(५)	ठिणगी	-	रामराव झुंजारे
(६)	शुक	-	महादेव गायकवाड

पद्य विभाग

ब-घटक — तासिका-२

(१)	कुळंबिण	-	म. जोतिबा फुले
(२)	निर्झरास	-	बालकवी
(३)	नवमहाराष्ट्र गीत	-	सुरेश भट
(४)	आई	-	ग्रेस
(५)	गिरोबा	-	वीर धवल परब
(६)	गल्टीलुटालुटीचा झिंग लपालपा	-	अरूण काळे
(७)	बिरसा मुंडा	-	भुजंग मेश्राम
(८)	गुणवत्तेचा निकष	-	रंगाजी सावळकर
(९)	ग्लोबल मेंदीची नक्षी	-	अजीम नवाज राही
(१०)	बाप	-	संजय आघाव
(११)	काय असतं प्रेम	-	प्रतीक्षा गायकवाड

उपयोजित मराठी

क-घटक — तासिका

(१)	घोषवाक्य (सामाजिक / राजकीय / पर्यावरण / सांस्कृतिक)
(२)	संवाद लेखन
(३)	अहवाल लेखन
(४)	जाहिरात लेखन

Course outcome: - B.A. , B.Sc. II Year Marathi (First Language) (Paper – III)

अभ्यासपत्रिका ३ री गद्य - पद्य उपयोजित मराठी

घटक क्र. १ - गद्य विभाग ता

पाठाचे नाव	लेखक
१) छत्रपती शिवाजी महाराजांच्या कार्याचे स्वरूप	प्र.न. देशपांडे
२) लोकसंस्कृती आणि जागतिकीकरण	डॉ.द.ता. भोसले
३) मरणानं डाव साधला, नशिबानं हात दिला !	सौ. सिंधुताई सपकाळ
४) लोकराजे मा.श्री. पवार साहेब	प्रा. लक्ष्मण ढोबळे
५) नदी	सुरेश पाटील (इर्लेकर)

घटक क्र. २ पद्य विभाग ता

कविता	कवी
१) निष्कर्ष	सुहासिनी इर्लेकर
२) आकाशाएवढा	सदानंद सिनगारे
३) साऱ्या घरालाच लागली वाळवी	प्रदीप पाटील
४) कुणबी माझा !	अनिल गव्हाणे
५) वीरता	बाबाराव मडावी
६) अरुंद दारातून बाहेर पडताना	संजीवनी तडेगावकर

घटक क्र. ३

१) परिभाषा : तंत्र , स्वरूप व उपयोजन

परिभाषेचे स्वरूप व वैशिष्ट्ये, परिभाषेची आवश्यकता,शासन व्यवहारातील परिभाषा, विज्ञानाची परिभाषा, कार्यालयीन परिभाषा, वाङ्मयीन परिभाषा इ. या परिचय व उपयोजन

२) आकाशवाणी प्रसार माध्यम : लेखनतंत्र व उपयोजन

आकाशवाणी श्राव्य प्रसार माध्यम - स्वरूप, आकाशवाणी या प्रसार माध्यमाचे घटक, परिचय(कार्यक्रम) बातमी,श्रुतिका, नभोनाट्य, संवाद, भाषण, मुलाखत इ.

आकाशवाणीचा प्रभाव - ज्ञान व विज्ञानाद्वारे संस्कार, लोकप्रबोधन, वार्तांचा प्रसार, मनोरंजन, नैसर्गिक संकटाची पूर्वकल्पना , विविध सूचना

३) पुस्तक परिचय : तंत्र व स्वरूप

वाङ्मयलेखन प्रकारांचा परिचय

उदा. कथा,कादंबरी,कविता,चरित्र,आत्मचरित्र , निबंध इ.

वाङ्मयेतर लेखन प्रकारांचा परिचय

उदा. सामाजिकशास्त्रे,विज्ञान, वाणिज्य विषयक, विधीविषयक

४) जलनियोजन : तंत्र व स्वरूप

जलनियोजनाचे महत्त्व, जलनियोजन धरणे आणि शेती, धरणातील जलनियोजन , शेतीसाठी जलनियोजन (ठिबक), पिण्यासाठी जलनियोजन

Course outcome: - B.A. , B.Sc. II Year Marathi (First Language) (Paper – IV)

अभ्यासपत्रिका ४ थी - गद्य - पद्य व उपयोजित मराठी तासिका - २०

घटक क्र. १ गद्य विभाग

पाठाचे नाव	लेखक
१) [illegible]	अंबादास केदार
२) [illegible]	विजय जावळे
३) [illegible]	अंजली [illegible]
४) [illegible]	एकनाथ [illegible]
५) भूक	उमेश मोहिते

घटक २ तासिका २०

कविता	कवी
१) [illegible]	म.मो. जोशी
२) [illegible]	शिवाजी मारुती पाटील
३) [illegible]	कल्पना दुधाळ
४) [illegible]	शिवाजी [illegible]
५) [illegible]	भारती [illegible]
६) [illegible]	वि.वा. कराड

घटक क्र. ३ तासिका - २०

१) संगणक क्षेत्रातील संकल्पना : स्थूल परिचय

सॉफ्टवेअर , हार्डवेअर, विंडोज, फाईल, फोल्डर, डाटा, संगणकाची कौशल्य, भारतीय समाजावरील संगणकाचा प्रभाव

२) संगणकाची वैशिष्ट्ये -

अचूक काम , प्रचंड वेग, कामाची सलगता, माहितीचे संक्रमण व सादरीकरण, कामाची विविधता, स्वविचारक्षमता नाही

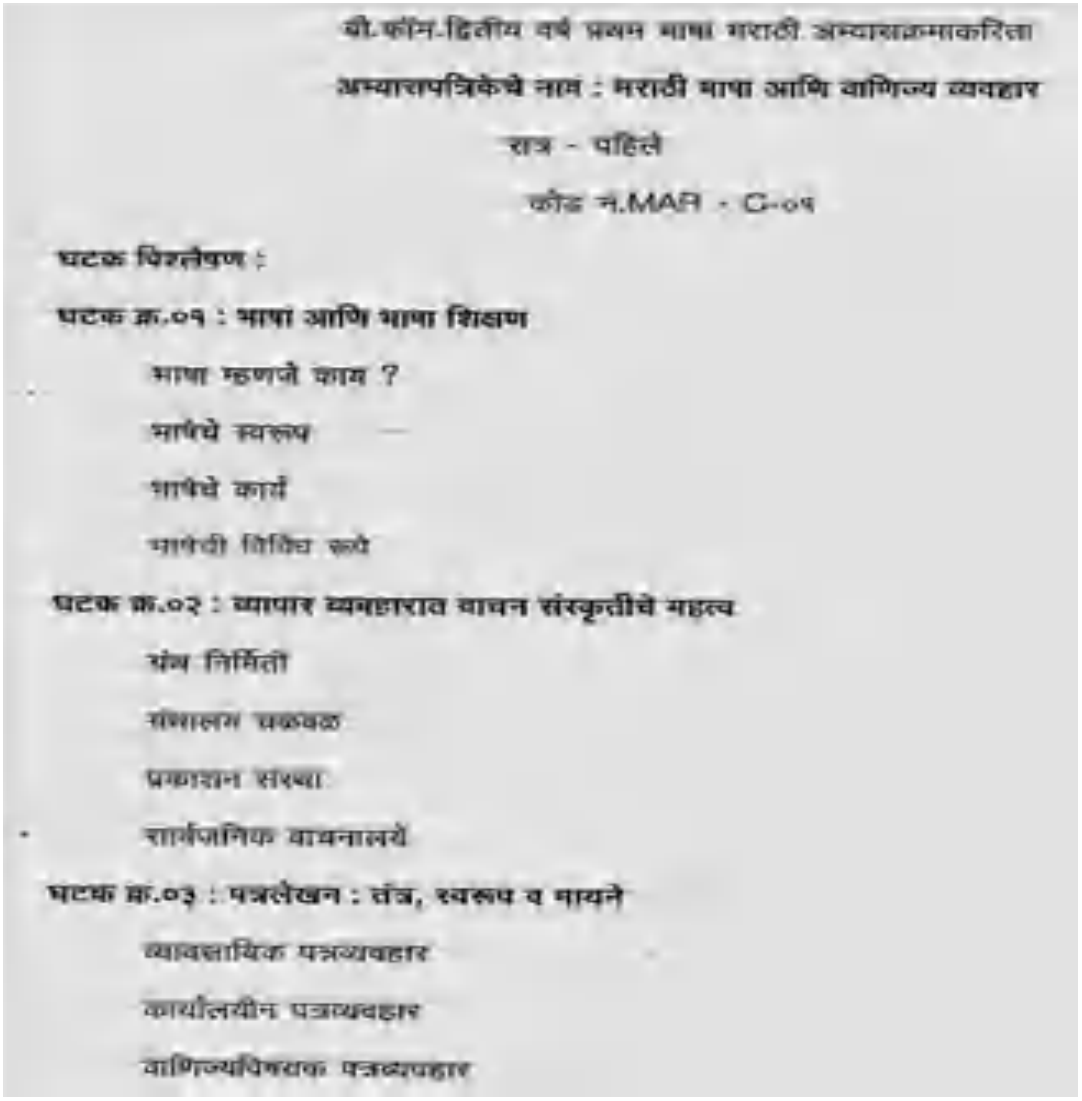
३) मराठी समाजावरील संगणकाचा प्रभाव

सामाजिक धोरणाचे मार्गदर्शन, नैसर्गिक आपत्तीचे पूर्वकथन, लोकसंख्याबद्दलचे मार्गदर्शन, निवडणूक व मतदान क्षेत्र, हवामानाचा अंदाज, वैज्ञानिक संशोधन, साहित्य क्षेत्रातील उपयोग, अंतराळ संशोधनाचे नियोजन

४) इंटरनेट : स्वरूप आणि कार्यप्रणाली

इंटरनेट : अर्थ आणि व्याख्या, वेबसाईट, ई- मेल, चॅट, सर्फिंग, डाऊनलोडिंग, अकाऊंट, इंटरनेटचा भारतीय समाजावरील प्रभाव - सामाजिक परिवर्तन, हवामानाचा अंदाज, सेवा उद्योग, संपर्क साधने , संदेशाची सुलभता, व्यापारातील वाढ.

Course outcome: - B.Com. II Year Marathi (First Language) (Paper – III)



बी.कॉम-द्वितीय वर्ष प्रथम भाषा मराठी अभ्यासक्रमासकरिता

अभ्यासपत्रिकेचे नाव : मराठी भाषा आणि वाणिज्य व्यवहार

सत्र - पहिले

कोड न.MAR - C-०५

घटक विश्लेषण :

घटक क्र.०१ : भाषा आणि भाषा शिक्षण

भाषा म्हणजे काय ?

भाषेचे स्वरूप

भाषेचे कार्य

भाषेची विविध रूपे

घटक क्र.०२ : व्यापार व्यवहारात वाचन संस्कृतीचे महत्व

ग्रंथ निर्मिती

ग्रंथालय चळवळ

प्रकाशन संस्था

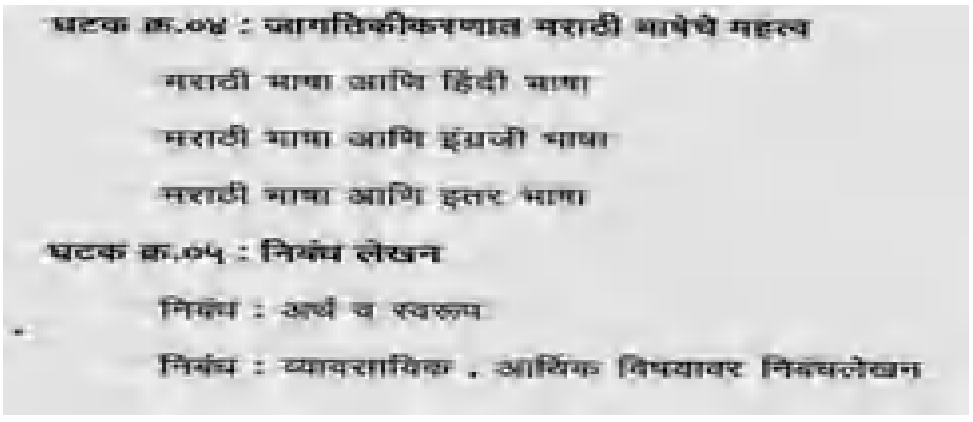
सार्वजनिक वाचनालये

घटक क्र.०३ : पत्रलेखन : तंत्र, स्वरूप व गमने

व्यावसायिक पत्रव्यवहार

कार्यालयीन पत्रव्यवहार

वाणिज्यविषयक पत्रव्यवहार



घटक क्र.०४ : जागतिकीकरणात मराठी भाषेचे महत्व

मराठी भाषा आणि हिंदी भाषा

मराठी भाषा आणि इंग्रजी भाषा

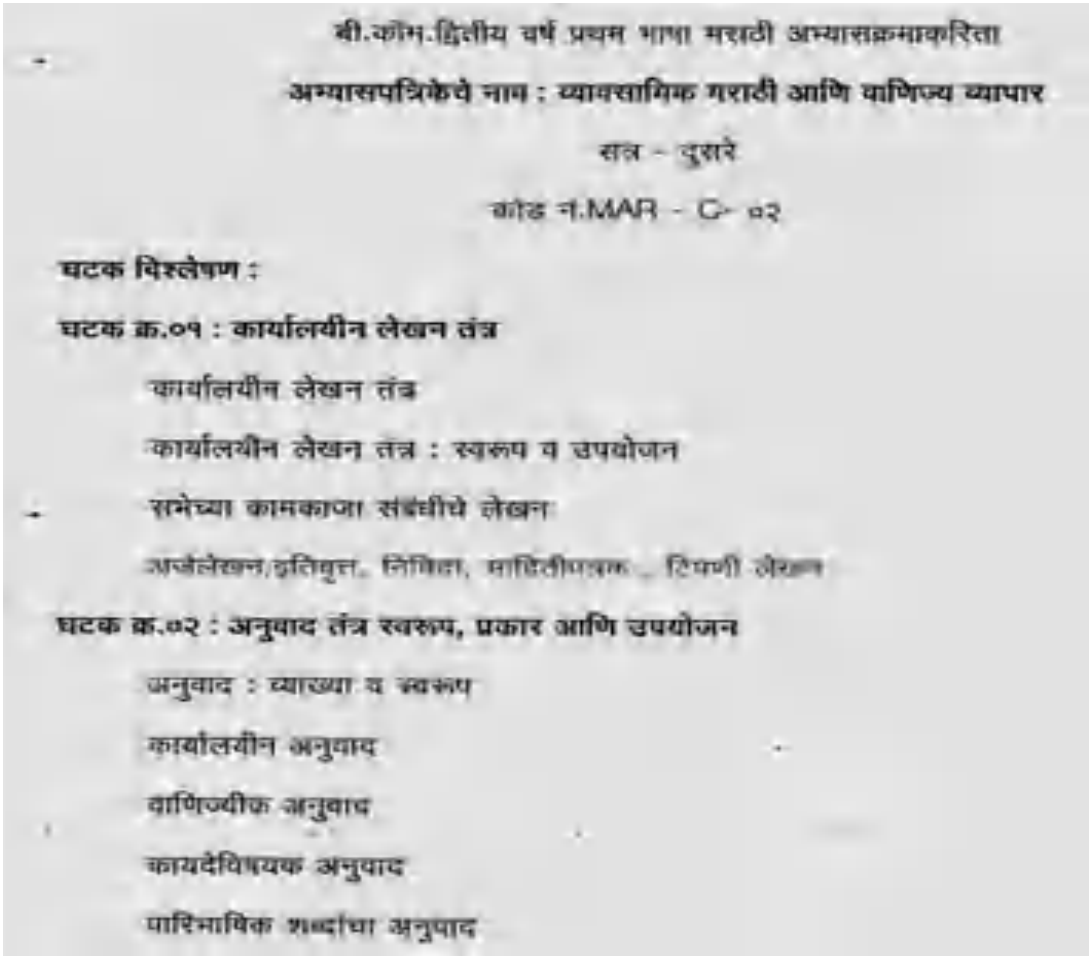
मराठी भाषा आणि इतर भाषा

घटक क्र.०५ : निबंध लेखन

निबंध : अर्थ व स्वरूप

निबंध : व्यावसायिक , आर्थिक विषयावर निबंधलेखन

Course outcome: - B.Com. II Year Marathi (First Language) (Paper – IV)



बी.कॉम.द्वितीय वर्ष प्रथम भाषा मराठी अभ्यासक्रमाकरिता

अभ्यासपत्रिकेचे नाव : व्यावसायिक मराठी आणि वाणिज्य व्यापार

सत्र - दुसरे

कोड न.MAR - C- ०२

घटक विश्लेषण :

घटक क्र.०१ : कार्यालयीन लेखन तंत्र

कार्यालयीन लेखन तंत्र

कार्यालयीन लेखन तंत्र : स्वरूप व उपयोजन

समेच्या कामकाजा संबंधीचे लेखन

अजेलेखन,इतिवृत्त, निविदा, माहितीपत्रक , टिपणी लेखन

घटक क्र.०२ : अनुवाद तंत्र स्वरूप, प्रकार आणि उपयोजन

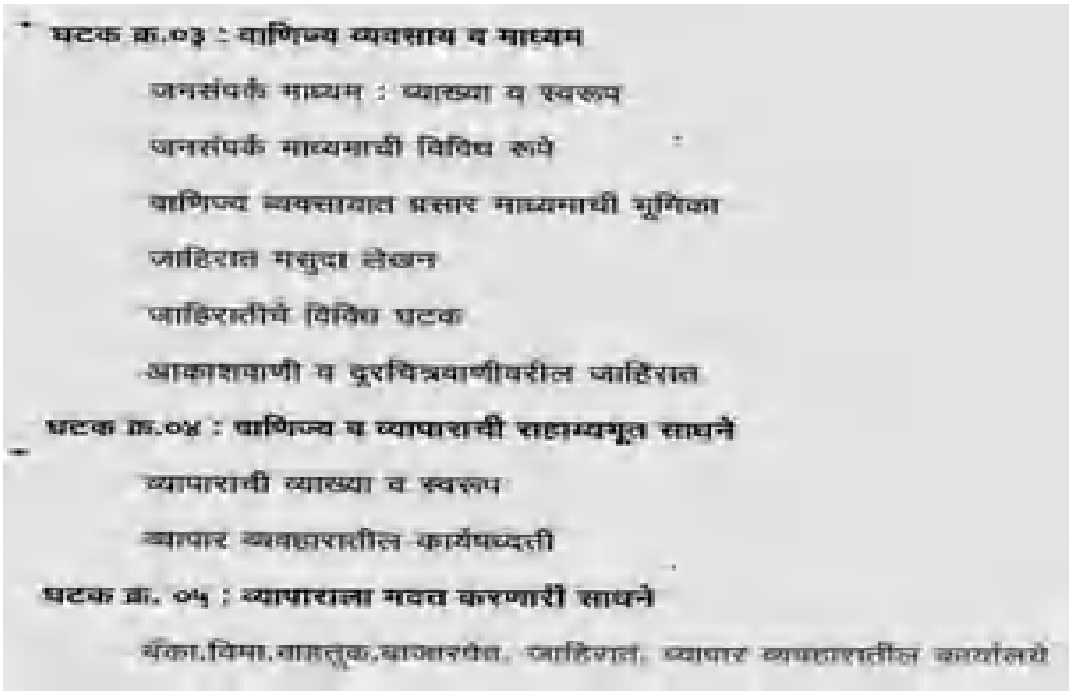
अनुवाद : व्याख्या व स्वरूप

कार्यालयीन अनुवाद

वाणिज्यीक अनुवाद

कायदेविषयक अनुवाद

पारिभाषिक शब्दांचा अनुवाद



घटक क्र.०३ : वाणिज्य व्यवसाय व माध्यम

जनसंपर्क माध्यम : व्याख्या व स्वरूप

जनसंपर्क माध्यमांची विविध रूपे

वाणिज्य व्यवसायात प्रसार माध्यमांची भूमिका

जाहिरात मसुदा लेखन

जाहिरातीचे विविध घटक

आकाशवाणी व दूरचित्रवाणीवरील जाहिरात

घटक क्र.०४ : वाणिज्य व व्यापाराची सहाय्यभूत साधने

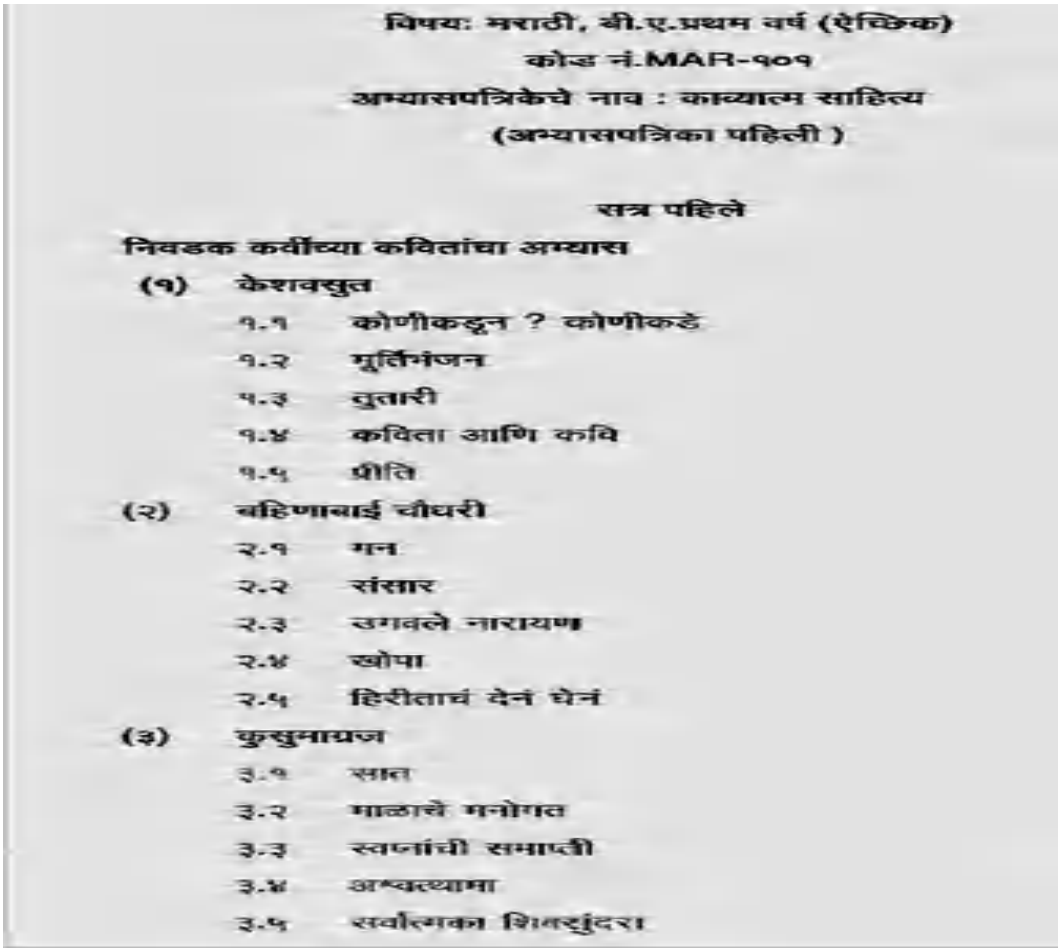
व्यापाराची व्याख्या व स्वरूप

व्यापार व्यवहारातील कार्यपध्दती

घटक क्र. ०५ : व्यापाराला मदत करणारी साधने

बँका,विमा,गोदाम,बाजारपेठ, जाहिरात, व्यापार व्यवहारातील कार्यालये

Course outcome: - B.A. I Year Marathi (Optional) (Paper – I)



विषय: मराठी, बी.ए.प्रथम वर्ष (ऐच्छिक)
कोड नं.MAR-१०१
अभ्यासपत्रिकेचे नाव : काव्यात्म साहित्य
(अभ्यासपत्रिका पहिली)

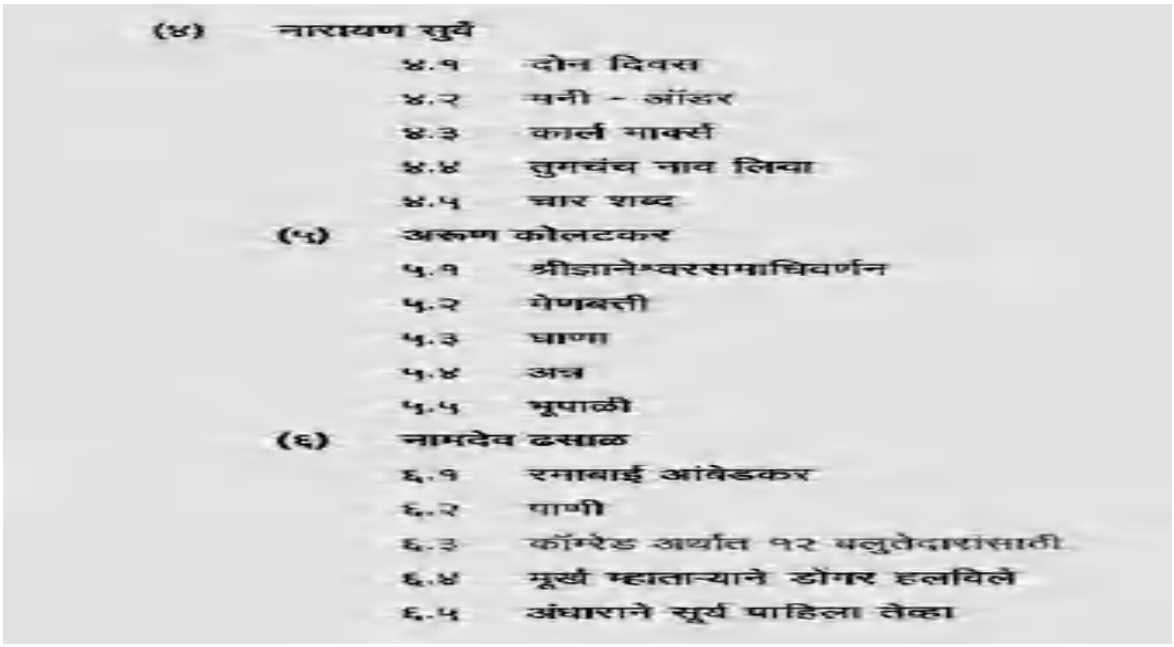
सत्र पहिले

निवडक कवींच्या कवितांचा अभ्यास

(१) केशवसुत
- १.१ कोणीकडून ? कोणीकडे
- १.२ मूर्तिभंजन
- १.३ तुतारी
- १.४ कविता आणि कवि
- १.५ प्रीति

(२) बहिणाबाई चौधरी
- २.१ मन
- २.२ संसार
- २.३ उगवले नारायण
- २.४ खोपा
- २.५ हिरीताचं देनं घेनं

(३) कुसुमाग्रज
- ३.१ सात
- ३.२ माळाचे मनोगत
- ३.३ स्वप्नांची समाप्ती
- ३.४ अश्वत्थामा
- ३.५ सर्वात्मका शिवसुंदरा



(४) नारायण सुर्वे
- ४.१ दोन दिवस
- ४.२ मनी – ऑर्डर
- ४.३ कार्ल मार्क्स
- ४.४ तुमचंच नाव लिहा
- ४.५ चार शब्द

(५) अरूण कोलटकर
- ५.१ श्रीज्ञानेश्वरसमाधिवर्णन
- ५.२ गेणबत्ती
- ५.३ घाण
- ५.४ अत्र
- ५.५ भूपाळी

(६) नामदेव ढसाळ
- ६.१ रमाबाई आंबेडकर
- ६.२ गाणी
- ६.३ कॉम्रेड अर्थात १२ बलुतेदारांसाठी
- ६.४ मूर्ख म्हाताऱ्याने डोंगर हलविले
- ६.५ अंधाराने सूर्य पाहिला तेव्हा

Course outcome: - B.A. I Year Marathi (Optional) (Paper – II)

विषय:मराठी बी.ए.प्रथम वर्ष (ऐच्छिक)

कोड नं.MAR-१०२

अभ्यासपत्रिकेचे नाव : नाट्यात्म साहित्य

(अभ्यासपत्रिका दुसरी)

सत्र पहिले

तासिका -६०

नाट्यात्म साहित्य

१. अ) फाटलेला पतंग ब) तिन्ही महिन्याची झाली नाही तोच - शंकर गोविंद दिवाकर

२. उपरे - रा.रं.बोराडे

३. मुलगी झाली हो..... - ज्योति म्हापसेकर

४. यातना उत्सव - बापू घोक्षे

Course outcome: - B.A. I Year Marathi (Optional) (Paper – III)

विषय: मराठी बी.ए.प्रथम वर्ष (ऐच्छिक)

कोड नं.MAR-१०३

अभ्यासपत्रिकेचे नाव : कथात्म साहित्य

(अभ्यासपत्रिका तिसरी)

सत्र दुसरे

कथात्म साहित्य

(१)	सरत्या पावसाळ्यांतील एक रात्र	- बी. रघुनाथ
(२)	भोमक्या	- अण्णाभाऊ साठे
(३)	अंत:करणाचे रत्नदीप	- विभावरी शिरूरकर
(४)	नदीकाठचा प्रकार	- द.मा.मिरासदार
(५)	गांधीजी २००१	- रंगनाथ पठारे
(६)	आपण माणसात जगा नाही	- राजन गवस
(७)	हिशोब	- भास्कर चंदनशिव
(८)	चौठी	- आबासाहेब वाघमारे
(९)	अण्णा	- एल.पी.जगिले
(१०)	केशी	- ज्ञा.रा.पंडित
(११)	तीन पायली दान	- कुमार खरात

Course outcome: - B.A. I Year Marathi (Optional) (Paper – IV)

विषय:मराठी बी.ए.प्रथम वर्ष (ऐच्छिक)

कोड नं.MAR-१०४

अभ्यासपत्रिकेचे नाव : मुद्रित माध्यमासाठी लेखन कौशल्ये

(अभ्यासपत्रिका चौथी)

सत्र दुसरे

तासिका-६०

मुद्रित माध्यमासाठी लेखन कौशल्य

१. वृत्तपत्राचे स्वरुप व महत्त्व

२. बातमी लेखन

३. स्तंभलेखन

४. मुलाखत

५. संवाद लेखन

६. अग्रलेख

७. समीक्षात्मक लेखन

८. जाहिरात लेखन

९. वाचकांची पत्रे

१०. निविदा तयार करणे

Course outcome: - B.A. II Year Marathi (Optional) (Paper – V)

विषय - बी.ए.मराठी द्वितीय वर्ष (ऐच्छिक) कोड नं. MAR -१०५

आधुनिक मराठी वाङ्मयाचा इतिहास (इ.स. १८०० ते इ.स.१९२०)

अभ्यास पत्रिका पाचवी

सत्र पहिले

घटक: १ - इ.स. १८०० ते इ.स. १८४४ या कालखंडाची सामाजिक व सांस्कृतिक पार्श्वभूमी

१.१ संस्कृतिची संकल्पना व स्वरूप
१.२ संस्कृती आणि इतिहास
१.३ संस्कृती आणि साहित्य अंतःसंबंध
१.४ साहित्य आणि सामाजिक दृष्टी
१.५ मुद्रणकलेचा उदय
१.६ शाळा पुस्तक मंडळी व ख्रिस्ती मिशनऱ्यांची पुस्तके
१.७ धार्मिक प्रबोधनाच्या चळवळी
१.८ नियतकालिकांचा उदय

घटक : २ - निबंध,स्वरूप,विशेष

२.१ लोकहितवादींची 'शतपत्रे' १८०० ते १८४४
२.२ महात्मा फुलेंचे लेखन
२.३ 'निबंधमाला' – इ.स.१८४४ ते इ.स.१९२०

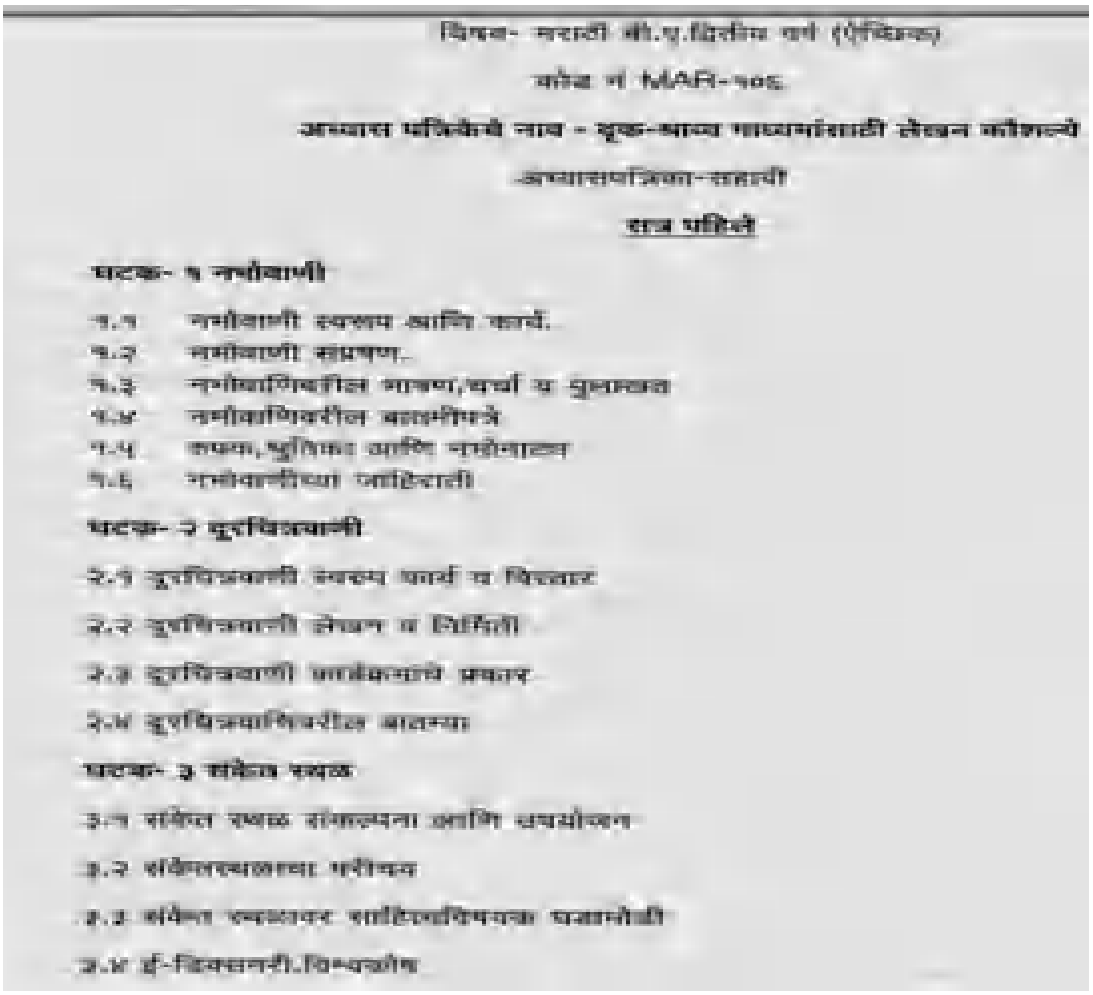
घटक : ३ - कथा - वाङ्मयाचे स्वरूप , विशेष

३.१ कथा वाङ्मयाच्या प्रारंभाचे स्वरूप
३.२ आम्बल इंग्रजी कालखंड
३.३ 'करमणूक' कालखंड

घटक : ४ - कादंबरी वाङ्मयाचे स्वरूप, विशेष

४.१ इ.स. १८५७ ते इ.स.१८८५ या काळातील कांदबरी
४.२ इ.स. १८८५ ते इ.स. १९२० या काळातील कादंबरी

Course outcome: - B.A. II Year Marathi (Optional) (Paper – VI)



विषय- मराठी बी.ए.द्वितीय वर्ष (ऐच्छिक)

कोड नं MAFI-१०६

अभ्यास पत्रिकेचे नाव - दृक-श्राव्य माध्यमांसाठी लेखन कौशल्ये

अभ्यासपत्रिका-सहावी

सत्र पहिले

घटक- १ नभोवाणी

१.१ नभोवाणी स्वरूप आणि कार्य.
१.२ नभोवाणी संप्रेषण.
१.३ नभोवाणीवरील भाषण,चर्चा व मुलाखत
१.४ नभोवाणीवरील बातमीपत्रे
१.५ रूपक,श्रुतिका आणि नाटीनाट्य
१.६ नभोवाणीच्या जाहिराती

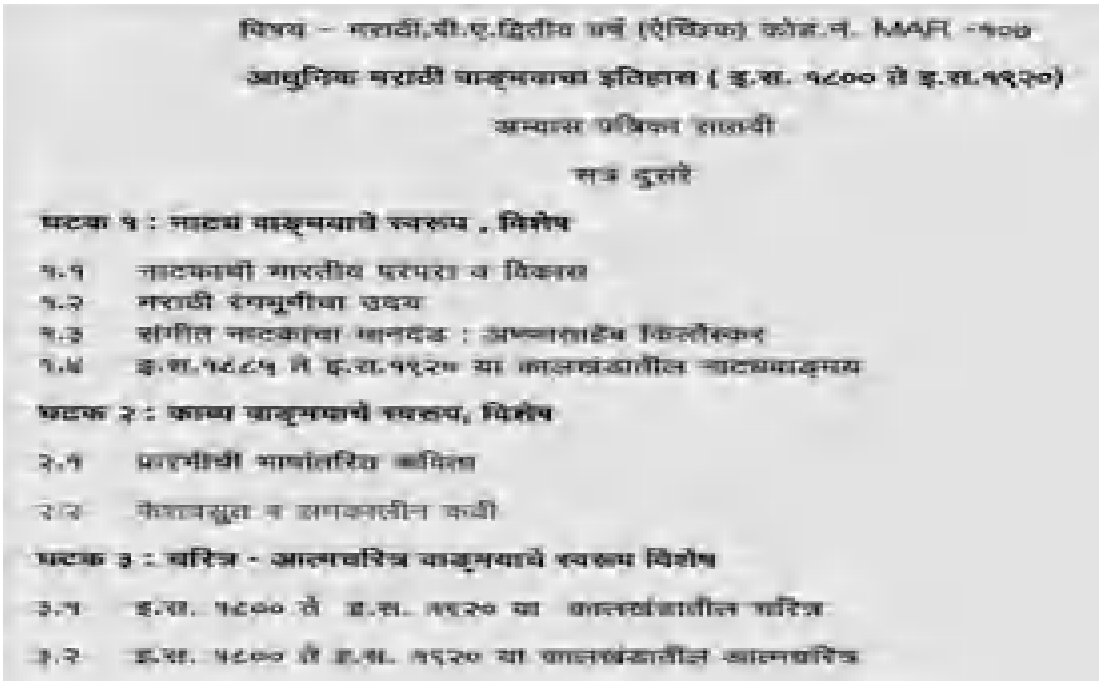
घटक- २ दूरचित्रवाणी

२.१ दूरचित्रवाणी स्वरूप कार्य व विस्तार
२.२ दूरचित्रवाणी लेखन व मर्यादा
२.३ दूरचित्रवाणी कार्यक्रमांचे प्रकार
२.४ दूरचित्रवाणीवरील बातम्या

घटक- ३ संकेत स्थळ

३.१ संकेत स्थळ संकल्पना आणि उपयोजन
३.२ संकेतस्थळांचा परीचय
३.३ संकेत स्थळावर माहितीसंविषयक मजकूरलेखन
३.४ ई-डिक्शनरी.विश्वकोश

Course outcome: - B.A. II Year Marathi (Optional) (Paper – VII)



विषय – मराठी,बी.ए.द्वितीय वर्ष (ऐच्छिक) कोड.नं. MAFI -१०७

आधुनिक मराठी वाङ्मयाचा इतिहास (इ.स. १८०० ते इ.स.१९२०)

अभ्यास पत्रिका सातवी

सत्र दुसरे

घटक १ : नाटक वाङ्मयाचे स्वरूप , विशेष

१.१ नाटकाची भारतीय परंपरा व विकास
१.२ मराठी रंगभूमीचा उदय
१.३ संगीत नाटकाचा कालखंड : अभ्यासाठीच किर्लोस्कर
१.४ इ.स.१८८५ ते इ.स.१९२० या कालखंडातील नाटकवाङ्मय

घटक २ : काव्य वाङ्मयाचे स्वरूप, विशेष

२.१ प्रासंगीक मार्गांतरित कविता
२.२ केशवसुत व समकालीन कवी

घटक ३ : चरित्र - आत्मचरित्र वाङ्मयाचे स्वरूप विशेष

३.१ इ.स. १८०० ते इ.स. १९२० या कालखंडातील चरित्र
३.२ इ.स. १८०० ते इ.स. १९२० या कालखंडातील आत्मचरित्र

Course outcome: - B.A. II Year Marathi (Optional) (Paper – VIII)

बी.ए.मराठी द्वितीय वर्ष (ऐच्छिक) सत्रनिहाय अभ्यासक्रम

अभ्यासपत्रिका आठवी (MAR १०८)

सत्र दुसरे — गुण : ५०

साहित्य प्रकारांतर आणि साहित्याचे माध्यमांतर — तासिका : ६०

घटक १. साहित्य प्रकारांतराची संकल्पना व स्वरुप

१.१) साहित्य प्रकारांतर म्हणजे काय ?

१.२) साहित्य प्रकारांतर : मूळ रचनाबंध मोडून नवा रचनाबंधाची निर्मिती.

१.३) वाङ्मय प्रकारांतराची लेखकाला पाटणारी आवश्यकता.

(उदा. एकांकिकेचे नाटक,कादंबरीचे नाटक करणे)

१.४) साहित्य प्रकारांतराची काही उदाहरणे.

घटक २. 'माध्यम' संकल्पना: प्रकार व वैशिष्ट्ये

२.१) माध्यमांची मांडणी : मुद्रित, श्राव्य व दृक-श्राव्य माध्यम

२.२) माध्यमे व साहित्य यांचा अनुबंध

२.३) माध्यमांसाठी साहित्याची आवश्यकता

२.४) माध्यम : आधुनिक काळाची गरज

घटक ३. माध्यमासाठीचे लेखन

३.१) मुद्रित माध्यमासाठीचे लेखन (स्थूल परिचय)

(सदर लेखन,स्फुटलेखन,अग्रलेख,ग्रंथपरीक्षण इ.)

३.२) श्राव्य माध्यमासाठीचे लेखन

(श्रुतिका व नभोनाट्य लेखन

३.३) दृक-श्राव्य माध्यमासाठीचे लेखन

(पटकथा लेखन (मालिकेसाठी), साहित्यविषयक अन्य कार्यक्रम उदा.वाचाल तर वाचाल, साहित्यविषयक गप्पा,मुलाखती इ.)

३.४) माध्यम लेखनाची वैशिष्ट्ये

(उदा. संवाद लेखन, चित्रिकरणाचे भान असणे, ध्वनी संयोजन, पार्श्वसंगीताचा वापर, कथेच्या गुंफणीतील रहस्यमयता इ.)

घटक ४. साहित्याचे माध्यमांतर (चित्रपटाच्या विशेष संदर्भात)

४.१) चित्रपट,पटकथा लेखनाचे स्वरुप.

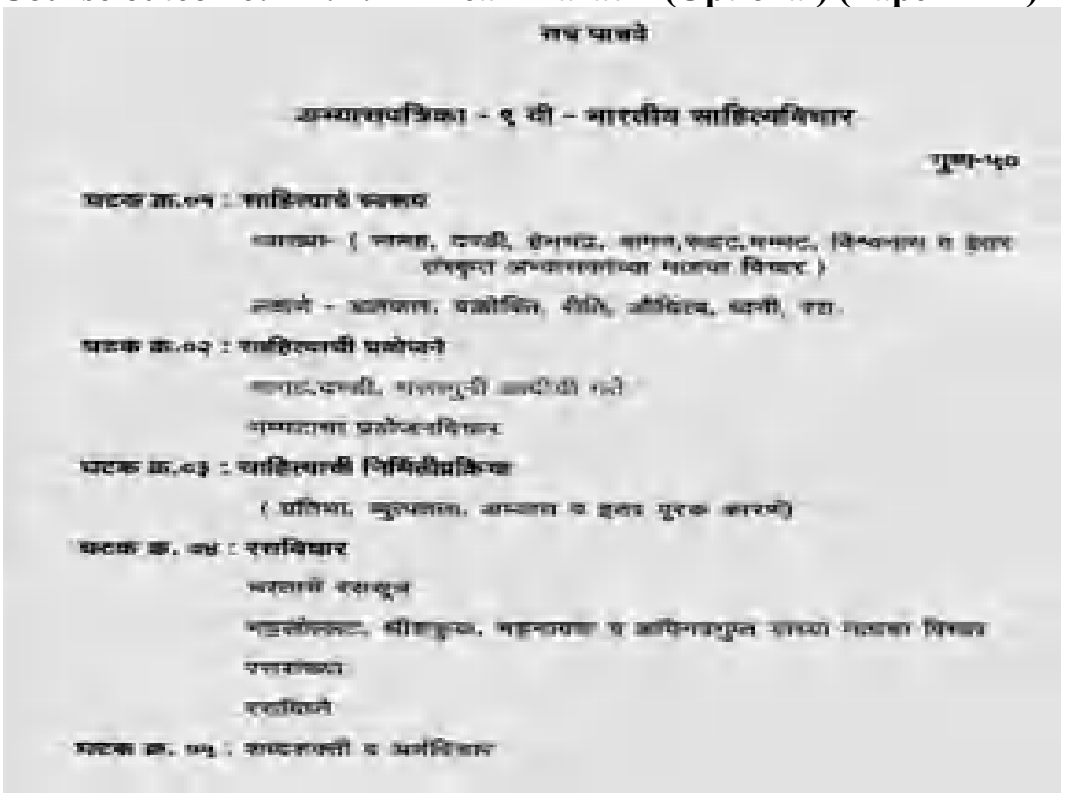
४.२) कथा वा कादंबरीवरुन चित्रपटकथा लेखनाचे वेगळेपण.

४.३) लघुपट व लघुपटाचे कथालेखन

४.४) मराठी साहित्य व चित्रपट : एक अनुबंध.

साहित्यकृती : १) नटरंग - आनंद यादव

Course outcome: - B.A. III Year Marathi (Optional) (Paper – IX)



सत्र पाचवे

अभ्यासपत्रिका - ९ वी – भारतीय साहित्यसिद्धांत

गुण-५०

घटक क्र.०१ : साहित्याचे स्वरूप

घटक क्र.०२ : साहित्यकर्ती प्रयोजने

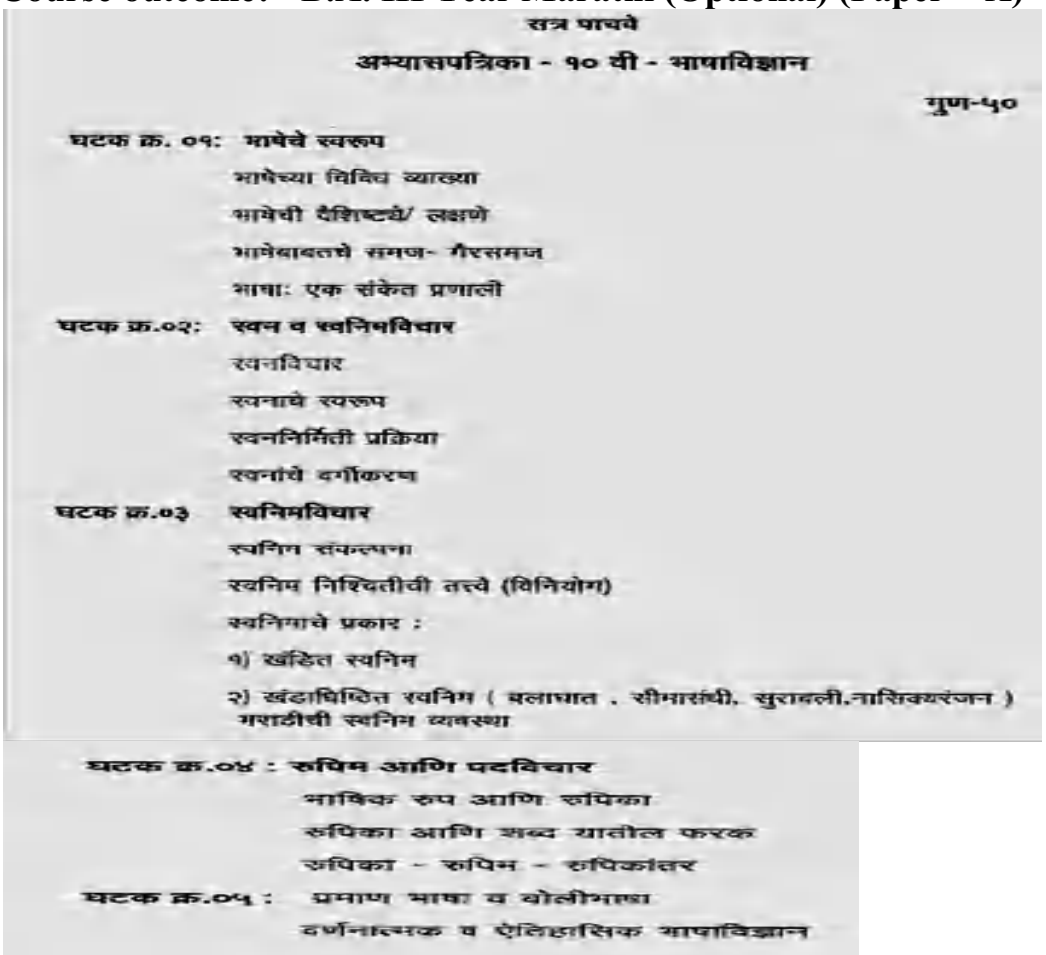
घटक क्र.०३ : साहित्यकर्ती निर्मितीप्रक्रिया

(प्रतिभा, व्युत्पत्ति, अभ्यास व इतर पूरक कारणे)

घटक क्र. ०४ : रससिद्धांत

घटक क्र. ०५ : शब्दशक्ती व अलंकारशास्त्र

Course outcome: - B.A. III Year Marathi (Optional) (Paper – X)



सत्र पाचवे

अभ्यासपत्रिका - १० वी - भाषाविज्ञान

गुण-५०

घटक क्र. ०१: भाषेचे स्वरूप

भाषेच्या विविध व्याख्या

भाषेची वैशिष्ट्ये/ लक्षणे

भाषेबाबतचे समज- गैरसमज

भाषा: एक संकेत प्रणाली

घटक क्र.०२: स्वन व स्वनिमविचार

स्वनविचार

स्वनाचे स्वरूप

स्वननिर्मिती प्रक्रिया

स्वनांचे वर्गीकरण

घटक क्र.०३ स्वनिमविचार

स्वनिम संकल्पना

स्वनिम निश्चितीची तत्त्वे (विनियोग)

स्वनिमाचे प्रकार :

१) खंडित स्वनिम

२) खंडाधिष्ठित स्वनिम (बलाघात , सीमासंधी, सुरावली,नासिक्यरंजन)

मराठीची स्वनिम व्यवस्था

घटक क्र.०४ : रुपिम आणि पदविचार

मार्किक रुप आणि रुपिका

रुपिका आणि शब्द यातील फरक

रुपिका - रुपिम - रुपिकांतर

घटक क्र.०५ : प्रमाण भाषा व बोलीभाषा

वर्णनात्मक व ऐतिहासिक भाषाविज्ञान

Course outcome: - B.A. III Year Marathi (Optional) (Paper – XI)

सत्र पाचवे

अभ्यासपत्रिका - ११ वी - मध्ययुगीन मराठी वाङ्मयाचा इतिहास (प्रारंभ ते १६००)

गुण-५०

उद्दिष्टे :-

1) यादवकालीन राजकीय, सांस्कृतिक, आर्थिक स्थिती-गती लक्षात घेऊन त्या काळात जी ग्रंथरचना झाली तिच्याबद्दल माहिती करून घेणे, ग्रंथनिर्मितीमागील प्रेरणा व त्यांचा प्रत्यक्ष ग्रंथरचनेवरील परिणाम अभ्यासणे.

2) बहामनीकाळ ग्रंथनिर्मितीमागील प्रेरणा व त्यांचा प्रत्यक्ष ग्रंथरचनेवरील परिणाम समजून घेणे.

3) तत्कालीन महाराष्ट्राचे पंथ, पंथकार व पंथविशेष यांचे आकलन करून घेणे.

घटक क्र. - १ मराठीचा प्रारंभकाल व मुकुंदराज

घटक क्र.- २ महानुभाव पंथ आणि त्याचे वाङ्मयीन कार्य

१) महानुभाव पंथाचे पंचकृष्ण
२) महानुभाव पंथाचे तत्त्वज्ञान
३) महानुभावांचे वाङ्मयीन कार्य
४) महानुभावियांचे गद्य साहित्य
५) महानुभावियांचे पद्य साहित्य

घटक क्र.- ३ वारकरी संप्रदाय आणि त्याचे वाङ्मयीन कार्य

१) संत ज्ञानेश्वर
२) संत नामदेव
३) ज्ञानेश्वर पंचक
४) जनाबाई
५) चोखामेळा
६) कर्ममेळा
७) गोराकुंभार
८) विसोबा खेचर
९) सावता माळी
१०) नरहरी सोनार
११) परिसा भागवत
१२) सेना न्हावी
१३) कान्होपात्रा

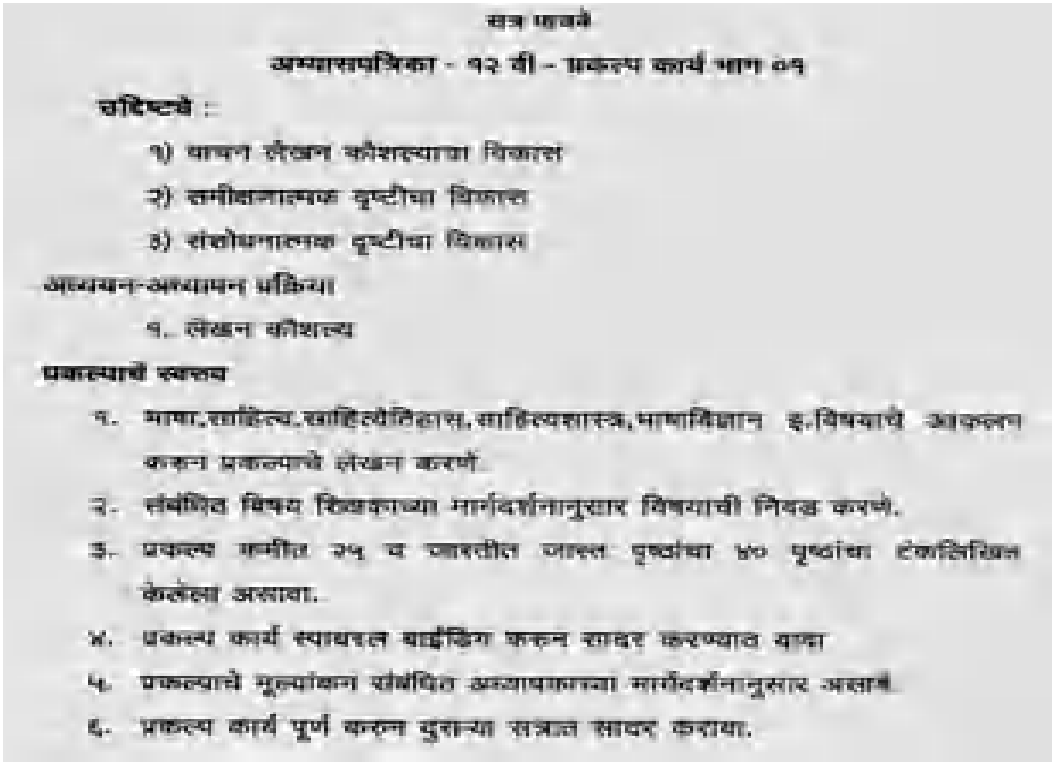
घटक क्र.- ४ बहामनीकालीन मराठी साहित्य

१) दत्त संप्रदाय
२) दासोपंत
३) संत एकनाथ
४) संत एकनाथांची वाङ्मय रचना

घटक क्र. -५ संत तुकाराम आणि संत रामदास

१) संत तुकाराम
२) संत तुकारामांची गाथा
३) संत तुकारामांचे कवित्व
४) समर्थ रामदास
५) संत रामदासांचे साहित्य

Course outcome: - B.A. III Year Marathi (Optional) (Paper – XII)



सत्र पहावे

अभ्यासपत्रिका - १२ वी – प्रकल्प कार्य भाग ०१

उद्दिष्टे :

१) वाचन लेखन कौशल्याचा विकास

२) समीक्षात्मक दृष्टीचा विकास

३) संशोधनात्मक दृष्टीचा विकास

अध्ययन-अध्यापन प्रक्रिया

१. लेखन कौशल्य

प्रकल्पाचे स्वरूप

१. भाषा,साहित्य,साहित्येतिहास,साहित्यशास्त्र,भाषाविज्ञान इ.विषयाचे अवलोकन करून प्रकल्पाचे लेखन करणे.

२. संबंधित विषय शिक्षकाच्या मार्गदर्शनानुसार विषयाची निवड करणे.

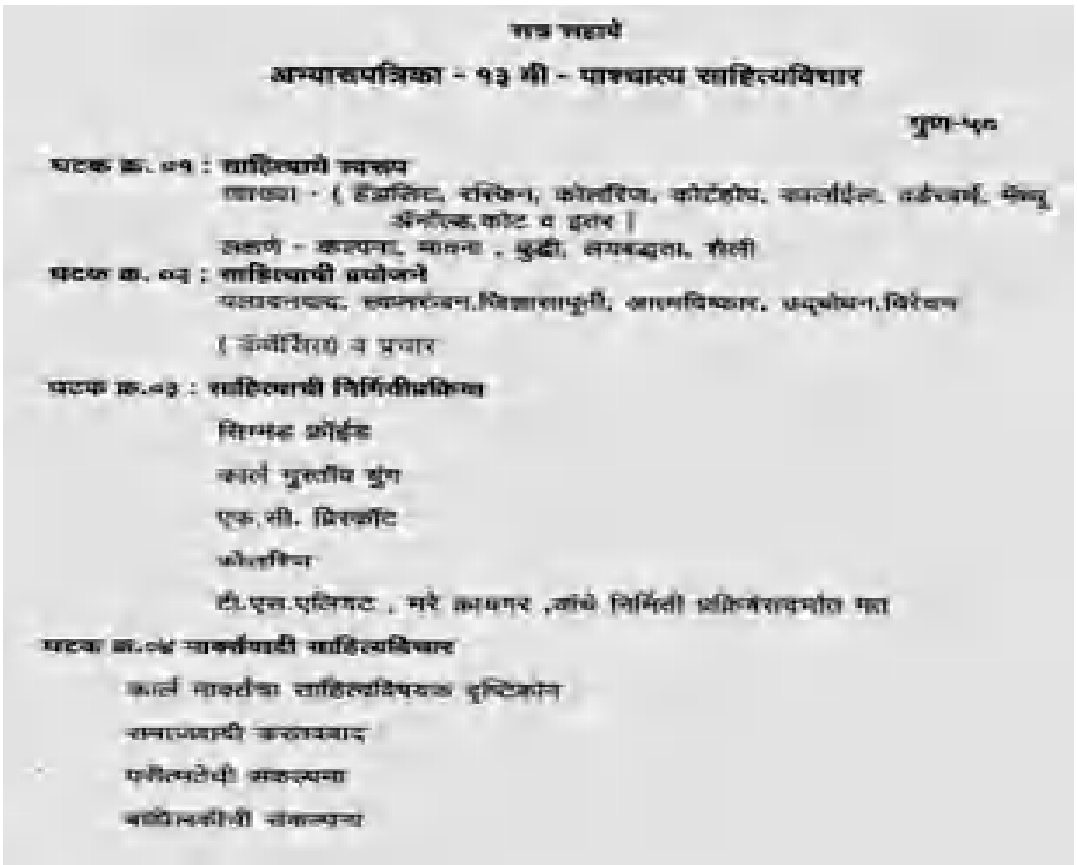
३. प्रकल्प वही ३५ व त्यापेक्षा जास्त पृष्ठांचा ४० पृष्ठांचा टंकलिखित केलेला असावा.

४. प्रकल्प कार्य स्वाध्यायल बाईंडिंग करून सादर करण्यात यावा

५. प्रकल्पाचे मूल्यांकन संबंधित अध्यापकाच्या मार्गदर्शनानुसार असावे

६. प्रकल्प कार्य पूर्ण करून दुसऱ्या सत्रात सादर करावा.

Course outcome: - B.A. III Year Marathi (Optional) (Paper – XIII)



सत्र सहावे

अभ्यासपत्रिका - १३ वी - पाश्चात्य साहित्यविचार

गुण-५०

घटक क्र. ०१ : साहित्याचे स्वरूप

व्याख्या - (ॲरिस्टॉटल, रस्किन, कोलरिज, कोटेहोप, कार्लाईल, मॅथ्यू ॲर्नोल्ड,क्रोट व इतर)

लक्षणे - कल्पना, भावना , बुद्धी, लयबद्धता, शैली

घटक क्र. ०२ : साहित्याची प्रयोजने

(ॲरिस्टॉटल व प्लेटो

घटक क्र.०३ : साहित्याची निर्मितीप्रक्रिया

सिग्मंड फ्रॉईड

कार्ल युंगचा सिद्धांत

एफ.सी. प्रिस्कॉट

कोलरिज

टी.एस.एलियट , मरे क्रमवार ,यांचे निर्मिती प्रक्रियेसंदर्भात मत

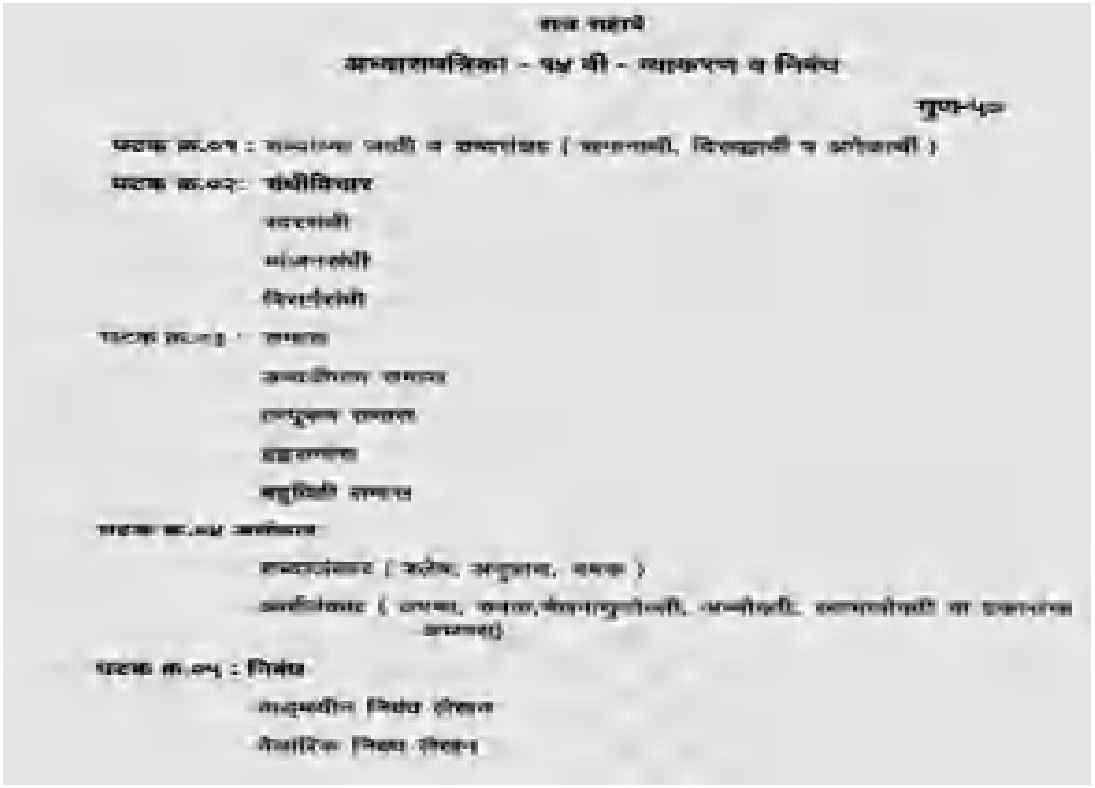
घटक क्र.०४ मार्क्सवादी साहित्यविचार

कार्ल मार्क्सचा साहित्यविषयक दृष्टिकोन

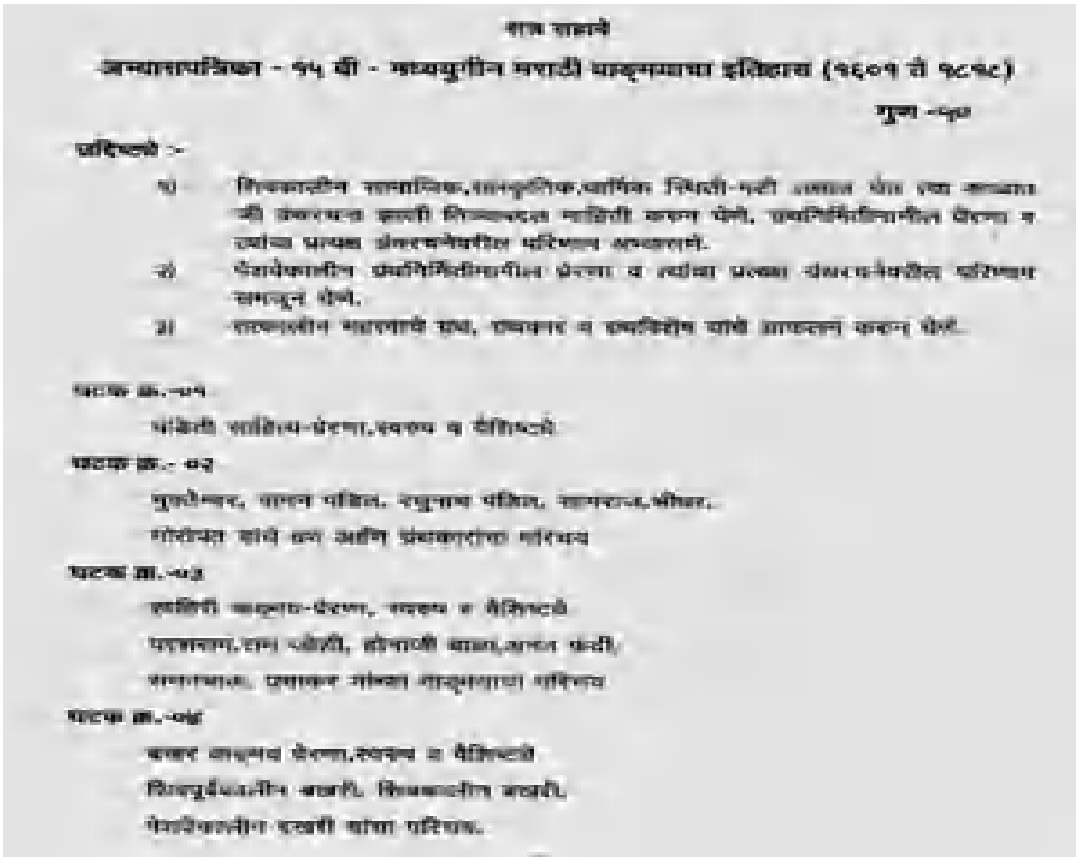
समाजवास्तवाची संकल्पना

फ्रेडरिक एंगल्सची संकल्पना

Course outcome: - B.A. III Year Marathi (Optional) (Paper – XIV)



Course outcome: - B.A. III Year Marathi (Optional) (Paper – XV)



Course outcome: - B.A. III Year Marathi (Optional) (Paper – XVI)

सत्र पाचवे

अभ्यासपत्रिका - १६ वी - प्रकल्प कार्य भाग ०२

गुण- १००

उद्दिष्टये :

१) वाचन लेखन कौशल्याचा विकास
२) समीक्षणात्मक दृष्टीचा विकास
३) संशोधनात्मक दृष्टीचा विकास
४) सिमा भागातील व आपल्या प्रादेशिक विशेषांचा भाषिक अभ्यास व संशोधन करणे.
५) भाषा बोलीचे शब्दविशेष नोंदविणे.
६) लोकजीवनातील ओवी,लोकगीते,उखाणे,लोककथा इ.संकलन व मूल्यमापन करणे.

अध्ययन-अध्यापन प्रक्रिया

१. लेखन कौशल्य

प्रकल्पाचे स्वरुप

१. भाषा,साहित्य,साहित्येतिहास,साहित्यशास्त्र,भाषाविज्ञान इ.विषयाचे आकलन करुन प्रकल्पाचे लेखन करणे.
२. संबंधित विषय शिक्षकाच्या मार्गदर्शनानुसार विषयाची निवड करणे.
३. प्रकल्प कमीत कमी २५ व जास्तीत जास्त ४० पृष्ठांचा टंकलिखित केलेला असावा.
४. प्रकल्प कार्य स्पायरल बाईंडिंग करुन सादर करण्यात यावा.
५. प्रकल्पाचे मूल्यांकन संबंधित अध्यापकाच्या मार्गदर्शनानुसार असावे.

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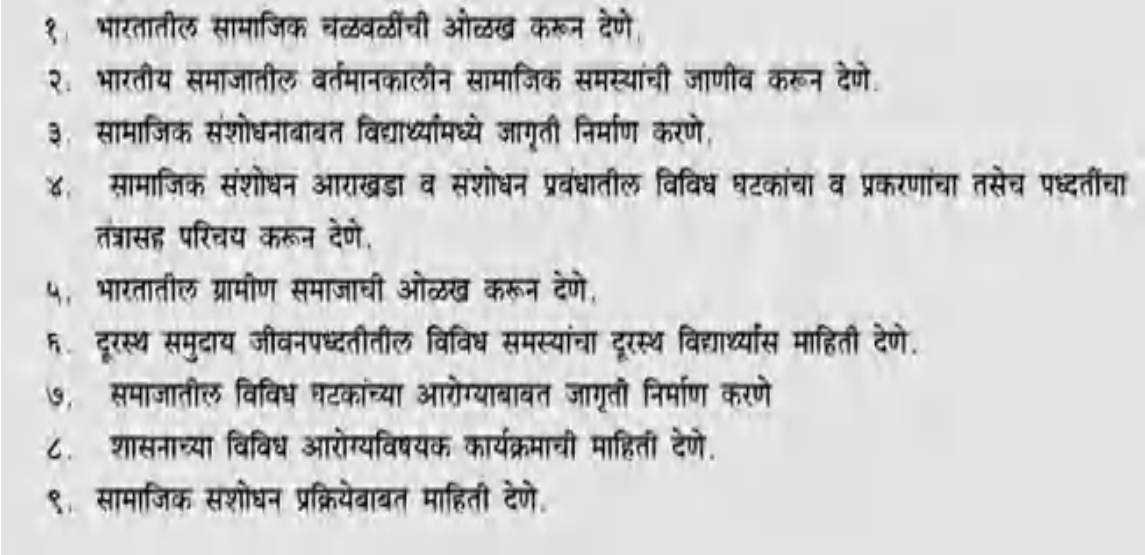
Department of Sociology

Programme Outcomes (PO)



१. भारतातील सामाजिक चळवळींची ओळख करून देणे.
२. भारतीय समाजातील वर्तमानकालीन सामाजिक समस्यांची जाणीव करून देणे.
३. सामाजिक संशोधनाबाबत विद्यार्थ्यांमध्ये जागृती निर्माण करणे.
४. सामाजिक संशोधन आराखडा व संशोधन प्रबंधातील विविध घटकांचा व प्रकरणांचा तसेच पध्दतींचा तंत्रासह परिचय करून देणे.
५. भारतातील ग्रामीण समाजाची ओळख करून देणे.
६. दूरस्थ समुदाय जीवनपध्दतीतील विविध समस्यांचा दूरस्थ विद्यार्थ्यांस माहिती देणे.
७. समाजातील विविध घटकांच्या आरोग्याबाबत जागृती निर्माण करणे
८. शासनाच्या विविध आरोग्यविषयक कार्यक्रमाची माहिती देणे.
९. सामाजिक संशोधन प्रक्रियेबाबत माहिती देणे.

- **PO1:** Learn origin and development of Sociology and its relations with other social science subjects.
- **PO2:** Introduce students with various social systems and their utility.
- **PO3:** Make students aware of basic social concepts like society, community, groups, etc.
- **PO4:** Teach them the importance of socialisation, culture, social control, etc.
- **PO5:** Introduce students with tribal, rural and civil societies.
- **PO6:** bring primary Indian systems like family, caste, marriage, class to the notice of students.
- **PO7:** make students aware of several social problems, their causes and remedies thereof.
- **PO8:** Introduce students with origin, nature and ambit of Social Anthropology and its relations with other social science branches.
- **PO9:** Bring various social systems of tribal community like family, clan, marriage to the notice of students.
- **PO10:** Introduce students with tribal economy, faith, religion, magic and their political systems.
- **PO11:** Inform students about Problems of tribal, reformative programs and various schemes addressing their problems.

Programme Specific Outcomes (PSO)

१. सामाजिक समस्येचा अर्थ आणि स्वरूप समजून घेता येईल.
२. सामाजिक समस्येची कारणे स्पष्ट करता येतील.
३. सामाजिक विघटनाचा अर्थ आणि स्वरूप स्पष्ट करता येईल.
४. सामाजिक विघटनाची कारणे सांगता येतील.
५. भारतीय समाजातील ज्वलंत समस्या – शेतकरी आत्महत्या स्पष्ट करता येईल.
६. शेतकरी आत्महत्येची कारणे स्पष्ट करता येतील.
७. शेतकरी आत्महत्येवर उपाययोजना सांगता येतील.

१. दारिद्र्याचा अर्थ समजून घेता येईल.
२. दारिद्र्याचे स्वरूप स्पष्ट करता येईल.
३. दारिद्र्याची कारणे समजून घेण्यास मदत होईल.
४. दारिद्र्याचे परिणाम स्पष्ट करता येतील.
५. दारिद्र्यावर उपाय सांगता येतील.

६. लैंगिक शोषण आणि पिळवणुकीचा अर्थ व स्वरूप समजून घेता येईल.
७. लैंगिक शोषण आणि पिळवणुकीची कारणे स्पष्ट करता येतील.
८. लैंगिक शोषण आणि पिळवणुकीचे परिणाम विशद करता येतील.

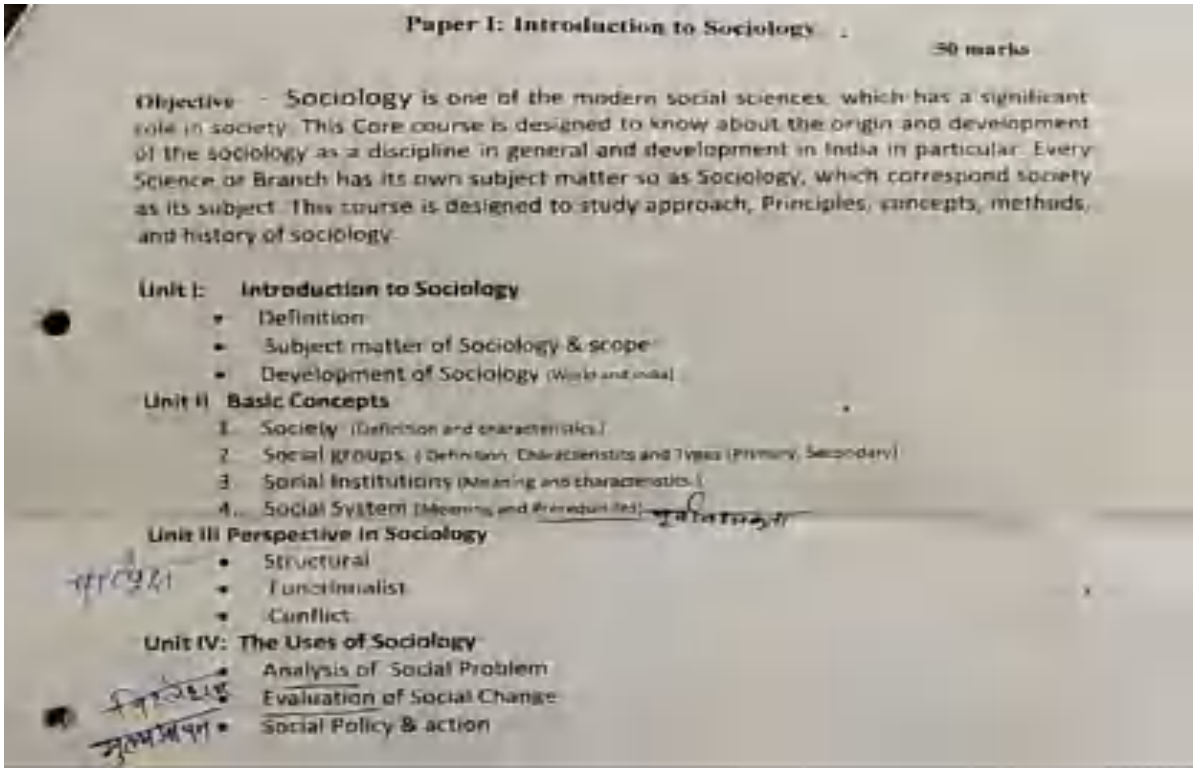
१. हुंड्याचा अर्थ आणि स्वरूप स्पष्ट करता येईल.
२. हुंडा पद्धतीची कारणे समजून घेता येतील.
३. हुंडा पद्धतीचे परिणाम विशद करता येतील.
४. हुंडा समस्येवर उपाययोजना सांगता येतील.
५. कौटुंबिक हिंसाचाराचा अर्थ व स्वरूप स्पष्ट करता येईल.
६. कौटुंबिक हिंसाचाराची कारणे विशद करता येतील.
७. वृद्धांचा समस्येच्या अर्थ आणि स्वरूप स्पष्ट करता येईल.
८. वृद्धावस्थेतील समस्या समजून घेता येतील.
९. वृद्धांच्या समस्येची कारणे सांगता येतील.
१०. वृद्धांच्या समस्येवर उपाययोजना विशद करता येतील.

- **PSO1:** Introduce students to social institution, organizations and their nature, work and utility.
- **PSO2:** Create awareness among students about various social problems their nature and causes and to study and find out remedies.
- **PSO3:** Teach students about social values and norms and cultivate ideal citizens
- **PSO4:** Introduce students with tribal society and culture, their problems and develop positive attitude towards them.

Course Outcomes (CO): Sociology

By the completion of this course the student will be able to

Course outcome: Paper- I



Paper I: Introduction to Sociology 50 marks

Objective – Sociology is one of the modern social sciences, which has a significant role in society. This Core course is designed to know about the origin and development of the sociology as a discipline in general and development in India in particular. Every Science or Branch has its own subject matter so as Sociology, which correspond society as its subject. This course is designed to study approach, Principles, concepts, methods, and history of sociology.

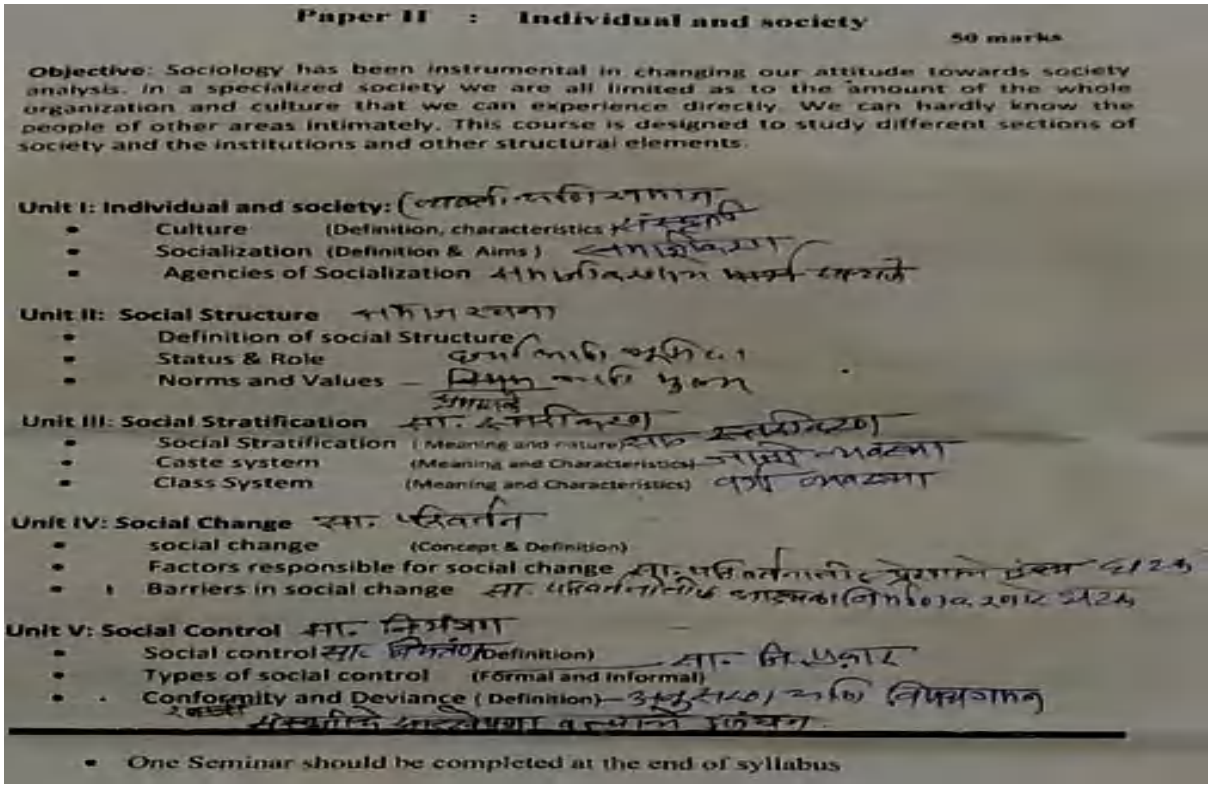
Unit I: Introduction to Sociology
- Definition
- Subject matter of Sociology & scope
- Development of Sociology (World and India)

Unit II Basic Concepts
1. Society (Definition and characteristics)
2. Social groups (Definition, Characteristics and Types (Primary, Secondary)
3. Social Institutions (Meaning and characteristics)
4. Social System (Meaning and Prerequisites)

Unit III Perspective in Sociology
- Structural
- Functionalist
- Conflict

Unit IV: The Uses of Sociology
- Analysis of Social Problem
- Evaluation of Social Change
- Social Policy & action

Course outcome: Paper- II



Paper II : Individual and society 50 marks

Objective: Sociology has been instrumental in changing our attitude towards society analysis. In a specialized society we are all limited as to the amount of the whole organization and culture that we can experience directly. We can hardly know the people of other areas intimately. This course is designed to study different sections of society and the institutions and other structural elements.

Unit I: Individual and society:
- Culture (Definition, characteristics)
- Socialization (Definition & Aims)
- Agencies of Socialization

Unit II: Social Structure
- Definition of social Structure
- Status & Role
- Norms and Values

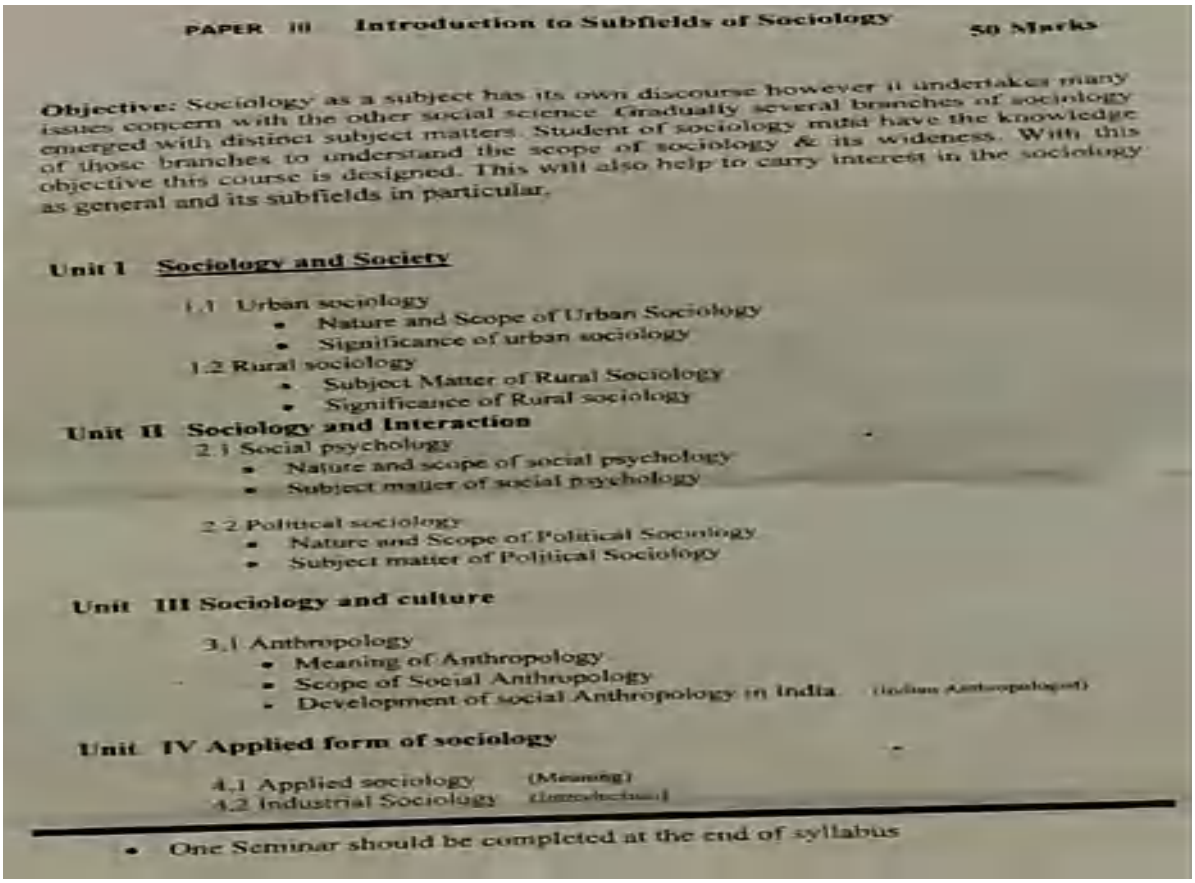
Unit III: Social Stratification
- Social Stratification (Meaning and nature)
- Caste system (Meaning and Characteristics)
- Class System (Meaning and Characteristics)

Unit IV: Social Change
- social change (Concept & Definition)
- Factors responsible for social change
- Barriers in social change

Unit V: Social Control
- Social control (Definition)
- Types of social control (Formal and Informal)
- Conformity and Deviance (Definition)

- One Seminar should be completed at the end of syllabus

Course outcome: Paper- III



PAPER III **Introduction to Subfields of Sociology** 50 Marks

Objective: Sociology as a subject has its own discourse however it undertakes many issues concern with the other social science. Gradually several branches of sociology emerged with distinct subject matters. Student of sociology must have the knowledge of those branches to understand the scope of sociology & its wideness. With this objective this course is designed. This will also help to carry interest in the sociology as general and its subfields in particular.

Unit I Sociology and Society

1.1 Urban sociology
- Nature and Scope of Urban Sociology
- Significance of urban sociology

1.2 Rural sociology
- Subject Matter of Rural Sociology
- Significance of Rural sociology

Unit II Sociology and Interaction

2.1 Social psychology
- Nature and scope of social psychology
- Subject matter of social psychology

2.2 Political sociology
- Nature and Scope of Political Sociology
- Subject matter of Political Sociology

Unit III Sociology and culture

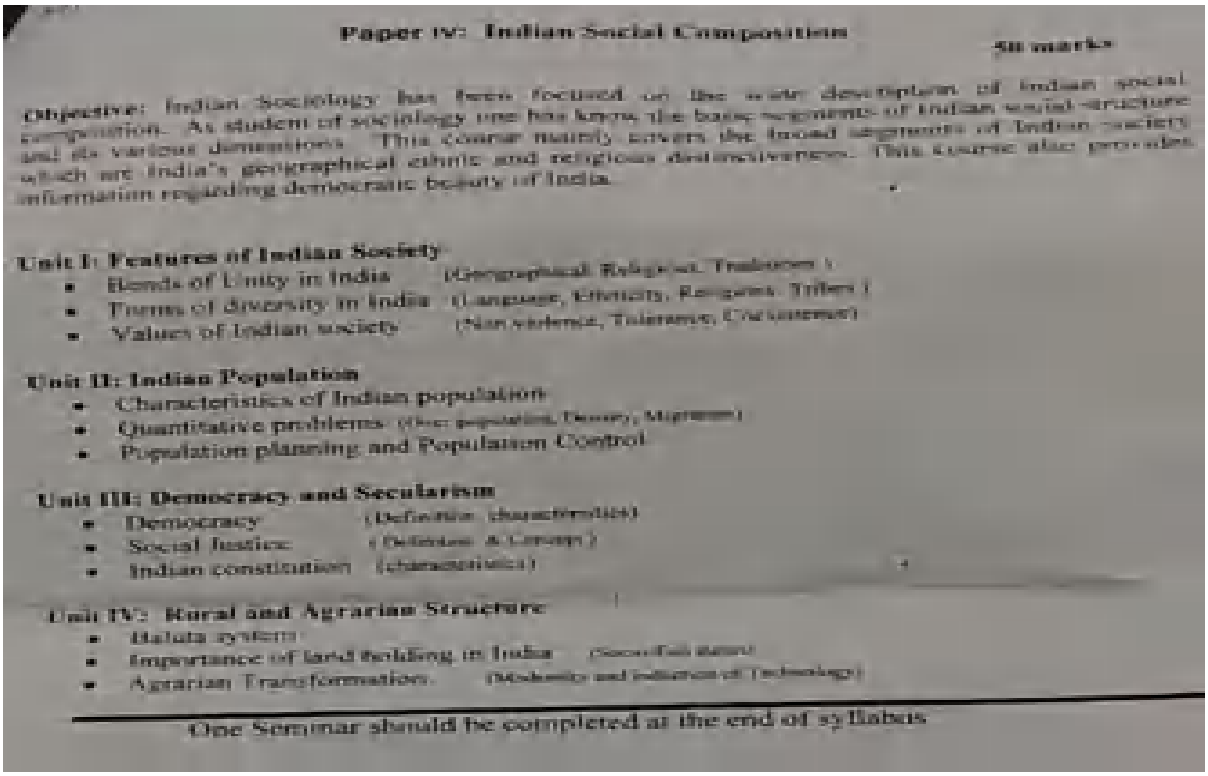
3.1 Anthropology
- Meaning of Anthropology
- Scope of Social Anthropology
- Development of social Anthropology in India (Indian Anthropologist)

Unit IV Applied form of sociology

4.1 Applied sociology (Meaning)
4.2 Industrial Sociology (Introduction)

- One Seminar should be completed at the end of syllabus

Course outcome: Paper- IV



Paper IV: Indian Social Composition 50 marks

Objective: Indian Sociology has been focused on the [illegible] development of Indian social composition. As student of sociology one has know the basic segments of Indian social structure and its various dimensions. This Course mainly covers the broad segments of Indian society which are India's geographical ethnic and religious distinctiveness. This course also provides information regarding democratic beauty of India.

Unit I: Features of Indian Society
- Bonds of Unity in India (Geographical, Religious, Traditions)
- Forms of diversity in India (Language, Ethnicity, Religion, Tribes)
- Values of Indian society (Non violence, Tolerance, Co-existence)

Unit II: Indian Population
- Characteristics of Indian population
- Quantitative problems (Size: population, Density), Migration)
- Population planning and Population Control

Unit III: Democracy and Secularism
- Democracy (Definition, characteristics)
- Social Justice (Definition & Concept)
- Indian constitution (characteristics)

Unit IV: Rural and Agrarian Structure
- Balata system
- Importance of land holding in India (Socio-Economic status)
- Agrarian Transformation (Modernity and influence of Technology)

One Seminar should be completed at the end of syllabus

Course outcome: Paper V

Problems of Rural India

Objectives: It is very important to focus on studies about Rural Development in country like India where a large section of population still living in rural areas. Rural life is affected by the changes taking places at world around. A student of Sociology must be aware about the changing scenario of Rural India and the contemporary problems of rural development: this course is designed with these objectives.

Unit I: Institutional Issues
- Disintegration of Rural Family
- Problems of rural women (Education and Health)
- Domestic Violence: Dowry

Unit II: Education and Health
- Dropout in Education
- Problem of illiteracy
- Community Health and Malnutrition

Unit III: Rural Economy
- Problem of Landless Labours
- Problem of Rural Industries
- Developmental Projects and displacement

Unit IV: Major issues in Development
- Rural unemployment- causes and remedies
- Corruption in governmental schemes
- Indebtedness (Non Institutional Finance)

Course outcome: Paper VI

Contemporary Urban Issues

Objective: Urbanization is irreversible process in all over world so as in India. The number of cities and the demographic population is increasing day by day. As the result of it several issues of planning and distribution of means are raised, so this course is design to create understanding and analytical capacity among students about urbanization, urban Communities, urban planning and urban problems.

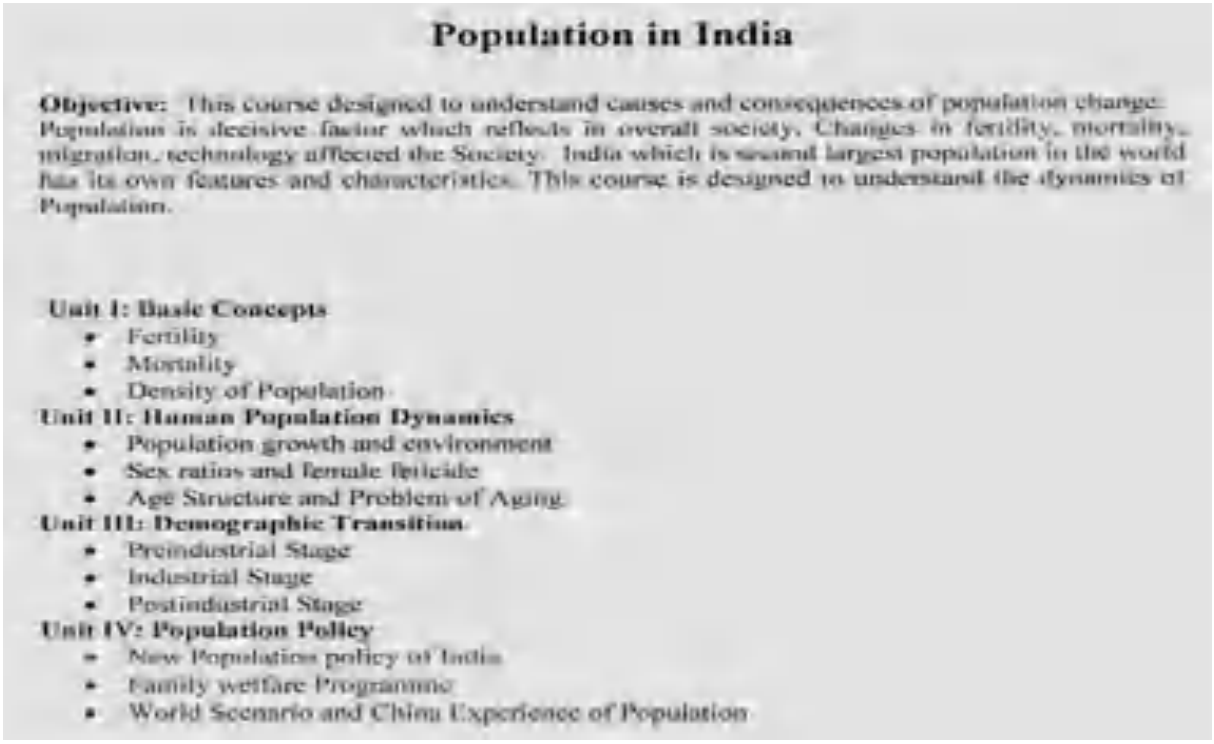
Unit I: Urbanization
- Meaning, Definition of Urbanization
- Emergence of cities
- Migration

Unit II: Problems of Urbanization
- Unemployment and Poverty
- Crime, Prostitution
- Juvenile delinquency

Unit III: Urban Planning
- Housing and Slums
- Urban infrastructure
- Scarcity of space

Unit IV: Globalization and urban change
- Implications of globalization for cities and planning
- Mega Projects
- Jawaharlal Nehru Urban Renewal Mission

Course outcome: Paper VII



Population in India

Objective: This course designed to understand causes and consequences of population change. Population is decisive factor which reflects in overall society. Changes in fertility, mortality, migration, technology affected the Society. India which is second largest population in the world has its own features and characteristics. This course is designed to understand the dynamics of Population.

Unit I: Basic Concepts
- Fertility
- Mortality
- Density of Population

Unit II: Human Population Dynamics
- Population growth and environment
- Sex ratios and female feticide
- Age Structure and Problem of Aging

Unit III: Demographic Transition
- Preindustrial Stage
- Industrial Stage
- Postindustrial Stage

Unit IV: Population Policy
- New Populations policy of India
- Family welfare Programme
- World Scenario and China Experience of Population

Course outcome: Paper VIII

Sociology of Development

Objective: Development is broad and critical process which makes impact on society. The development of human society has come across many stages. The outreach of any development has created many issues too. Sociology has taken 'Development' as a diverse discourse to study. This course provides a broad introduction to many development Issues in India.

Unit I: Conceptual Perspectives on Development
- Development and Underdevelopment
- Sustainable Development
- Social Audit

Unit II: Development Issues
- Development and socio-economic disparities
- Gender and development
- Problems of Weaker Sections

Unit III: Development Approaches
- Capitalist view
- Socialist view
- Mixed approach

Unit IV: Indian experience of development
- Government schemes (problems and Impact)
- Consequences of L.P.G. (Competition and Conflict)
- Developmental issues of Marathwada (Unemployment ,Infrastructure and Education)

Course outcome: Paper IX

Paper IX - Sociological Traditions

Objectives:

- To provide information to the students with the understanding of historical, socio-economic and intellectual forces of the rise of sociological theories.
- To provide the students with the basic understanding of emergence of sociological thought and to know about pioneer sociologists stated theories with their contributions to sociology.

Course Outline

1. **Emergence of sociological thought**
   (a) Period of Enlightenment
   (b) French Revolution
   (c) Industrial Revolution

2. **The Pioneers**
   (a) August Compte- Positivism, Law of Three Stages
   (b) Herbert Spencer- Theory of Organism, Evolution
   (c) Emile Durkheim- Theory of Suicide, Social Fact

3. **The Classical Tradition**
   (a) Karl Marx Historical Materialism, Class struggle
   (b) Max Weber- Theory of Authority, Analysis of Spirit of Capitalism And Protestant Ethics

Course outcome: Paper X

Paper X - Introduction to Research Methodology

Objectives

- This course is designed to introduce Research Methodology to undergraduate students for better understanding of application of social sciences in general and Sociology in particular
- To provide and equip the students with the procedures, tools and techniques of social research

Course Outline

1. **Basic Concepts in Research Methodology**
   (a) Meaning of Research
   (b) Scope and importance of Social Research
   (c) Theory, Facts, Objectivity

2. **Types of Research**
   (a) Pure and applied research
   (b) Qualitative and Quantitative Research
   (c) Descriptive Research and Exploratory Research

3. **Scientific Research Process**
   (a) Formulation of Problem
   (b) Hypothesis
   (c) Sampling and Data Collection
   (d) Data analysis and Statement

Course outcome: Paper XI

Paper XI - Social Problems in India

Objectives:

- As a Nation of diversity and plural society India witnessed many issues in past and present this course is designed to identify and analyze some of emerging social problems from sociological perspective.
- To sensitize the students about social problems of contemporary India and to discuss the measures on it

Course outline:

1. **Corruption and Crime**

   (a) Corruption in India and its implications (nature and causes)
   (B) White collar crime, Suicide
   (C) Measures on corruption

2. **Displacement and Rehabilitation**

   (a) Displacement and Problems of Developmental projects (SEZ)
   (b) Problem of Land acquisition for industrial projects (Acts and Ambiguity)
   (c) Commercialization of agriculture
   (d) Measures on Rehabilitation problems

3. **Problem of Inequality**

   (a) Educational inequality (Poor, Weaker Section and Women)
   (b) Rural India against Urban India
   (c) Globalization and increasing Inequality

OR

Paper XI Urban Sociology

Objectives:

- Urban Sociology is important branch of Sociology which indulge in Urban features, studies and urban theories this course is designed to provide information to student about urban sociology and to furnish the basic elements of the subject and to drew attention of the students towards increasing urbanization

Course Outline:

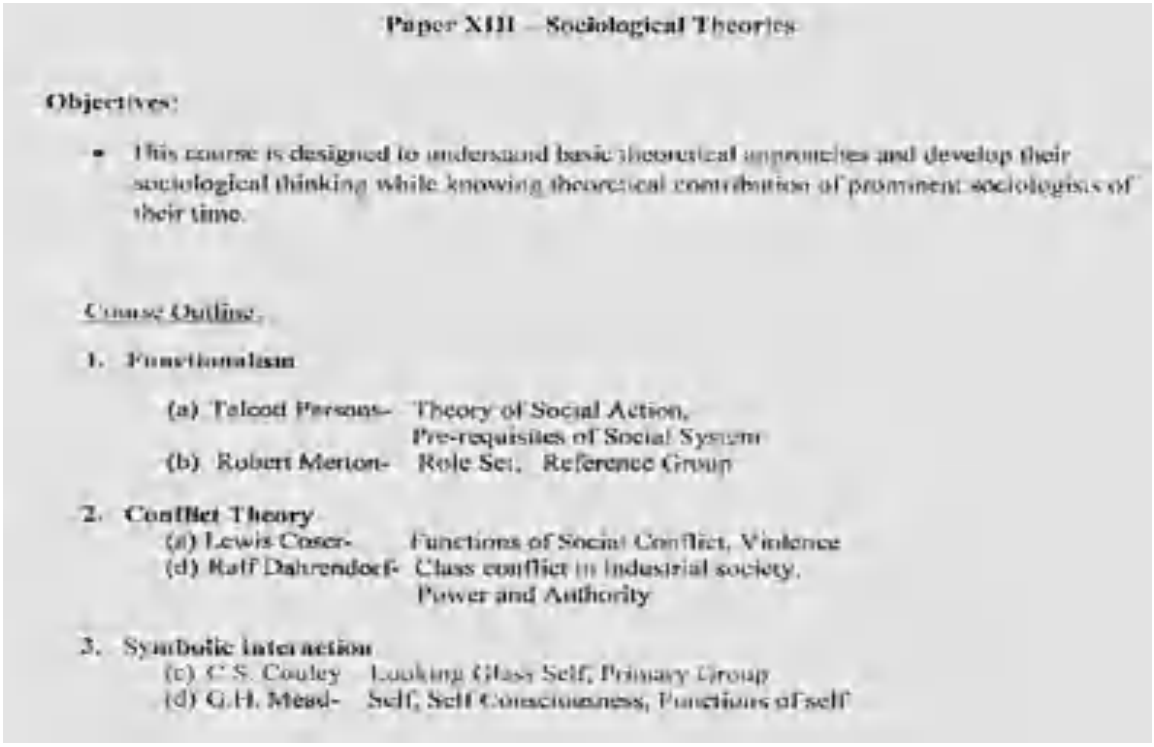
1. **Introduction**
   (a) Nature and Scope of Urban Sociology
   (b) Importance of Urban Sociology
   (c) Concepts- Urban Locality, Urbanization, suburb, Mega Cities, Heterogeneity

2. **Process of Urban Development**
   (a) Urban Revolution
   (b) Medieval City
   (c) Industrial Urban Development

3. **Urban Sociological Theories**
   (a) Theory Concentric Zone- Burges
   (b) Mechanical and Organic Solidarity- Durkheim
   (c) Metropolis and Mental life – George Simmel
   (d) Robert Louise wirth – 'Urbanism -As a way of life'

Course outcome: Paper XII Practical

Course outcome: Paper XIII



Paper XIII – Sociological Theories

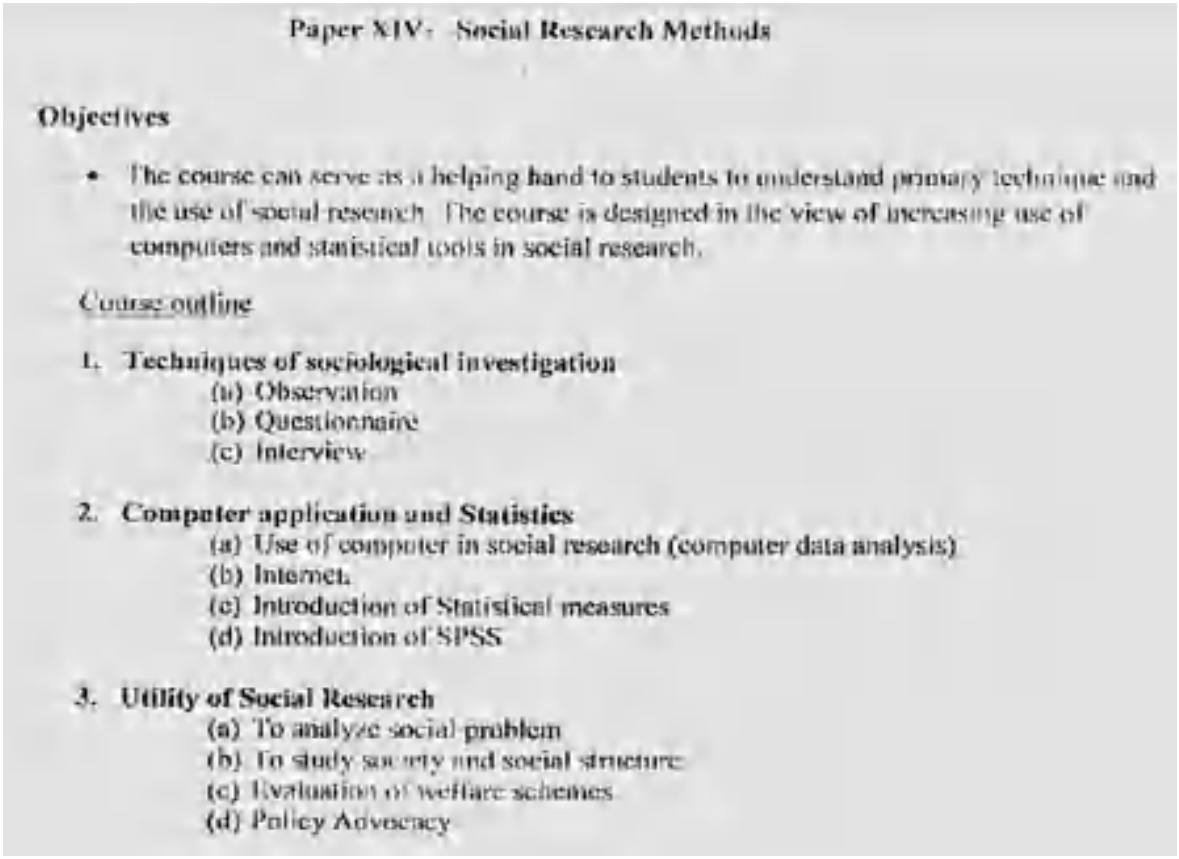
Objectives:

- This course is designed to understand basic theoretical approaches and develop their sociological thinking while knowing theoretical contribution of prominent sociologists of their time.

Course Outline:

1. Functionalism
   - (a) Talcott Parsons- Theory of Social Action, Pre-requisites of Social System
   - (b) Robert Merton- Role Set, Reference Group
2. Conflict Theory
   - (a) Lewis Coser- Functions of Social Conflict, Violence
   - (d) Ralf Dahrendorf- Class conflict in industrial society, Power and Authority
3. Symbolic interaction
   - (c) C.S. Cooley Looking Glass Self, Primary Group
   - (d) G.H. Mead- Self, Self Consciousness, Functions of self

Course outcome: Paper XIV



Paper XIV- Social Research Methods

Objectives

- The course can serve as a helping hand to students to understand primary technique and the use of social research. The course is designed in the view of increasing use of computers and statistical tools in social research.

Course outline

1. Techniques of sociological investigation
   - (a) Observation
   - (b) Questionnaire
   - (c) Interview
2. Computer application and Statistics
   - (a) Use of computer in social research (computer data analysis)
   - (b) Internet
   - (c) Introduction of Statistical measures
   - (d) Introduction of SPSS
3. Utility of Social Research
   - (a) To analyze social problem
   - (b) To study society and social structure
   - (c) Evaluation of welfare schemes
   - (d) Policy Advocacy

Course outcome: Paper XV

Paper XV - Social Disorganization in Contemporary India

- Objective: With rapid industrialization and modernization Indian society is witnessing drastic changes, with this transformation Indian society also witnessing few negative changes in social institutions. The course is designed to elaborate on such changes and to know causes and impact of social disorganization.

Course Outline

1. **Problem of Disorganization**
   (a) Concept and nature Social Disorganization
   (b) Causes of social disorganization: [population heterogeneity , Lack of Mobility, cynicism, underdevelopment, changing values and culture]

2. **Violence and social disorder**
   (a) Violence against women
   (b) Terrorism in India
   (c) Problem of Naxalism in India

3. **Regionalism**
   (a) Regionalism (concept) , Factors of Regionalism (Geographical, Historical, Social and Political)
   (b) Regionalism in India (causes and consequences)
   (c) Analysis of regional imbalance: special reference to Marathwada and Vidharbha

OR

Urban Society in India

- Objectives: This course is designed to analyze critically social problems of urban India and to discuss regarding impact of modernization and industrialization on Indian urban sphere.

1. **Urban India**
   (a) Growth of urban population in India
   (b) Emergence of Cities
   (c) Overcrowding (Rural Urban Migration)

2. **Social Problems of urbanization**
   (a) Prostitution
   (b) Urban Family (Changing Nature)
   (c) Poverty and Unemployment
   (d) Slums and Housing problems

3. **Urbanization and Industrialization**
   (a) Impact of industrialization (shortage of Electricity, waste disposal)
   (b) Transport and Traffic
   (c) Pollution (Air, Noise, chemical and water)

Course outcome: Paper XVI Practical

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Department of Political Science

Programme Outcomes (PO)

By the completion of this course the student will be able to

- **PO1:** Write, read, speak and listen effectively in academic and social contexts.
- **PO2:** Construct research questions and use appropriate sources and research methods to answer them. Students will enable to develop and be able to demonstrate skills in conducting as well as presenting research in political science.
- **PO3:** Analyze individual and group political behaviour; the political process; public policy and administration; and case law within government.
- **PO4:** Analyze the core intellectual traditions in political thought and apply their central tenets to contemporary political questions and issues.
- **PO5:** Analyze the behaviour of politicians and the nature of their interactions.
- **PO6:** Compare and contrast the various political, social and economic systems that exist across the international community and analyze the political consequences of those variations.
- **PO7:** Use analytical skills to understand civic, social and environmental challenges.
- **PO8:** Demonstrate social responsibility and ethical reasoning within a variety of contexts.
- **PO9:** Generate a scholarly product that demonstrates appropriate knowledge, technical proficiency, information collection, synthesis, interpretation, presentation and reflection.
- **PO10:** Develop academic proficiency in the subfields of Indian Government and Politics, Comparative Government, International Relations, Public Administration, Political Theory, and Political Ideology.
- **PO11:** Analyze political and policy problems and formulate policy options.
- **PSO12:** Discuss the major theories and concepts of political science and its subfields, and also deliver thoughtful and well articulated presentations of research findings.
- **PO13:** Serve as a politician
- **PO14:** Work as a teacher in colleges, schools and high schools
- **PO15:** Serve as political party member, political adviser, and well citizen of India.
- **PO16:** Work in elections and political as well as administrative system.

Programme Specific Outcomes (PSO)

By the completion of this course the student will be able to know

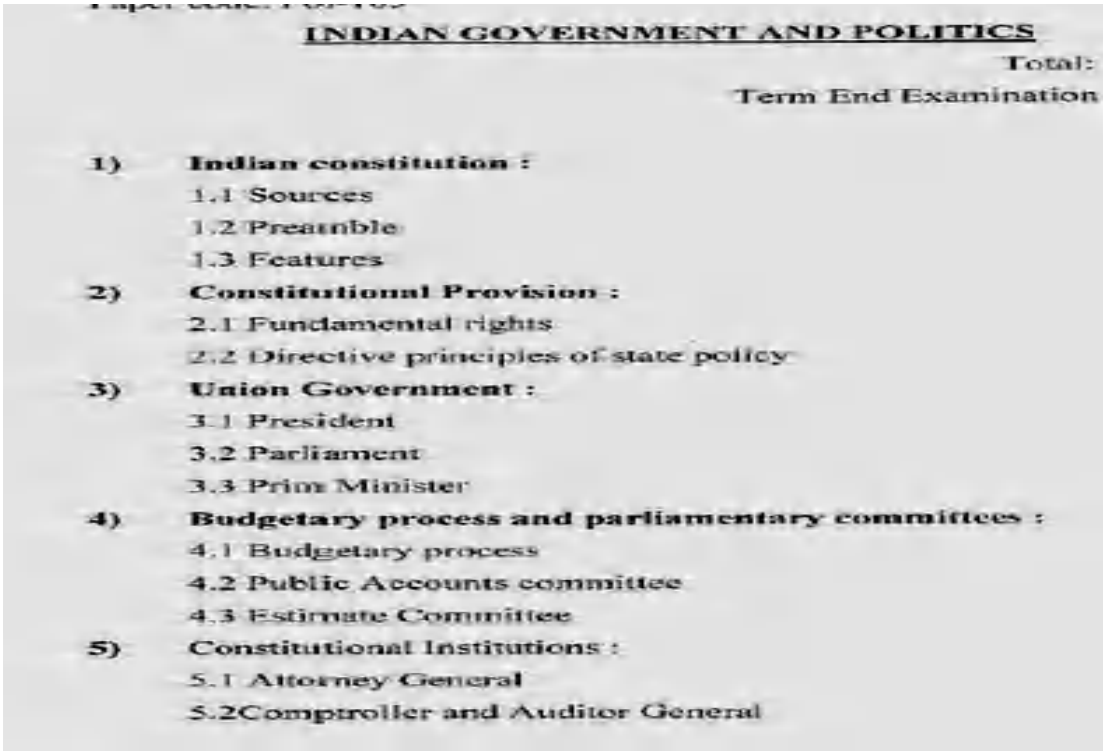
- **PSO1:** Characteristic of Indian Constitution, Preamble, Fundamental Rights.
- **PSO2:** Directive Principles of State Policy, Fundamental Duties, Citizenship.
- **PSO3:** Work and rights of President, Vice President, Prime minister.
- **PSO4:** Work of Parliament- Loksabha, Rajyasabha
- **PSO5:** Work of Judicial System of India-Supreme Court, High Court
- **PSO6:** Election Commission of India- structure, power and Function.
- **PSO7:** State Executive- Governor, Chief Minister, council of Minister.
- **PSO8:** State Legislature- structure, power and Function. Local self Government.
- **PSO9:** women Political Participation in Panchyat raj, Nagpur Pact in Maharashtra formation, Right to Information Act.

- **PSO10:** Meaning of comparative Government, Approaches of the comparative study, Constitutionalism
- **PSO11:** The Government and Politics of U.K- Constitution, Executive, Legislature, Judiciary, Political Party
- **PSO12:** The Government and Politics of U.S.- Constitution, Executive, Legislature, Judiciary, Political Party.
- **PSO13:** The Government and Politics of Switzerland- Constitution, Executive, Legislature, Judiciary, Political Party.
- **PSO14:** The Government and Politics of China- Constitution, Executive, Legislature, Judiciary, Political Party
- **PSO15:** Nature and Significance of Political Theory, Meaning and scope.
- **PSO16:** Political Concept- Sovereignty, citizenship, Liberty. Equality and Justice, Democracy. Development and Welfare State.
- **PSO17: U**nderstand the philosophy of Indian constitutions.
- **PSO18:** Identify the causes, impact of British colonial rule.
- **PSO19:** Appreciate the various phases of Indian national movement. Create value in young youth regarding the patriotism.
- **PSO20:** Understand the various Government of Indian acts their provision and reforms.
- **PSO21:** Know the salient features in making of Indian constitution.
- **PSO22:** Appreciate the socio-economic political factors which lead to the freedom struggle.
- **PSO23:** Appreciate the fundamental rights and duties and the directive principle of state policy.
- **PSO24:** Evaluate the evolution, functioning and consequences of political parties in India.
- **PSO25:** Identify how electoral rules and procedure in India effect election outcomes.
- **PSO26:** Examine political thought through the Classical, Renaissance, and Enlightenment periods based on the works of Plato, Aristotle, Machiavelli, Hobbes, Locke, Rousseau, Tocqueville, and Marx.
- **PSO27:** Compare and contrast the concepts of justice, freedom, equality, citizenship, and sovereignty in the works of Machiavelli, Hobbes, Locke, and Rousseau.
- **PSO28:** Explain the different versions of, and importance of, the state of nature to political thought. Have good knowledge about main issues and topics in political sociology.
- **PSO29:** Be able to understand basic principles of the exercise of power, of the state relations with civil society; individual and group interactions in the political realm.
- **PSO30**: Achieve practical skills of analysis of social phenomena in their political settings.
- **PSO31:** Acquire habits of socio-political information finding, sorting and critical examining.
- **PSO32: T**he role of British imperial on local government in India.
- **PSO33: U**nderstand the contributions of various committees on local government.
- **PSO34: D**escribe the features and provisions of Constitutional Amendment Acts regarding Local Government Institutions.
- **PSO35: E**quip the learner to play an active and responsible leadership role in the functioning of Local Government Institutions.
- **PSO36**: Describe the significance and role of Grama Sabha in Maharashtra.

- **PSO37: U**nderstand the evolution, scope and significance of international relations
- **PSO38: D**emonstrate an understanding of: the key historical events and also they enable to understand contemporary international system; and the key actors which shaped the international Politics.
- **PSO39: D**iscuss the main international relations theories.
- **PSO40: A**nalyze importance of International relation in process of nation progress.
- **PSO41: A**ppreciate the foreign policy their determinants features & its relevance.

Course Outcome (CO): Political Science

Course Outcome: Paper 105



INDIAN GOVERNMENT AND POLITICS

Total:

Term End Examination

1) **Indian constitution :**
   - 1.1 Sources
   - 1.2 Preamble
   - 1.3 Features
2) **Constitutionnl Provision :**
   - 2.1 Fundamental rights
   - 2.2 Directive principles of state policy
3) **Union Government :**
   - 3.1 President
   - 3.2 Parliament
   - 3.3 Prim Minister
4) **Budgetary process and parliamentary committees :**
   - 4.1 Budgetary process
   - 4.2 Public Accounts committee
   - 4.3 Estimate Committee
5) **Constitutional Institutions :**
   - 5.1 Attorney General
   - 5.2Comptroller and Auditor General

Course Outcome: Paper 106

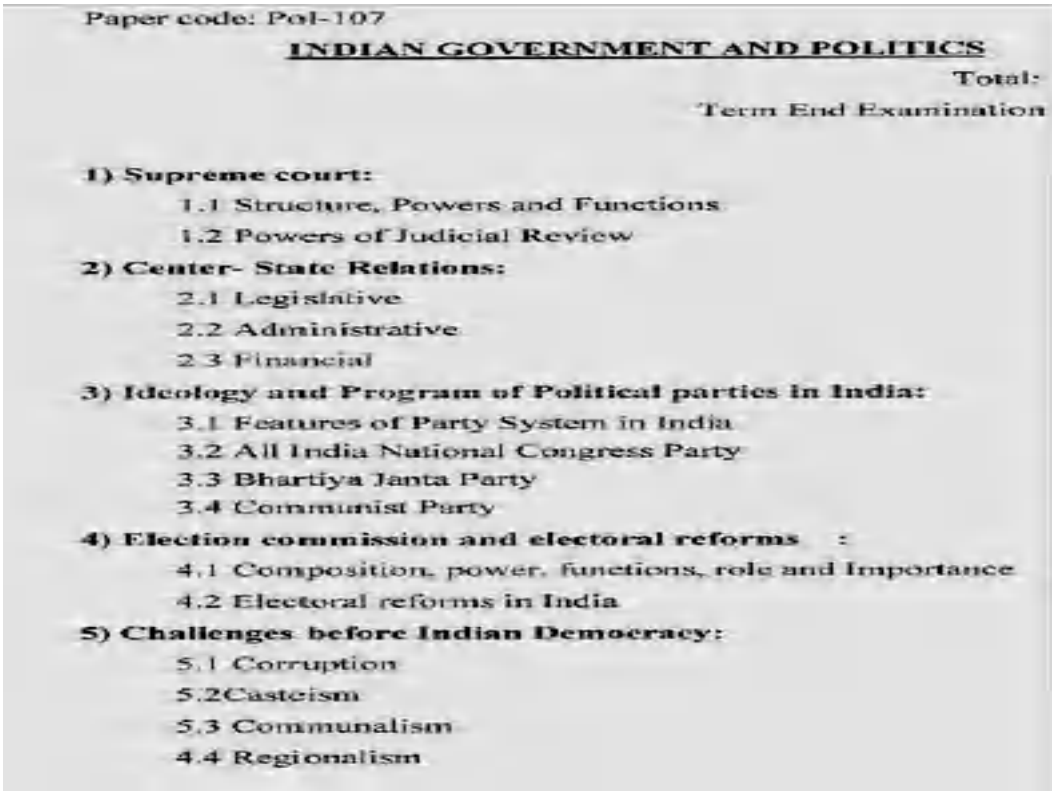
Paper code: Poi-106

International relations

Term End Exam

1) **International relations**
   - 1.1 Meaning
   - 1.2 Nature
   - 1.3 Scope and significance
2) **Approaches to the study of International relations**
   - 2.1 Idealist approach
   - 2.2 Realist approach
   - 2.3 Behavioral approach
3) **Indin's foreign Policy:**
   - 3.1 Principles
   - 3.2 Objectives
4) **National interest and National power**
   - 4.1 Meaning
   - 4.2 Determinants
5) **Balance of power**
   - 5.1 Meaning
   - 5.2 Techniques
   - 5.3 Types and relevance

Course Outcome: Paper 107



Paper code: Pol-107

INDIAN GOVERNMENT AND POLITICS

Total:

Term End Examination

1) Supreme court:

1.1 Structure, Powers and Functions

1.2 Powers of Judicial Review

2) Center- State Relations:

2.1 Legislative

2.2 Administrative

2.3 Financial

3) Ideology and Program of Political parties in India:

3.1 Features of Party System in India

3.2 All India National Congress Party

3.3 Bhartiya Janta Party

3.4 Communist Party

4) Election commission and electoral reforms :

4.1 Composition, power, functions, role and Importance

4.2 Electoral reforms in India

5) Challenges before Indian Democracy:

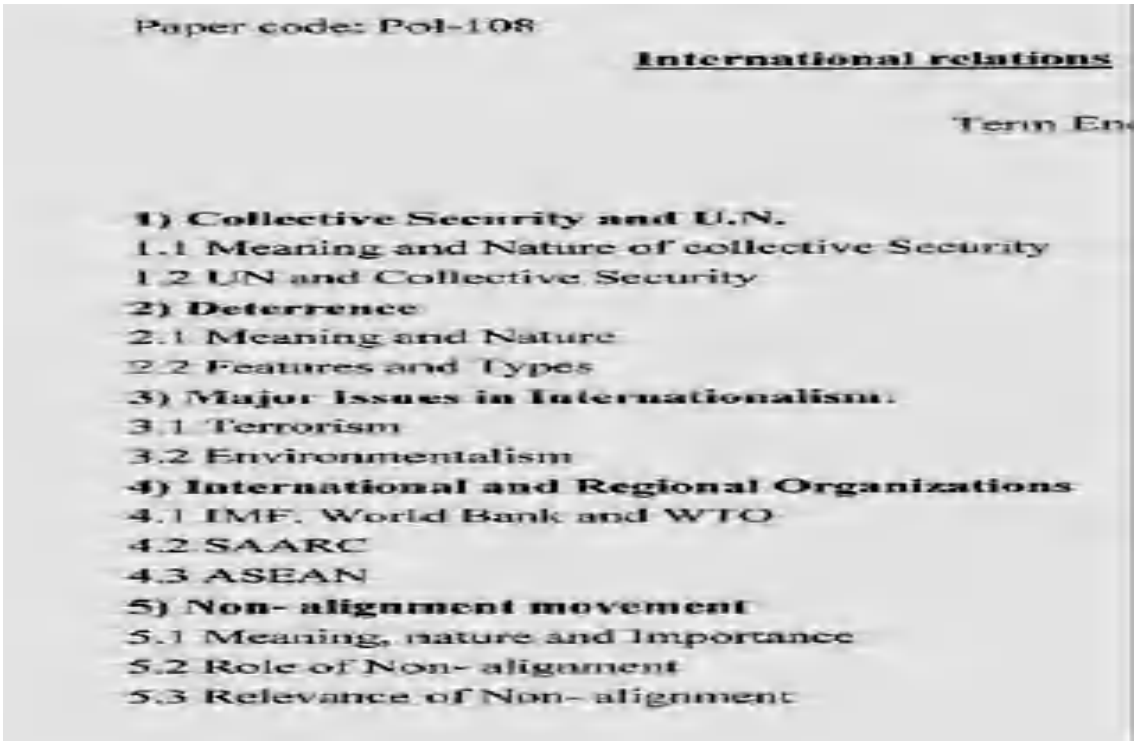
5.1 Corruption

5.2Casteism

5.3 Communalism

4.4 Regionalism

Course Outcome: Paper 108



Paper code: Pol-108

International relations

Term En

1) Collective Security and U.N.

1.1 Meaning and Nature of collective Security

1.2 UN and Collective Security

2) Deterrence

2.1 Meaning and Nature

2.2 Features and Types

3) Major Issues in Internationalism:

3.1 Terrorism

3.2 Environmentalism

4) International and Regional Organizations

4.1 IMF, World Bank and WTO

4.2 SAARC

4.3 ASEAN

5) Non- alignment movement

5.1 Meaning, nature and Importance

5.2 Role of Non- alignment

5.3 Relevance of Non- alignment

Course Outcome: Paper 109

Paper Code: Pol -109

INDIAN POLITICAL THINKERS

Total : 50
Periods: 60

1.Raja Ram Mohan Roy

1.1 Architect of Indian Renaissance
1.2 Views on Religion
1.3 Social and Political ideas

2.DayanandSaraswati

2.1 Religious and Social Thought
2.2 Political Thought

3. Gopal Krishna Gokhale

3.1 Social and liberal ideas
3.2 Nationalist thought

4. LokmanyaTilak

4.1 Views on Nationalism
4.2 Political Ideas – Four point Program
4.3 Views on Social Reform

5. Mahatma Gandhi

5.1 Views on Religion
5.2 Concept of Satya, Ahimsa and Satyagraha
5.3 Concept of Ram Rajya

Course Outcome: Paper 110

Paper Code: Pol -110

WESTERN POLITICAL THINKERS

Total : 5
Periods: 60 ~~Periods: 60~~

1) Plato

Views on: Justice, Communism, Education, Ideal State

2) Aristotle

Views on: State, Citizenship, Revolution

3)Niccolo Machiavelli

Human Nature, Advice to Prince, Views on Religion and Morality,

4) ThomasHobbes

Human Nature, Social Contract Theory and Concept of Sovereignty

5) JohnLocke

Human Nature, Social Contract Theory, Idea of Rights

Course Outcome: Paper 111

Paper Code: Pol -111

POLITICAL IDEOLOGIES

(While studying ideologies, stress must be laid on meaning, development, features of the ideology. Taking a critical review of each ideology is also expected)

Total : 50 Mark

Periods: 60

periods : 60

1. **Nationalism**
2. **Liberalism**
3. **Democracy**
4. **Imperialism**
5. **Feminism**

Course Outcome: Paper 112

Paper Code: Pol -112

INDIAN POLITICAL THINKERS

Total : 50 Marks

Periods: 60

periods : 60

1. **Maulana Azad**
   - 1.1 Views on Religion and Politics
   - 1.2 Views on Hindu-Muslim Unity
   - 1.3 Idea of Nationalism and "Synthesis Nationalism"
2. **Jawaharlal Nehru**
   - 2.1 Views on Nationalism, Democracy and Socialism
   - 2.2 Idea of Secularism
   - 2.3 Views on Internationalism
3. **M.N. Roy**
   - 3.1 Critique of Marxism
   - 3.2 Radical Humanism or New Humanism
   - 3.3 Radical Democracy
4. **Dr. BabasahebAmbedkar**
   - 4.1 Views on Religion and Society
   - 4.2 Idea of Democracy
   - 4.3 Economic Thought
5. **JayaprakashNarayan**
   - 5.1 Views on Socialism and Democracy
   - 5.2 Idea of Total Revolution

Course Outcome: Paper 113

Paper Code: Pol -113

WESTERN POLITICAL THINKERS

Total : 50 Marks

Periods: 60

1. Jean JacquesRousseau

1.1 Human Nature
1.2 Social Contract Theory
1.3 Idea of General Will

2. John Stuart Mill

2.1 Utilitarianism
2.2 Idea of Liberty
2.3 Representative Government

3. Jeremy Bentham

3.1 Views on State, Government and Rights
3.2Ideas on Law and Reform and Punishment
3.3Theory of Utilitarianism

4. Karl Marx

4.1 Dialectical Materialism &Materialistic Interpretation of History
4.2Theory of Class Struggle& Surplus Value
4.5 Views on State and Revolution

5. Harold Laski

5.1 Pluralistic Theory of Sovereignty,
5.2 Views on Liberty

Course Outcome: Paper 114

Paper Code: Pol -114

POLITICAL IDEOLOGIES

(While studying ideologies, stress must be laid on meaning, development, features of the ideology. Taking a critical review of each ideology is also expected)

Total : 50 Marks

Periods: 60

1. **Socialism**
2. **Communism**
3. **Fascism**
4. **Anarchism**
5. **Environmentalism**

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Department of History

Programme Outcome (PO)

By the completion of this course the student will be able to

- **PO1:** Find employment with Archaeological Survey of India or with private firms related to archaeology.
- **PO2:** Get public service is always open.
- **PO3:** Work as a teacher in schools and high schools.
- **PO4:** Serve as conservator and tourist guide in historical monuments.
- **PO5:** Get employed by NGOs and Social Welfare Organizations.
- **PO6:** Write/Subject Matter Expert
- **PO7:** Know the national as well as international history
- **PO8:** Preserve Indian culture by creating awareness about age old Indian culture
- **PO9:** Promote students to preserve and protect ancient and medieval historical structures and monuments
- **PO10:** Prepare students for various competitive examinations
- **PO11:** Help in nation building by developing patriotism among students

Programme Specific Outcomes (PSO)

By the completion of this course the student will be able to

- **PSO1:** Perceive various sources to study of Ancient India. Understand the glory of Indian History in the age of Harappan civilization. Comprehend the history of Vedic period. Understand the philosophy of Jainism and Buddism. Perceive influence of political support on religion.
- **PSO2:** Know about the Mauryan Empire. Perceive socio-economic, religious situation under the Maurya.
- **PSO3:** Comprehend about the Gupta period. Understand emergence of feudal system in Indian Society. Understand the History of Satvahans, Shungas, Kushans and Hunas,
- **PSO4:** Understand the Harshavardhan and Patronage to Buddhism. Know about the Sangam age, the Cholas, Pallavas and Chalukyas. Understand early difficulties of Arab and Turks Invasion and its Impact in India.
- **PSO5:** Understand the Education in Ancient India. Understand the Position of women in Ancient India. Know about the Judicial Administration in Ancient India. Perceive various Art and Architecture in sources to study of Ancient India .
- **PSO6:** Understand the Foundation of Delhi Sultanate and Administration. Understand early difficulties of Sultans in India.
  PSO7: Understand the Bahamani Kingdom. Understand the rise and expansion of Vijaynagar Empire.
- **PSO8:** Understand the political situation of India on the eve of Babar's invasion. Grasp territorial expansion of Mughal Empire. Understand the emergence and consolidation of Sher Shah. Understand the administrative set up of Mughals. Understand the inspiration behind the establishment of Swarajya. Explain the reasons behind Chatrapati Shivaji's

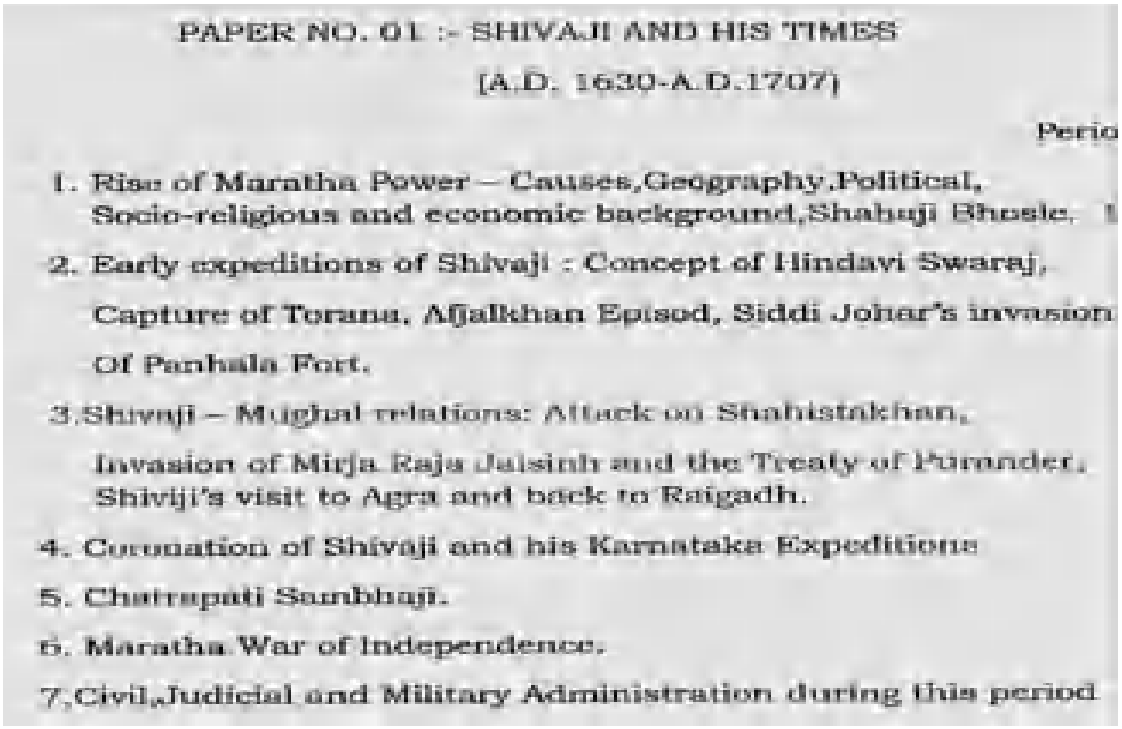
early conflicts with the regional lords and the outsiders. Comprehend the basic features of Mansabdari and change in it during 17th century

- **PSO9:** Know the system of trade and commerce during the period of Mughals. Understand the nature of village community. Grasp the some aspects of fiscals and monetary system of Mughals.
- **PSO10: U**nderstand modern Indian history. Identify the importance and the legacy of Freedom Movement. Distinguish the detail account of British raj as well as its overall impact on the Indian society. Understand some of the early resistance to British rule.
- **PSO11:** Understand early political awakening in Indian freedom struggle. Identify the social institutions of late nineteenth century. Understand various phases of national movement. Comprehend the socio-religious scenario and the social reformation.
- **PSO12:** Grasp the details of freedom movement under the Mahatma Gandhi's Leadership. Understand the evolutionary processes of constitutional developments.
- **PSO13:** Learn about the causes and aftermaths of the French revolution. Understand the factors responsible for the end of Monarchy in France. Understand the rise of Nepolean and how Meternic dominated the European politics.
- **PSO14:** Understand the foreign policy o Germany under Bismark and Kaiser William II. Describe the Historical process which leads to rise of nationalism in Europe. Learn about the Causes and effects First World War. Describe the policies of US's fourteen points of president Woodrow Wilson.
- **PSO15:** Evaluate the Russian Revolution and the first experiment of the communist government. Understand the League of Nations Aims, Objectives and structure. Describe the policies of Mussolini and Hitler and his policies.
- **PSO16:** Explain the aftermaths of the World War II on the world politics. Understand the Diplomatic conferences during the war Period. Understand the United Nations Organization.
- **PSO17:** Understand how Russia and America emerged as superpowers on the verge of cold war. Understand the Military Alliances NATO, SEATO, CENTO. Learn the Non-Aligned movement and the Third world, origin and progress.
- **PSO18:** Student view will increase towards Nationalism and Secularism.
- **PSO19:** Introduced to student social, economic and religious condition.
- **PSO20:** Prepare competitive examination especially Civil Services exams.
- **PSO21:** Students understand of the stages of development in Modern India, why certain events happened and analysis of the consequences of such developments that paves an impact on our society, economy and our political system.

Course Outcome (CO): History

By the completion of this course the student will be able to know about

Course Outcome: Paper I



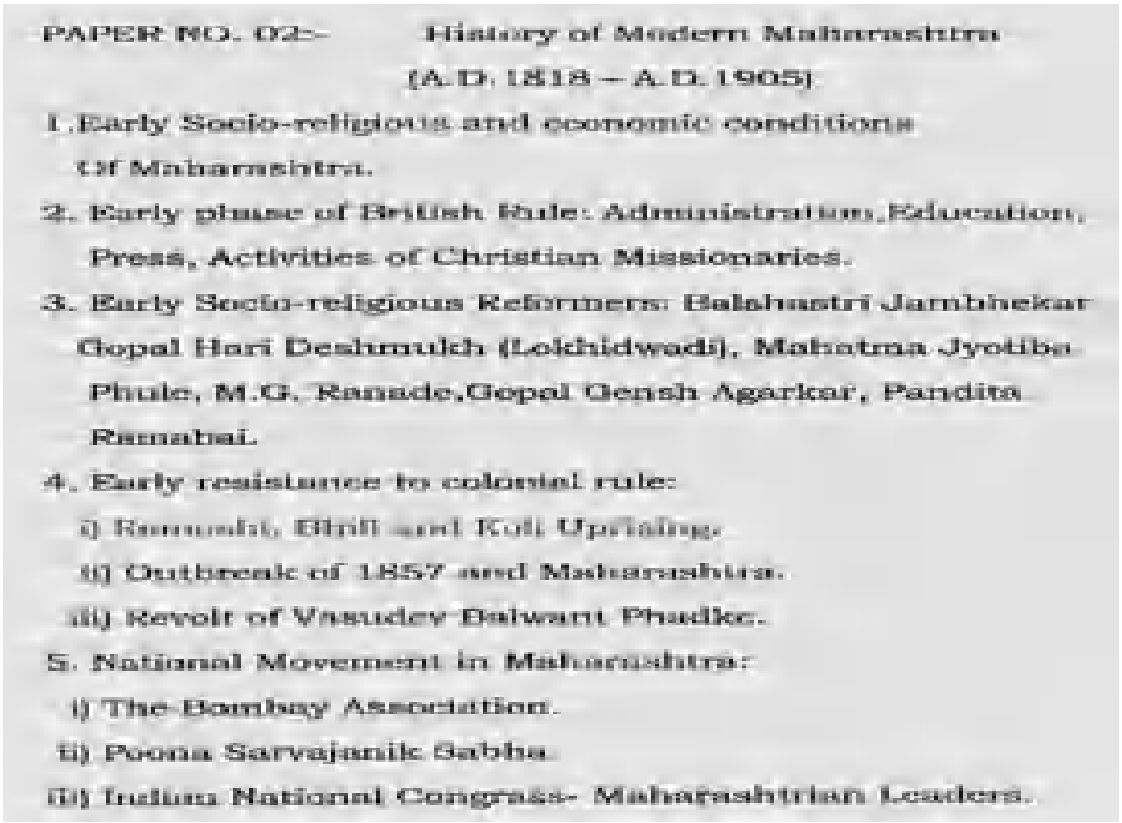
PAPER NO. 01 :- SHIVAJI AND HIS TIMES

(A.D. 1630-A.D.1707)

Perio

1. Rise of Maratha Power – Causes,Geography,Political, Socio-religious and economic background,Shahuji Bhosle.
2. Early expeditions of Shivaji : Concept of Hindavi Swaraj, Capture of Torana, Afjalkhan Episod, Siddi Johar's invasion Of Panhala Fort.
3. Shivaji – Mughal relations: Attack on Shahistakhan, Invasion of Mirja Raja Jaisinh and the Treaty of Purander, Shiviji's visit to Agra and back to Raigadh.
4. Coronation of Shivaji and his Karnataka Expeditions
5. Chatrapati Sambhaji.
6. Maratha War of Independence.
7. Civil,Judicial and Military Administration during this period

Course Outcome: Paper II

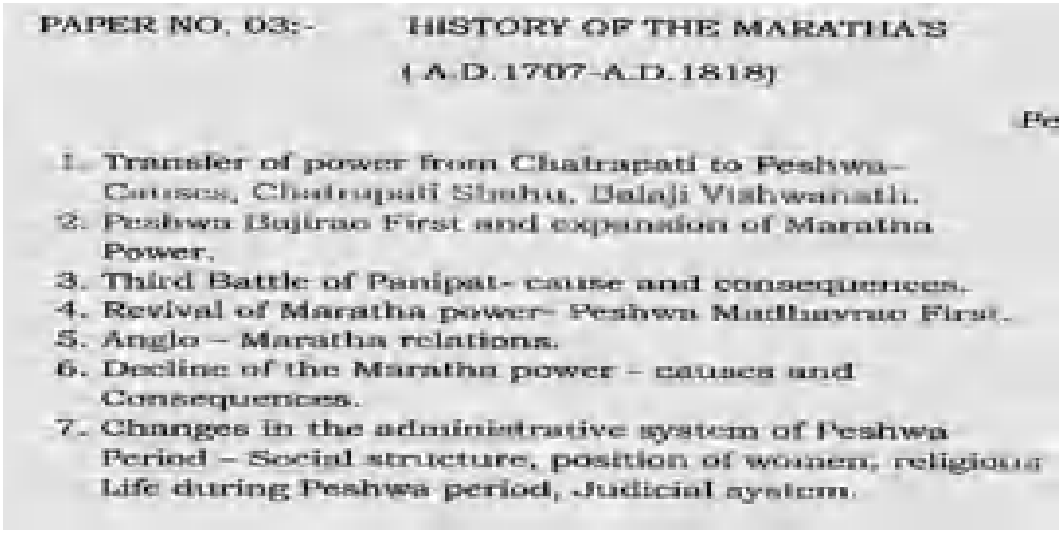


PAPER NO. 02:- History of Modern Maharashtra

(A.D. 1818 – A.D. 1905)

1. Early Socio-religious and economic conditions of Maharashtra.
2. Early phase of British Rule: Administration,Education, Press, Activities of Christian Missionaries.
3. Early Socio-religious Reformers: Balshastri Jambhekar Gopal Hari Deshmukh (Lokhitwadi), Mahatma Jyotiba Phule, M.G. Ranade,Gopal Ganesh Agarkar, Pandita Ramabai.
4. Early resistance to colonial rule:
   i) Ramoshi, Bhil and Koli Uprising.
   ii) Outbreak of 1857 and Maharashtra.
   iii) Revolt of Vasudev Balwant Phadke.
5. National Movement in Maharashtra:
   i) The Bombay Association.
   ii) Poona Sarvajanik Sabha.
   iii) Indian National Congress- Maharashtrian Leaders.

Course Outcome: Paper III



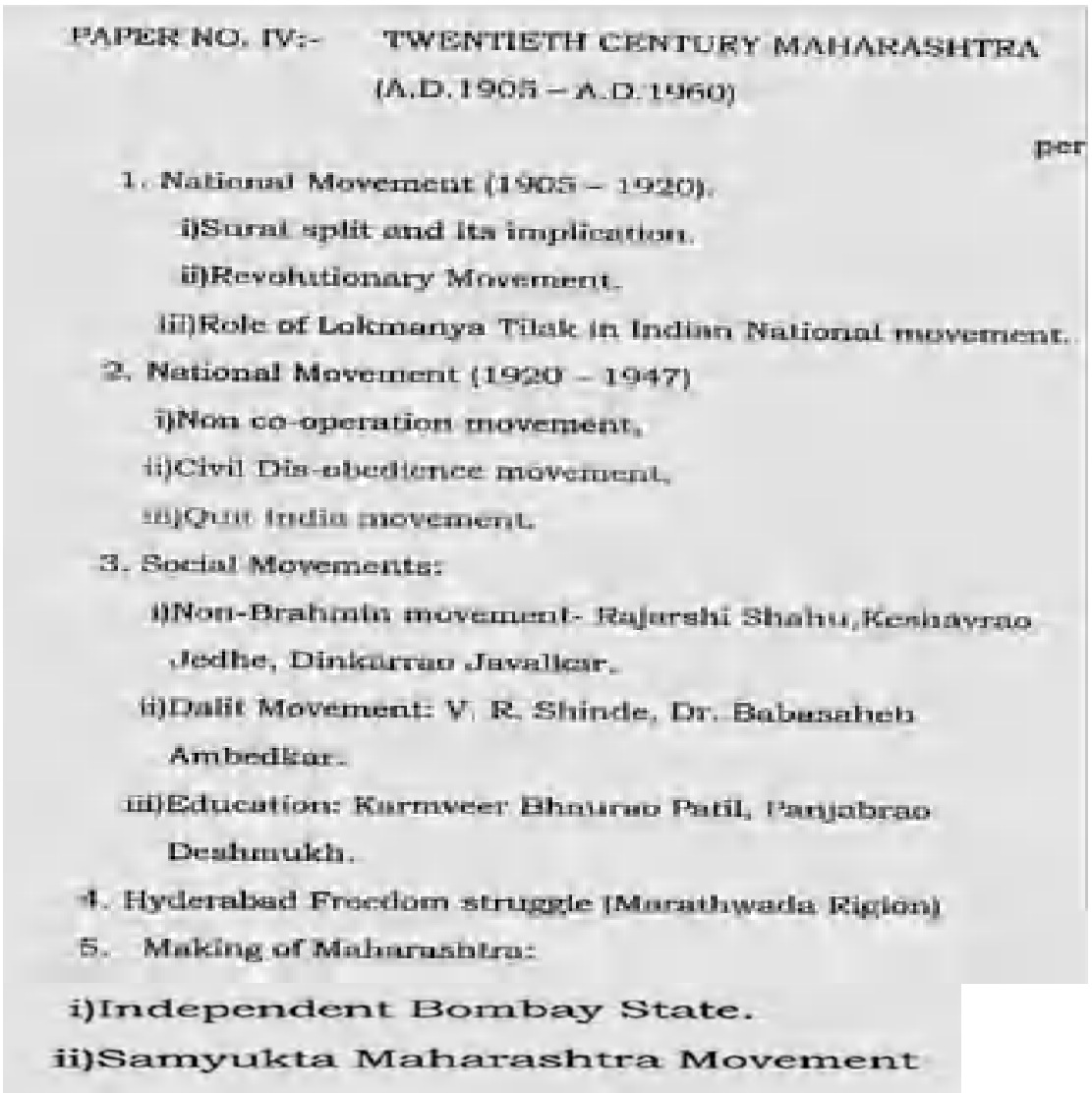
PAPER NO. 03:- HISTORY OF THE MARATHA'S

(A.D.1707-A.D.1818)

Pe

1. Transfer of power from Chatrapati to Peshwa– Causes, Chatrapati Shahu, Balaji Vishwanath.
2. Peshwa Bajirao First and expansion of Maratha Power.
3. Third Battle of Panipat- cause and consequences.
4. Revival of Maratha power- Peshwa Madhavrao First.
5. Anglo – Maratha relations.
6. Decline of the Maratha power – causes and Consequences.
7. Changes in the administrative system of Peshwa Period – Social structure, position of women, religious Life during Peshwa period, Judicial system.

Course Outcome: Paper IV



PAPER NO. IV:- TWENTIETH CENTURY MAHARASHTRA

(A.D.1905 – A.D.1960)

per

1. National Movement (1905 – 1920).
   - i)Surat split and its implication.
   - ii)Revolutionary Movement.
   - iii)Role of Lokmanya Tilak in Indian National movement.
2. National Movement (1920 – 1947)
   - i)Non co-operation movement,
   - ii)Civil Dis-obedience movement,
   - iii)Quit India movement.
3. Social Movements:
   - i)Non-Brahmin movement- Rajarshi Shahu,Keshavrao Jedhe, Dinkarrao Javalkar.
   - ii)Dalit Movement: V. R. Shinde, Dr. Babasaheb Ambedkar.
   - iii)Education: Karmveer Bhaurao Patil, Panjabrao Deshmukh.
4. Hyderabad Freedom struggle (Marathwada Region)
5. Making of Maharashtra:
   - i)Independent Bombay State.
   - ii)Samyukta Maharashtra Movement

Course Outcome: Paper V

PAPER NO. V – HISTORY OF EARLY INDIA (UPTO B. C. 300)	
Sr.No	**Name of the Chapter**
1	A) Religious and secular Literature, Foreign Accounts B) Archaeological, Numismatic Sources
2	A) Stone age culture B) Harappan civilization – Major sites, Town planning, Socio – Religious and Economic Life.
3	**Vedic culture** : Original home of Aryas Early Vedic age – Society, economy, Religion Later Vediv age – polity, society, economy and religion
4	A) Religious Movements – Jainism and Buddhism B)Philosophy – Upnishadas, Shaddarshan and Charwak
5	**A) Janapadas and Mahajanapadas** – Rise of Magadha **B)Mauryan Empire** – Chandragupta Mauryan, Ashoka, Mauryan Economy, Administration. Art and Architecture.

Course Outcome: Paper VI

PAPER No. VI - HISTORY OF DELHI SALTANAT (A. D. 1200 – A. D. 1526)	
Sr.No	**Name of the Chapter**
1	**Sources : A)** Literary sources, Foreign Travelers Accounts. **B)** Archaeological, numismatic sources.
2	**Political History – A Brief Survey** A)Turkish invasion of India and foundation of Delhi Sultanat B)Khalji, Tughuqs, Sayyid and Lodi dynasty C)Yadavas of Deogiri, Bhamani empire, Vijaynagar empire
3	**Delhi Saltanat** : Religious policy, Central and provincial Administration, Ruling Classes
4	**Economy and Social Life** A) Trade and Commerce, Indistries, Monetary System, Urbanisation B) Social structure – Rural and Urban Life, Caste System, Slavery, Education, Position of Women.
5	**Religious Cults** – Nath, Mahanubhav and Warkari Cults, Bhakti Movement in North India, Sikhism, Sufisim.
6	A) Arts and Architecture of Delhi Sultanate, Art and Architecture of Yadav, Bhamani and Vijaynagar Enpire . B) Languages and Literature – Persian, Sanskrit and Regional Languages.

Course Outcome: Paper VII

PAPER NO. VII – HISTORY OF INDIA (B. C. 300 – A. D.650)

Sr.No	Name of the Chapter
1	**Sources** : Literary And Archaeological Sources
2	**Brief Survey of Political Changes** : Sungas and Kanvas, Allexandar's invasion. Shakas, satavahanas, western Kshtrapas. Kushan,Gupta,Wakataka dynesty,Harsha wordhan Sangam age
3	**Socio – Economic Life** : Structure of Society, Social Traditions, Education,Status of women Economic Condition and urbanization.
4	**Religious life** : Propogation of Jainism, Buddhism, Shaivism and Vaishnavism
5	**Development of Arts and Architecture** : Temple Architecture – Evolution of Major regional styles
6	**Language and Literature** – Sanskrit, Prakrit, Kannad and Sangam.

Course Outcome: Paper VIII

PAPER NO.- VIII - HISTORY OF MUGHAL INDIA (A. D. 1526 – A. D. 1757)

Sr.No	Name of the Chapter	Periods Allot
1	**Sources** : Literary and Archaeological	06
2	**A Brief survey of political History of Mughal period** : Babar, Humayun and shershsah Sur, Akbar, Jahangir, Shahjahan and Aurangzeb, Later Mughals	10
3	**Mughal Administration** : A) Civil, Military and Judical B)Ruling Classes – 1) Nobility, Zamindar, Mansabdar and Jagirdar	12
4	**Economic Development** : Agriculture Economy – Land Revenue. Trade and Commerce, Currency system, Urbanization.	10
5	**Religious and Social Life.** A)Religious policies of Mughal Emperor, Impact of Islam. Sufism, Sikhism, Hindu Religion Vaishnav cult. B)Society – Rural and urban ,slavery, Education and statues of Women.	12
6	**A) Art and Architecture,** School of paintings **B)Language and Literature** : Sanskrit, Persian and Regional Languages	10

Course Outcome: Paper IX

PAPER NO. 09 - HISTORIOGRAPHY

Sr.No.	Name of the Chapter
1.	History : Definition, Nature, Scope, Kinds of History, History as a Science and History as an Art
2.	History and Other branches of Knowledge : History and Archaeology, History and Anthropology History and Geography, History and Sociology History and Economics, History and Political Science.
3.	Sources of History: Classification of Sources. Evaluation of sources – Authenticity and credibility
4	Modern Thinkers of History : Ranke, Hegel, Karl Marx, Toynbee.
5	Major trends in Indian History writing : Orientalist, Imperialist, Nationalist, Marxist, Subaltern.
6	Use & Abuse of History
7	History Research Method

Course Outcome: Paper X

PAPER NO. 10 : HISTORY OF INDIAN FREEDOM MOVEMENT (A.D. 1885-A.D. 1947)

Sr. No.	Name of the Chapter	Periods Allotted
1	Background : Nature, policies and administration of British rule in india.	10
2	Rise of Nationalism in India – Causes and Development.	08
3	Indian National Congress and National movements : A) Origin of Indian National Congress, B) Leadership of moderates and extremists.	10
4	Revolutionary movements: Rise, nature and importance of the revolutionary movement. Role of women in Indian freedom movement.	6 4
5	Nationalist movement under the leadership of Mahatma Gandhi.	10
6	Rise of communalism leading partition, and independence of India.	12

Course Outcome: Paper XI

PAPER NO. 11 – WOMEN'S STRUGGLE IN MODERN INDIA (A.D. 1850- A.D. 1947)

Sr. No.	Name of the Chapter	Periods Allotted
1	Major issues and conception of women's problems in 19th Century, Child marriage: Sati Tradition, Life of widows, Barns on Woman Education. Secondary position of women in family and Society.	12
2	Women and Social Struggle a) Approaches- Conservative, Progressive (Pandita Ramabai and D.K. Karve). Antcaste (Mahatma Phule, Tarabai Shinde, Dr.B.R. Ambedkar) b) Struggle for Women's education	14
3	Social reform movement and women's emancipation.	10
4	Women's participation: a) Women in tribal and peasant struggle. b) Women in national struggle for independence c) Women in Caste movements.	14
5	Women and Law: Consent bill, Sharada Act, Patel bill.	10

OR

PAPER-II HISTORY OF INDIA (A.D. 1757- 1885)

Sr No.	Name of the Chapter
1.	Advent of European Powers in India Indian Polity & Economy in the Mid-Eighteenth Century
2.	Expansion and consolidation of British Power Bengal, Punjab, Awadh, Mysore, Maharashtra.
3.	Early Phase of British Rule I. Administrative & Judicial Structure II. Education III. Press IV. Activities of Missionaries
4.	Economy I. Agarian Settlement – Permanent Settlement Ryatwari Settlement & Mahalwari system Commercialization of agriculture II. Traditional handicraft industry & Question of de – industrialization. III. Railway, Post & Telegraphs. IV. Large Scale Industry- Cotton, Jute Iron & Steel. V. Famine & British Policy. VI. Internal & External Trade
5.	Socio- Religious reform Movement Brahmo Samaj Satyshodhak Samaj Arya Samaj Prarthana Samaj
6.	Resistance to colonial Rule I. Nature to form of Resistance II. Pre-1857 Peasent & Trible resistance. III. Revolt of 1857 — nature, causes leadership & impact.
7.	Rise and growth of Indian nationalism Early political organizations & Foundation of Indian National Congress

Course Outcome: Paper XII - PROJECT

Course Outcome: Paper XIII

PAPER NO. 13 FIELDS OF HISTORY (ARCHAECOLOGY, MUSEOLOY, TOURISM)

Sr. No.	Name of the chapter	Periods Allotted
	Objective: History is allied and deeply rooted in the various fields of professions. And this course will orient the students in reading and using them as a part of their historical acknowledge.	
1	Archaeology a) Meaning and object b) Archaeology and Anthropology, Archaeology and Material Sciences. c) A brief history of Indian Archaeology.	15
	Process in Archaeology a) Search of Archaeological Sites. b) Collection and classification of Archaeological material (remains)	10
2	Museology : a) Definition of museum and Musicology. b) Aims and function of History museums. c) Documentation, identification, classification and indexing of the material. d) Use of History Museum.	15
3	Tourism : a) Definition and object of Tourism, role of History in Tourism. b) Distinction between travelers and visitors, excursionist and business tour. c) Motivation of Tourism – Pleasure education, culture, Social, ethic, religion, health, history	12
4	Types and forms of Tourism: Domestic, regional, national and international	08

Course Outcome: Paper XIV

PAPER NO. 14 - LANDMARKS IN THE HISTORY OF MODERN WORLD

Sr.No.	Name of the Chapter	Period Allotted
1	Renaissance and Reformation in Chapter	10
2	American war of Independence Causes, Course and Consequences	08
3	French Revolution: Causes, Course and Consequences	08
4	Industrial Revolution: Background, Development, Significance.	10
5	European Imperialism in Asia & Africa First World War : Causes and Effects	08
6	Russian Revolution of 1917 : Causes, Course and Consequences.	08
7	Second World War : Causes, Course and Consequences	08

Course Outcome: Paper XV

PAPER NO 15 – GLIMPSES OF THE HISTORY OF MARATHWADA (U.P. TO A.D. 1948)

Sr. No.	Name of the Chapter	Periods Allotted
1	Political History of Marathwada – A brief Survey.	12
2	Religious movements : Brahminism, Buddhism, Jainism, Maharaubhav, Veershiva, Varkari movement, Sufism.	12
3	Art and Architecture, Temple Architecture, Forts.	12
4	Socio-Economical and cultural History of under the Nizam state	12
5	Hyderabad freedom Struggle. Role of all India Scheduled Cast Federation in Hyderabad Freedom Struggle.	12

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Department of Economics

Programme Outcomes (PO)

On Completion of the course, students will be able to

- **PO1:** Study economics theories and principles and see their applications.
- **PO2:** Understand and study the Indian economy.
- **PO3:** Understand and study monetary policies of India.
- **PO4:** Determine economic variables including inflation, unemployment, poverty, GDP, balance of payments.
- **PO5:** Understand the behaviour of financial and money markets and perform cost-benefit analysis for making investment decisions.
- **PO6:** Understand basic concepts of economics.
- **PO7: A**nalyze economic behaviour in practice.
- **PO8:** Understand the economic way of thinking.
- **PO9: A**nalyze historical and current events from an economic perspective.
- **PO10:** Write clearly expressing an economic point of view.
- **PO11: E**xpose to alternative approaches to economic problems through exposure to coursework in allied fields.
- **PO12: S**uggest of the various economic problems.

Programme Specific Outcomes (PSO)

On Completion of the course, students will be able to

- **PSO1:** Understand the behavior of an economic agent, namely, a consumer, a producer, a factor owner and the price fluctuation in a market.
- **PSO2:** Understand nature and scope of economics, the theory of consumer behavior, analysis of production function and equilibrium of a producer, the price formation in different markets structures and the equilibrium of a firm and Industry.
- **PSO3:** Understand concept of Revenues and cost of Production.
- **PSO4:** Understand Linear & Non- Linear functional relationship.
- **PSO5:** Understand price determination of factors (Rant, wages, interest and Profit.)
- **PSO6:** Understand meaning of social welfare function.
- **PSO7:** Understand the Basic Micro- Economic Problems of Scarcity and Choice, utility demand modern utility analysis, Elasticity of demand.
- **PSO8:** Understand concepts one and two input production function.
- **PSO9:** Understand concepts Law of Variable Proportions Returns to the Variable Factor, Returns to Scale, Cobb- Douglas Production Function.
- **PSO10:** Understand Analysis Characteristics and properties various concepts and Curves of Production cost and Revenue.
- **PSO11:** Understand concepts of Partial and General Equilibrium.
- **PSO12:** Understand Concept of Social Welfare. Understand macro economic analysis. Understand of national income.
- **PSO13:** Understand classical & Keynesian theories of output and employment.

- **PSO14:** Understand consumption & Investment function. Understand concept of public fiancé. Understand concept of public revenue. Understand concept of inflation and deflation.
- **PSO15:** Understand Role and functions of the Government in an economy. Understand concepts Private Goods, Public Goods, and Merit Goods.
- **PSO16:** Understand concept of budget & deficit finance. Understand incidence & approaches of taxation. Understand concept of public debt. Understand concept of budget & deficit finance. Understand taxation & public debt of India.
- **PSO17:** Understand the differences between Economic growth and Development, Indicators of Economic Development. Understand Characteristics of Developing Countries. Understand Constraints on Development Process.
- **PSO18:** Understand macroeconomic policies, roll of foreign capital and economic planning etc. in developing countries.
- **PSO19:** Understand Classical and Modern Trade Theories international trade. Understand gains from international trade & concepts of term of trade. Understand Trade policy.
- **PSO20:** Understand Function and Role of GATT, WTO, Understand Composition and Features of Global Trade Growth. Understand Nature, Scope and Importance of International Economics. Understand theories international trade, gains from international trade & their measurements. Understand theory of intervention in trade, theory of regional blocks
- **PSO21**: Understand trade policies in India. Understand international financial institutions, foreign direct investments and foreign exchange market.
- **PSO22:** Understand India's foreign trade. Understand concept of globalization. Understand public expenditure in India.
- **PSO23:** Understand public debt& deficit finance. Understand concept of fiscal policy. Understand concept of budget & deficit finance. Understand international trade theories. Understand gains from international trade & trade policy.
- **PSO24:** Understand economics of agriculture. Understand Indian agriculture sector.
- **PSO25**: Understand the concept of environmental pollution. Understand relation between population and environment. Understand types of pollution and its remedies.
- **PSO26:** Understand nature, Basic Characteristics and Major issues of Indian economy. Understand population & economic development. Understand Poverty and Unemployment Concepts and their trends in Indian economy.
- **PSO27:** Understand role of agriculture, industrial sector in Indian economy. Understand economic planning in India.
- **PSO28:** Understand Salient Features of Economy of Maharashtra. Understand Role of Co-operative in Economic Development of Maharashtra.
- **PSO29:** Understand Regional Imbalance Causes & Preventive Measures.
  PSO30: Create the awareness among the students of Modern Banking System. Understand commercial banking system in India. Understand working & operation of RBI.
- **PSO31:** Understand new development in Indian financial system periods. Understand cooperative and rural banking in India. Understand non banking financial institutions & financial services in India.
- **PSO32:** Understand the Indian money market. Understand the Indian capital market. Able to understand international aspects of the Indian financial system.
- **PSO33:** Understand nature of Maharashtra economy. Understand population & economic development. Understand infrastructure and economic development. Understand role of agriculture in Maharashtra economy.

Course outcomes (CO)

Course Outcome: Paper 101

F.Y.B.A. Economics

(Revised Syllabus)

Semester – I

Total Marks: 50

MICRO ECONOMICS (COMPULSORY) Paper – ECO-101

OBJECTIVES:

As a foundation of economics in this paper student is expected to understand the meaning and scope of micro economics, the behavior of an economic agent, namely, a consumer, a producer, a factor owner and the price fluctuation in a market. The approach of this paper is to study the behavior of a unit and analysis is generally static and in partial equilibrium framework. The units incorporated in this paper deals with nature and scope of economics, the theory of consumer behavior and analysis of market equilibrium.

Unit- I: Introduction

1.1 Meaning, nature, scope, significance and limitations of micro economics.

1.2 Difference between Micro Economics and Macro Economics.

1.3 Welfare Economics: Definition and nature of welfare Economics, The concept of new welfare Economics, Pigovian Welfare Economics, Social Welfare Function.

Init - II: Theory of Demand and Supply:

2.1 Concept of Demand, Law of Demand.

2.2 Demand Function – Linear and non-Linear demand function.

2.3 Concept of Supply, Law of Supply and Supply Function.

2.4 Elasticity of Demand – Price, Income and Cross and its measurement.

2.5 Elasticity of Supply.

Unit III: Consumers Behaviour and Demand:

3.1 Meaning of Utility.

3.2 Marishallian Approach: Theory of Dimmishing Marginal Utility, Equi-marginal utility, Consumer's Surplus.

3.3 Hicks Approach: Indifference curve – properties of Indifference Curve.

3.4 Consumer's Equilibrium with the help of Indifference Curve, Price effect, Income effect and substitution effect

3.5 Samuelson Approach: Revealed Preference Theory.

Unit IV: Analysis of Market Equilibrium:

4.1 Meaning and Importance of Equilibrium.

4.2 Kinds of Equilibrium – Stable, Unstable and Neutral Equilibrium.

4.3 Static and Dynamic Equilibrium, Partial and General Equilibrium.

Course Outcome: Paper 102

F.Y.B.A. Economics

(Revised Syllabus)

Semester – I

Total Marks:-50

INDIAN ECONOMY (COMPULSORY) - Paper-ECO-102

OBJECTIVES:

The objective of the paper at the F.Y.B.A. level would be to sharpen the analytical faculty of the students, by highlighting an integrated approach to be functioning aspects of the Indian economy, keeping in view the scope for alternative approaches. Such an analysis is essential because the Indian economy is a unique amalgam of alternative competing and often conflicting theories and a proper understanding of its working of its working is imperative if the student is to comprehend the ramifications that underlie most of the observed phenomena in the Indian economic set-up. The emphasis of the paper is on overall social, political and economic environment influencing policy decisions. To develop all these themes, the courses are divided into specific modules.

1. STRUCTURE OF THE INDIAN ECONOMY

1.1 Characteristics of the Indian Economy as a less developed economy.

1.2 Features: Natural Resources- Land, Water and Forest Resources and Minerals, Need for sustainable development.

1.3 Population: -Broad features, size and growth rates sex composition, Birth rate – death rate, Density, Literacy, Sex composition, Age composition, Occupational distribution, Rural Urban Population- Life expectancy, Rural Urban Migration occupational distribution- Problems of over population, population policy.

2. HUMAN RESOURCE DEVELOPMENT

2.1 Human Development Index (HDI): Concept and Meaning, Indicators, Importance

2.2 Gender Related Development Index (GDI)

2.3 Human Poverty Index (HPI)

2.4 HDI : Indian country and inter- state comparison

3. POVERTY & UNEMPLOYMENT

3.1 Concept of Poverty- Measurement of Poverty – Causes of Poverty- Measures to removal of Poverty.

3.2 Nature & Types of Unemployment

4. PLANNING IN INDIA

4.1 Background of Indian planning-National Planning Committee, Bombay Plan, Peoples Plan, Gandhian Plan, The Planning Commission.

4.2 Objectives & Strategy of Indian Planning.

4.3 Achievements & Failures of Five-Year Plan

4.4 Current Five Year Plan - Objectives, Allocations & Targets.

4.5 New Economic Reforms.

Course Outcome: Paper- 103

F.Y.B.A. Economics

(Revised Syllabus)

Semester – II

Total Marks: 50

Price Theory (COMPULSORY) Paper–ECO-103

OBJECTIVE:

The purpose of this paper on price theory at the B. A. level is to enable students to have an understanding of the various components regarding price determination under various types of markets. Units incorporated in this paper would enable the students to know about the theory of production, Cost and revenue analysis, forms of market and factor pricing theories.

Unit I: Theory of Production:

1.1 Meaning of production. Concept of Production Function.

1.2 The law of Variable Proportions.

1.3 Law of returns & returns to Scale. Internal and External Economies & Diseconomies.

1.4 Isoquant Curve. Properties of Isoquant curves.

1.5 Isocost Line, Production Possibility Curve.

Unit II: Analysis of Costs and Revenue:

2.1 Concepts of Costs- Fixed and variable Costs, Opportunity cost, Average and Marginal Cost.

2.2 Short run and Long run cost curves.

2.3 Modern Approach related to Short run and Long run cost curves.

2.4 Relation between Marginal Cost, Average Cost and Total Cost.

2.5 Revenue concepts: Total Revenue, Average & Marginal Revenue.

2.6 Equilibrium of the Firm – Short run and Long run.

Unit III: Market

3.1 Meaning & classification.

3.2 Perfect Competition: concept - Characteristics, price determination in short and long run, Equilibrium of the firm and industry.

3.3 Monopoly: Concept, Characteristics and short and long run Equilibrium, price determination, Price discrimination.

3.4 Monopolistic Competition: concept, Characteristics and short & long run Equilibrium of Firm, Group Equilibrium, Selling cost.

3.5 Oligopoly – Concept, Characteristics.

3.6 Duopoly: - Concepts & Characteristics.

Unit IV: Factor Pricing.

4.1 Marginal Productivity theory of Distribution.

4.2 Rent – Concept -Ricardian Theory of Rent, Modern Theory of Rent, Quasi Rent.

4.3 Wages – Concept, Types – Modern theory of wages, wage differentials and Collective Bargaining.

4.4 Interest –Concept, Loanable funds theory and Keynes's Liquidity preference theory.

4.5 Profit – Concept, Risk and uncertainty theory and Innovation theory.

Unit V: Pricing Methods:

5.1 Pricing Methods: Marginal Cost Pricing - Full Cost Pricing - Multi product pricing –Limit Pricing.

5.2 Bain's Model.

Course Outcome: Paper- 104

F.Y.B.A. Economics

(Revised Syllabus)

Semester – II

Total Marks: 50

MONEY BANKING AND FINANCE (COMPULSORY) Paper– ECO-104

OBJECTIVE:

Money and banking constitutes important components of modern economy. A clear understanding of the operations of money and banking and their interaction with the rest of the economy is essential to realize how monetary forces operate. The paper on money and banking is essential for students to understand the monetary and banking system in India.

Unit – I: Meaning & Function of Money:

1.1 Meaning, Definition and Functions.

1.2 Types of Money.

1.3 Paper currency and kinds of Paper currency.

1.4 Methods of Note Issue – Principles of note issue and Paper Currency Standards.

1.5 Gresham's Law.

Unit – II: Banking in India:

2.1 Meaning and Definitions of Bank.

2.2 Banking Structure in India.

2.3 Commercial Banking – Functions, Credit Creation – process, purpose and limitations, Principles of Commercial Banks - Liquidity, Profitability and Safety.

2.4 Functions of Foreign Banks, Regional Rural Banks, District Central Cooperative Banks, Primary Agricultural Cooperative Credit Societies, State Cooperative Banks and NABARD.

2.5 New Concepts in Banking – Core banking, ATM, Credit Card, E-banking and Internet banking.

Unit – III: Reserve Bank of India:

3.1 Meaning and Functions of Reserve Bank of India.

3.2 Money measures – M1, M2, M3, & M4.

3.3 Organization and Management of R.B.I.

3.4 Monetary Policy – Meaning, Objectives

3.5 Methods of Credit Control – Qualitative and Quantitative.

Unit – IV: Money Market Capital Market in India:

4.1 Meaning, Structure and Functions.

4.2 Components of Money Market, Role of the Money Market,-Money Market Reforms in India.

4.3 Capital Market – Meaning, Nature and functions of Indian Capital Market.

4.4 Stock Market – Meaning and functions of stock Market.

4.5 Functions of Securities Exchanges Board of India (SEBI).

Course Outcome: Paper- 105

Semester –III

ECO – 105:-Macro Economics (Compulsory)

Marks: 50

Objectives:-

This paper of Micro Economics is designed to make undergraduate students aware of the basic theoretical framework underlying the field of Macro Economics.

Unit: I – Introduction:

1.1 Macro Economics –Definition, nature and scope.

1.2 Importance and limitations of Macro Economics.

1.3 Difference between Macro and Micro Economics.

Unit: II – National Income:

2.1 National Income –Definition and various concepts.

2.2 Significance and circular flow of national income.

2.3 Measurement and difficulties in measuring national income.

Unit: III – Theory of Money:

3.1 Value of money and its measurement.

3.2 Index Number.

3.3 Quantitative Theory of Money, Fisher's approach.

Unit: IV – Output and Employment:

4.1 Classical theories of employment.

4.2 Keynesian theory of employment-aggregate demand function, aggregate supply function, Principle of effective demand.

4.3 Consumption function – concept, Keynesian Psychological law of consumption average and Marginal propensity to consume.

Unit: V - Theory of Trade Cycles:

5.1 Nature and characteristics of trade cycles.

5.2 Hawtrey's monetary theory, Hayek's over investment theory, Keynesian view on trade cycles.

5.3 Control of trade cycles –monetary and Fiscal measures.

Course Outcome: Paper- 106

Semester – III

ECO-106:- Economics of Development (Compulsory)

Marks: 50

Objectives:

This paper would enable the students to know about theories of Development underlying the field of Economics of Development.

Unit – I: Introduction:

1.1 Meaning of economic development and growth.

1.2 Difference between development and growth.

1.3 Concept of underdevelopment and characteristics of underdeveloped countries, Sustainable development, obstacles to economic development.

Unit - II: Theories of Development:

2.1 Theories of Adam Smith and Malthus.

2.2 Karl Max's Theory of Economic Development.

2.3 Schumpeter's Theory of Economic Development.

Unit –III: Factors in Development Process.

3.1 Natural resources, renewable and non renewable.

3.2 Population – Theory of optimum population

3.3 Saving and investment – Capital accumulation, capital output ratio, Choice of technique.

Unit – IV: Growth Models:

4.1 Ragnar Nurkse's model of Economic growth.

4.2 W.W. Rostow's stages of economic growth.

4.3 Rosenstein Rodan's Theory of Big Push, Balanced v/s unbalanced growth.

Unit – V: Sectoral View of Economic Development:

5.1 Role of agriculture in economic development.

5.2 Role of industrialisation in economic development.

5.3 Role of service sector in economic development, Role of Nano Technology in agricultural development.

Course Outcome: Paper- 107

(Revised Syllabus)

Semester – IV

ECO – 107: Public Finance (Compulsory)

Marks: 50

Objective:

This paper would provide understanding about the significance and scope of Public Finance. The main objective of this paper is to provide detailed information to students about the fiscal policy, public revenue, public debt and public expenditure.

Unit – I: Introduction:

1.1 Meaning, nature and scope of public finance.

1.2 Importance of public finance.

1.3 Difference between private, public finance, private, public and merit goods.

Unit – II: Public Revenue:

2.1 Sources of public revenue.

2.2 Taxation –Direct and Indirect tax, objectives of taxation, canons of taxation, classification of taxes.

2.3 Division of tax burden – The benefit theory and ability to pay theory, impact and incidence and effects of taxation.

Unit – III: Public Expenditure:

3.1 Meaning and classification of public expenditure.

3.2 Principles of public expenditure.

3.3 Role of public expenditure in developing economy, effects of public expenditure.

Unit – IV: Public Debt:

4.1 Concept and importance of public debt, comparison between public debt and private debt.

4.2 Sources, causes and effects of public debt.

4.3 Debt burden and its management, redemption of bank debt.

Unit – V: Union Budget:

5.1 Meaning, objectives and components of union budget.

5.2 Types of budget – balanced, surplus, deficit and zero base budget, Concept of Gender Budget.

5.3 Current Central Government budget of India.

Course Outcome: Paper- 108

Semester – IV

ECO – 105 Statistical Methods (Compulsory)

Marks: 50

Objective:

The main objective of this paper named Statistical Methods is to train the students to use the techniques of statistical analysis which are commonly applied to economic problems. Statistical Methods paper also deals with simple tools and techniques, which will help the students in data collection, presentation, analysis and drawing inferences about various statistical hypotheses.

Unit – I: Introduction:

1.1 Meaning and nature of statistics.

1.2 Scope and importance of statistics.

1.3 Collection of data – Primary and Secondary data.

Unit – II: Measures of Central Tendency:

2.1 Types of series –Simple, Discrete and Continuous series.

2.2 Arithmetic mean- its merits and demerits.

2.3 Median and Mode – its merits and demerits.

Unit – III: Measures of Dispersion:

3.1 Range, Mean deviation.

3.2 Standard deviation.

3.3 Variance, Co-efficient of Variation.

Unit – IV: Correlation Analysis:

4.1 Meaning and types of correlation.

4.2 Karl Pearson's coefficient of correlation.

4.3 Properties of correlation of coefficient.

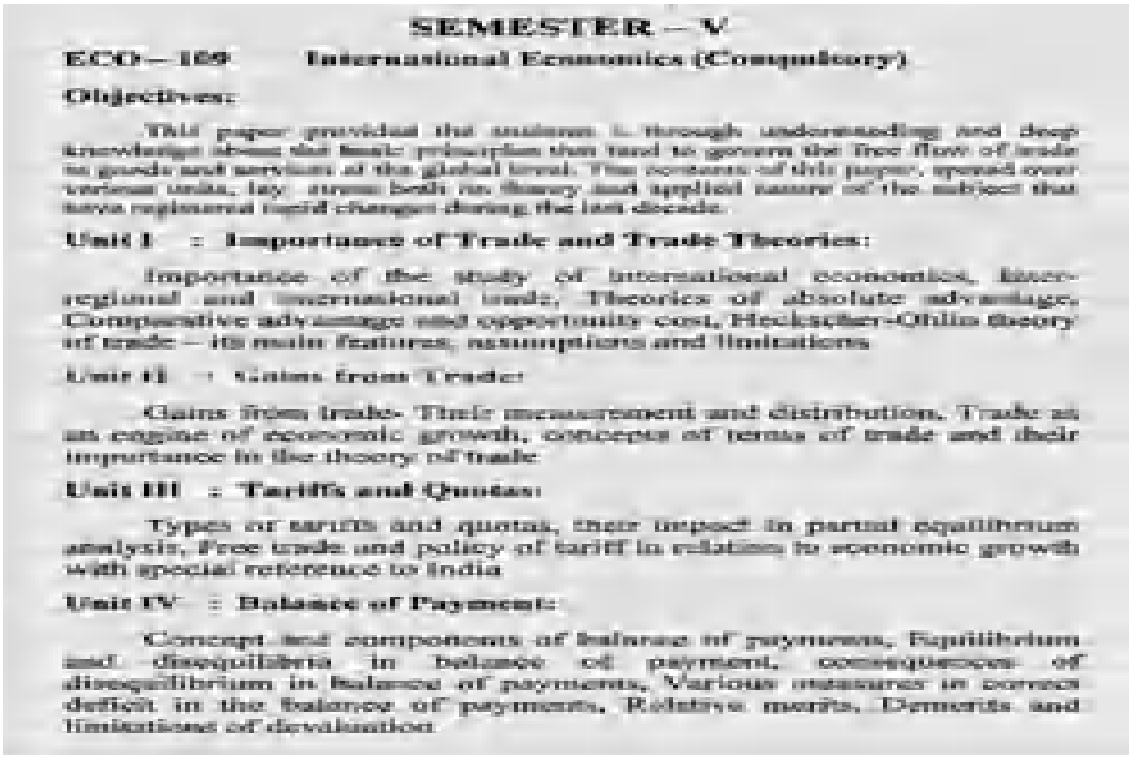
Unit – V: Index Number:

5.1 Meaning of Index Number.

5.2 Uses and limitations of Index Number.

5.3 Laspeyre's, Pasche's and Fisher's Ideal Index Numbers.

Course Outcome: Paper- 109



SEMESTER – V

ECO – 109 International Economics (Compulsory)

Objectives:

This paper provides the students a through understanding and deep knowledge about the basic principles that tend to govern the free flow of trade in goods and services at the global level. The contents of this paper, spread over various units, lay stress both on theory and applied nature of the subject that have registered rapid changes during the last decade.

Unit I : Importance of Trade and Trade Theories:

Importance of the study of international economics, Inter-regional and international trade; Theories of absolute advantage, Comparative advantage and opportunity cost, Heckscher-Ohlin theory of trade – its main features, assumptions and limitations

Unit II : Gains from Trade:

Gains from trade- Their measurement and distribution, Trade as an engine of economic growth, concepts of terms of trade and their importance in the theory of trade

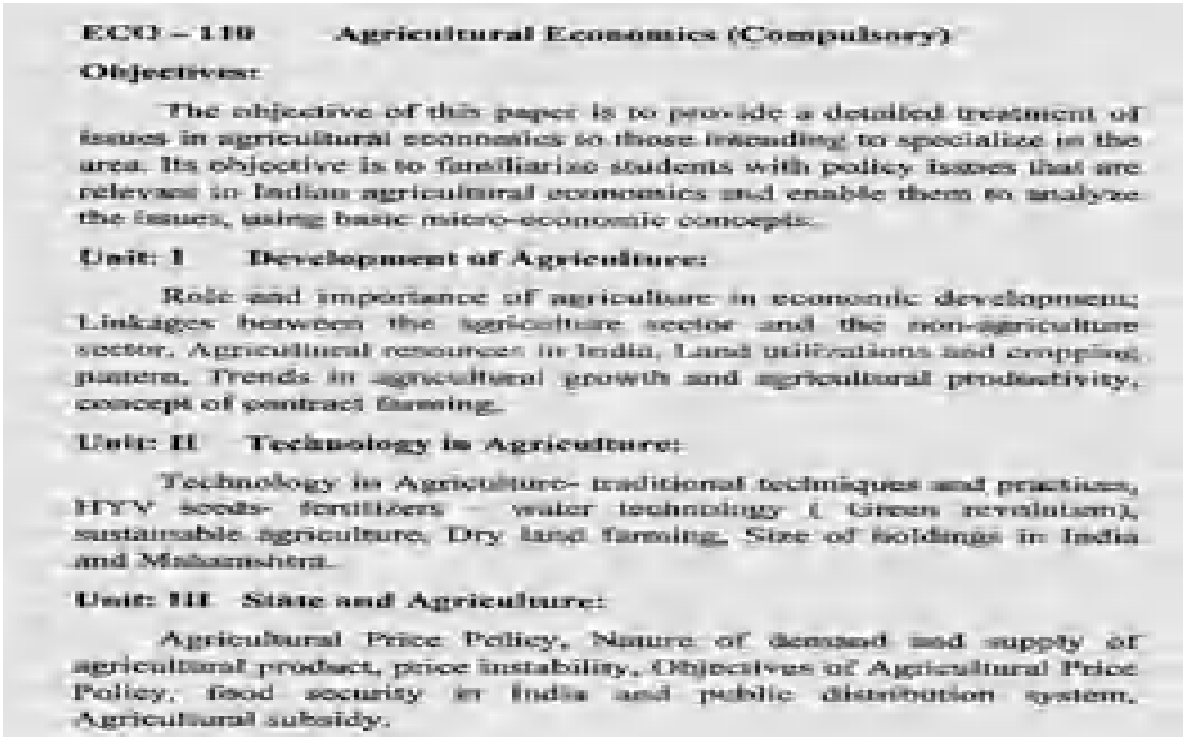
Unit III : Tariffs and Quotas:

Types of tariffs and quotas, their impact in partial equilibrium analysis, Free trade and policy of tariff in relation to economic growth with special reference to India

Unit IV : Balance of Payment:

Concept and components of balance of payments, Equilibrium and disequilibria in balance of payment, consequences of disequilibrium in balance of payments, Various measures to correct deficit in the balance of payments, Relative merits, Demerits and limitations of devaluation

Course Outcome: Paper- 110



ECO – 110 Agricultural Economics (Compulsory)

Objectives:

The objective of this paper is to provide a detailed treatment of issues in agricultural economics to those intending to specialize in the area. Its objective is to familiarize students with policy issues that are relevant in Indian agricultural economics and enable them to analyse the issues, using basic micro-economic concepts.

Unit: I Development of Agriculture:

Role and importance of agriculture in economic development; Linkages between the agriculture sector and the non-agriculture sector, Agricultural resources in India, Land utilizations and cropping pattern, Trends in agricultural growth and agricultural productivity, concept of contract farming.

Unit: II Technology in Agriculture:

Technology in Agriculture- traditional techniques and practices, HYV seeds- fertilizers – water technology (Green revolution), sustainable agriculture, Dry land farming, Size of holdings in India and Maharashtra.

Unit: III State and Agriculture:

Agricultural Price Policy, Nature of demand and supply of agricultural product, price instability, Objectives of Agricultural Price Policy, food security in India and public distribution system, Agricultural subsidy.

Unit: IV Fifty Years of Indian Agriculture:

An overview of agricultural development, Disguised unemployment and unemployment in the rural economy, Globalization of Indian economy and its effects on Indian agriculture.

Course Outcome: Paper- 111 (History of economic thoughts

Unit: I Early Period:

Mercantilism: Main characteristics; Thomas Mun – Physiocracy; natural order; primacy of agriculture, social classes, tableau economique, taxation.

Unit: II Classical Period:

Adam Smith- division of labour, theory of value, Capital accumulation, distribution, views on trade, Economic progress; David Ricardo- value, theory of rent, distribution, ideas on economic development and international trade; Tomas R. Malthus- Theory of Population; Karl Marks- dynamics of social change, theory of value, surplus value, profit and crisis of capitalism, Economic ideas of J. B. Say.

Unit: III Marginalists:

Marshal as a great synthesizer; role of time in price determination, economic methods, ideas on consumer's surplus, elasticities, prime and supplementary costs, representative firm, external and internal economies, quasi-rent, organization as a factor of production, nature of profits.

Unit: IV Keynesian Ideas:

The aggregate economy, Liquidity preference Theory and Liquidity trap; Marginal efficiency of capital and marginal efficiency of investment, wage rigidities under employment equilibrium, role of fiscal Policy; deficit spending and public works, multiplier principle.

Course Outcome: Paper- 112 Project work

ECO – 112 Project Work (Annually)

Objectives: This course will inform students about the project writings skill as per the study of research methodology techniques. It's also deals with the deep study of specific topic.

Note: Teacher should work as per the following guidelines:

1. The concern subject teacher should provide outline of the project work to the students.
2. The concern subject teacher should allot the topic of project work separately to each student.
3. The concern teacher should be guidence to the students regarding How to prepare project work in regular period activity in this semester. Project evaluation will be done by external and internal examiners at the end of VIth semester Examination.
3. Outline of the Project Work is as follows:
   i) Title of the Project
   ii) Introduction
   iv) Importance of the topic
   iii) Objectives
   v) Research Methodology
   vi) Analysis and Discussion
   vii) Conclusion
   viii) References
4. Written work of Project should be around 40 to 50 pages in own hand written along with certificate by concerned teacher and Head of the Department.
5. Workload of Project Work should be 04 periods per week.

Course Outcome: Paper- 113

ECO – 113 Research Methodology

Objectives:

The main objective of this paper is to provide information about social sciences research to the students of economics. This paper deals with importance of social research, research design, data collection and presentation of data.

Unit: I Introduction:

Meaning, nature, scope and objectives of social science research, Theory, concepts, hypothesis, stages of scientific research, Motivating factors of social research.

Unit: II Research Design:

Meaning and need of research design; Types of research design (only introduction)– descriptive, exploratory, diagnostic and experimental.

Unit: III Data Collection:

Facts- features; Primary data collection methods- Direct observation, questionnaire, schedule, interview; Secondary data collection methods- Personal documents, Public documents and Limitations.

Unit: IV Data Presentation and Analysis:

One– dimensional diagrams; Two– dimensional diagrams; Graphs of time series; Graphs of frequency distribution.

Course Outcome: Paper- 114

ECO – 114 Industrial Economics

Objectives:

In the contemporary world with globalization and liberalization more and more attention is being given to industry. This paper intends to provide knowledge to the students on the basic issues such as concepts and organization of a firm, productivity, efficiency, capacity utilization and debates involved in the industrial development of India.

Unit I: Introduction:

Need, importance and role of industries in economic and social development, Industry and agriculture sector linkages, Industrial classification.

Unit II: Industrial Organization and Ownership Structure:

Public, Private, Joint and Co-operative sectors, private corporate sector, MNCS and their role.

Unit III: Location and Dispersion:

Location of industries – Theories of location, diversification, integration and merger of industrial units, Dispersion and problem of regional imbalance.

Unit IV: Composition of Industrial Sector:

Structure of large – scale industries in India. Sugar, Cotton, Iron and Steel, Agro Processing Industries, Cottage and Village Industries and Rural industrialization.

Course Outcome: Paper- 115

ECO-115: Indian Economic Thinkers

Objectives:

This paper is essential for a student who aspires for advanced training in economics in India. The evolution of economic idea in each instance was as much a response to immediate economic problems and policy issues as much as it was a self-conscious attempt to refine earlier analysis by correcting mistakes and filling in the gaps in analysis.

Unit– I: Economic Thought of Koutilya:

Economic policies, concept of welfare state, principle of taxation.

Unit– II: Economic Ideas of Nauroji, Ranade and Datt:

Economic ideas of Dadabhai Nauroji – contribution to economic policies, Drain Theory, M.G. Ranade– Economic policies, political economic policies. R.C. Dutt– Economic ideas. Manvendra Roy- Economic ideas and concept of new humanism.

Unit– II: Economic Ideas of Mahatma Gandhi: Economic ideas of Mahatama Gandhi Sarvodaya, Village Swaraj, Swadeshi. Dr. B.R.Ambedkar– State socialism, Problems of Rupee, Public finance. Mahatma Phule's views on agriculture, reasons of farmer's poverty. D.R. Gadgil– Economic planning & co-operation, Y.B. Chavan: Thoughts of agriculture, industries & socialism.

Unit– IV: Economic Thoughts of Amartya Sen:

Economic welfare, Social Choice.

Course Outcome: Paper- 116

ECO- 116 Project Work (Annual Assessment)

Objectives: This course will inform students about the project writings skill as per the study of research methodology techniques. It's also deals with the deep study of specific topic.

Note:

1. The evaluation of completed project works and presentation examination will be done in the presence of external examiner appointed by University Authority. Scheme of marking will be done as per the following manner.

A) Project Report : 80 marks

B) Presentation : 20 marks

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Department of Geography

Programme Outcomes (PO)

On Completion of the course, students will be able to

- **PO1: Government Department:** A geographer has better job opportunities in government departments like planning and development, urban planning, forestry, environmental and disaster management departments, Public Work Department, Agriculture Department and travel agencies, manufacturing firms, text book, map publishers, media agencies, etc.
- **PO2: Cartographer:** Many people choose to work as a cartographer with extensive knowledge about maps and are involved in making maps, charts, globes, and models of Earth and other planets.
- **PO3: Surveyor:** Many others with a degree in geography also select to work as a surveyor in government sectors and private companies.
- **PO4: GPS Surveyors:** In recent days even the fields of GIS as well as Remote Sensing are providing better job opportunities to people with the educational background in geography and related GPS specializations.
- **PO5: GIS and Remote Sensing Fields:** Many Multinational Companies (MNC) are providing jobs to Geographer as a GIS Expert, Digitizers in GIS Company, GIS Analysis, GIS Engineer
- **PO6: Government employer:** Central government agencies employ geographers for mapping, intelligence work and remote sensing interpretation. State and local governments employ geographers on planning and development commissions.
- **PO7: GIS specialist:** City governments, county agencies and other government agencies and private groups are often in need of experienced GIS professionals.
- **PO8: Climatologist:** Agencies viz. National Weather Service, news media, the Weather Channel and other government entities occasionally need climatologist.
- **PO9: Transportation Manager:** The regional transit authorities or shipping, logistics and transportation companies requires in transportation geography.
- **PO10: Researcher:** Many Government and non-government institutes along with research center offer several career options for qualified geographers with numerous specializations.
- **PO11: Teacher/Professor:** The college teachers, school teachers and university teacher, depending upon the experience and degrees obtained.
- **PO12: Competitive Examinations**: It is learn that in the NET/SET, MPSC/UPSC and other competitive examinations.
- **PO13:** Serve as conservator in forest, Soil, Agricultural Departments.
- **PO14:** Work in disaster and water resources management.

Programme Specific Outcomes (PSO)

On Completion of the course, students will be able to

- **PSO1:** Understand the nature and basic concept of geography.
- **PSO2:** Understand the applied and professional nature of geography such as fields of G.I.S. and surveying

- **PSO3:** Understand the application of modern geography techniques such as geographical information system in society as well as environmental and settlement geography, hazards, language land cover etc.
- **PSO4:** Understand the effect of rotation of revolution the Earth. Understand interior structure of the earth. Know the importance of longitudes & latitudes. International Date line and Standard time. Understand Theory regarding of Origin of Continents and oceans.
- **PSO5:** Study the formation of Rocks. Understand the work of internal and external forces and their associated Landforms. Study the erosional and depositional land forms of Rivers and Sea Waves. Understand the concept of mass Wasting. Understand the Application of Geomorphology. Acquaint utility and application of Geomorphology in different regions and environment. Make aware of the need of protection and conservation of different landforms
- **PSO6:** Understand the importance of Atmosphere. Understand heat balance. Understand the types of winds. Understand the structure, composition of Atmosphere. Understand weather phenomena winds, humidity and precipitation. Understand properties of ocean water. Knowledge about effect of ocean Currents. Study about types of tides. Study of costal environment and Ocean Resources.
- **PSO7:** Study the Human Economic Activities. Explain the Weber theory of Industrial Location. Understand the mineral and power resources. Study conventional and non-conventional energy resources. Study of the distribution of Iron and Steel, Automobile, Cotton Paper and Ship Building Industries in India.
- **PSO8:** Get knowledge about types of agriculture, trade and transport. Aware the student about need of conservation and Protection of natural resources. Study of Transport and Trade. Understand the concept of Privatization, Globalization and Liberalisation.
- **PSO9:** Measure Map Scales, conversion of scales. Understand types of projections. Preparation of various graphs and diagrams. Get knowledge about Statistical Methods. Understand the different surviving techniques like, plane table, prismatic survey. Acquire knowledge of preparation of drawing of profile with the help of Dumpy level. Understand the socio economic condition of the villages.
- **PSO10:** Understand the relationship of man and environment. Study of human evolution and races of man kinds. Understand the concept of Determinism, Posibilism and Stop and Go determinism. Understand the modes of life of Bhill, gonad, Nagas and Tribes in India. Importance of Right to Information Acts. Understand the history of population. Study of distribution and density of population. Get knowledge of population theories. Study types, cause, effects of migration.
- **PSO11:** Understand approaches of agricultural geography. Know the silent feature, problems and prospects of Agriculture. **S**tudy about types of agriculture. Understand methods of irrigation. Know the Importance of water Resources. Study about water harvesting concept and methods. Study allied areas in agriculture and agriculture development. Study the Problems And Prospect of Agriculture. Understand sustainable agricultural development.
- **PSO12:** Know about Toposheets and its types. Understand the mechanism function of topographical maps. Understand interpretation if weather images. Understand the History of Remote Sensing. Know Arial Photographs and Satellite Imageries. Understand method of representation of relief. Introduce the student of top sheet, weather map. Understand the basic concept of RS GIS & GPS. Mapping and interpretation of Arial Photograph.
- **PSO13:** Understand about the tourism influencing factors: historical, natural, social, cultural and economic. Study the tourism motivating factors for pilgrimages, leisure, recreation, elements. Understand the Tourism types: eco-ethonocoastal and adventure

tourism, national and international tourism, globalization and tourism. Study tourism attraction, evolution of tourism, promotion of tourism, case studies from in India. Study and understand the environmental laws and tourism-current trends, spatial and recent changes, Tourism circuits-short and longer, accommodation and supplementary accommodation other facility, Indian hotel industry.

- **PSO14:** Examining the introduction to disaster, nature, scope, significance, types and approaches to study. Understand the fundamental concept of hazard, disaster, vulnerability, resilience and risk. Understand the various types and impact of natural and manmade hazards on human being, regional economy, nature etc. Understand the role of local peoples, NGOs, police, army, paramilitary forces in disaster management. Study the previous disasters and their management happened in India.
- **PSO15:** Understand about the definition, types and Forms of energy and classified material based and process based energy resources. Study the global scenario of energy requirement since industrial revolution period to the present and understand issue related to energy use and environment, understand difference in use of energy in develop and developing country. Understand the issues related to tread, energy crisis and related treaties and agreements on international level. Understand spatial and temporal pattern of energy consumption in agriculture, transport and industrial sectors, with reference to different states, rural and urban areas the in country. Study and understand planning of energy, institutional arrangements, policy models and understand the energy management process in India and methods of energy conservation traditional vs. modern energy management and sustainable development.
- **PSO16:** Understand study about the industrial geography, its nature, scope, and different study methods. Study the locations of industry and their activities primary and secondary and its factors responsible for same. Review on world distribution of some industries and selected countries. Understand the global nature of industrialization and related problems, methods of measuring the spatial distribution of manufacturing.
- **PSO17:** Understand the environmental degradation, industrial hazards and occupational health, manufacturing industry, role and factors affecting on the same.
- **PSO18:** Understand the about the physiographic division of India and Maharashtra. Understand the India Drainage system of India Rivers. Understand the climatic variation in India and climatic region of India and Maharashtra. Examine and understand the types of vegetation of India and Maharashtra. Understand the variation in industrial development in India and Maharashtra. Examine and understand the developed and underdeveloped states in India.
- **PSO19:** Understand the history and development, nature, types, need and types of trade. Study the physical, economic, social and political factors influencing on international trade. Understand types, characteristics, merits and demerits of modes of transportation. Understand the role and significance various modes of transportation in local and international trade. Understand the various problems of transportation in urban areas.
- **PSO20:** Understand the nature, scope, and concept of soil geography. Understand physical and chemical properties of soil and factors affecting formation of soil. Understand vertical structure of soil and soil horizon. Understand soil classification of USDA.
- **PSO21:** Understand the nature, scope and concept, relationship between culture and social Environment and right of information act. Examine the cultural complex and traits of culture and its concepts. Evolution to civilization and various cultural development and cultural system according to religion, language and geography and global cultural changes. Study the origin and growth of culture and agriculture and its basic concepts. Understand the concept of space and social process and present status. Understand

difference in rural and urban social and cultural life style with reference of settlement patterns.

- **PSO22:** Understand the fundamentals concepts related to watershed, significances of watershed development, demarcation of watershed, types of watershed according to area and shape. Study about the physical parameters of watershed, channel geometry and basin morphology. Understand the hydrological parameters, rainfall, aerial precipitation, evaporation and transpiration, infiltration, run off and drainage. Understand the watershed development planning and sample of watershed management and planning for appropriate development of watershed management for water conservation and development.
- **PSO23:** Understand the all fundamental concept of GIS, potential of GIS, concept of space & time, objectives of GIS, elements of GIS, GIS tasks, history of GIS and GIS applications in different field. Examine and understand the spatial and non spatial data models and all its functions components and applications in geography. Extract the knowledge and information about geospatial analysis and database query and GIS data analysis, various concept and problems analysed in GIS environment. Understand the concept of map, projections, and coordinate systems and basic of the same for different purposes in geography. GIS applied in the various kinds of fields, agriculture, populations, watershed planning and land use planning.
- **PSO24:** Understand fundamental concepts, approaches, development and challenges of health care in India. Learn the geographical factors affecting on human health. Get the knowledge of genetic, communicable, non-communicable and occupational diseases. Understand diffusion of diseases and causes major diseases. Understand rural environment and health and health problems of tribes in India. Get the knowledge about urban environment and health; pollution.
- **PSO25:** Get the knowledge about fundamental concept food security, accessibility, utilization and food stability. Understand the hunger and malnutrition and examine spatial-temporal distribution. Find the physical factors and socio-economic factor affecting food security in India. Understand agricultural productivity, land availability, land degradation in India. Examining spatial-temporal distribution of major food and cash crops in India. Understand concept of food justice, food sovereignty social injustice, gender inequalities and Food Security conditions in India at national and state level. Obtain the knowledge about India's Food Security Bill 2013 and its Benefits and detriments.

Course outcomes (CO)

On completion of the course, students will be able to

Course Outcome: Paper – I

Paper - 1
"Elements of Physical Geography"

Unit I	:	Introduction of Physical Geography : - Meaning, Nature and Scope, Element, Branches of Physical Geography
Unit II	:	Lithospheres : Interior of the Earth, Wegher's Continental Drift Theory, Isostacy and plate Tectonic theories.
Unit III	:	Earth Movements : Vertical and Horizontal, Process of Folding causes and effect, process of Faulting, Causes and effect. Volcanoes and Earthquakes.
Unit IV	:	Rocks: Classification of rocks on the basis of Origin. Properties of different rocks.

Course Outcome: Paper – II

Paper- II – Human Geography

Unit I	:	Introduction Definition, Nature and Scope of Human Geography Braches of Human Geography.
Unit II	:	Man and Environment relationship Types of Environment, Concept of Determiniam and Possibilism, Stop and Go deterministic Approach.
Unit III	:	Physical and Social Profile of Racial groups, Ethnic groups, Tribal groups in World and India, Eskimo, Bushmen, Masai, Gonds, Gujars.
Unit IV	:	Human Settlement :- Types, Forms Patterns and Functional classification

Course Outcome: Paper – III

Paper – III
"Geography of Landforms"

Unit I	:	Concept of landforms, Evolution and types of landforms, Concept of Cycle of Erosion.
Unit II	:	Weathering :- Types and classification of Weathering - Mechanical, Chemical and biological. Soil formation.
Unit III	:	Geomorphic Agents and Processes. Erosion, Transportation, Deposition, Landforms produced by River, Winds and Sea waves.
Unit IV	:	Land form prodnced by Glacier and Underground water. Applied Geomorphology - Geomorphology & Settlement, Geomorphology & Landuse, Geomorphology & Resources.

Course Outcome: Paper – IV

Paper – IV
"Regional Geography of Maharashtra"

Unit I	:	Position and Personality : Location, Size and Shape, Relief and Physical Division of Maharashtra.
Unit II	:	Climate, Drainage, Soil and Natural Vegetation of Maharashtra.
Unit III	:	Agriculture :- Cropping Pattern Major Crops :- Jowar, Wheat, Rice, Cotton, Sugarcane, Oilseeds & Pulses. Geographical Condition, Production & distribution of these crops.
Unit IV	:	Industries : - Cotton and texlile Industries, Sugar Industries. Transpiration :- Road and Railway transport.

Course Outcome: Paper – V

Paper- Practical Geography
Paper No. – V

Total

Unit I : **A)** Nature and Scope of Cartography. Scale- Meaning, Methods of Representing Scale. Verbal Scale, Numerical Scale and Lineau Scale

B) Types of Linear Scale
i) Simple Linear Scale.
ii) Comparative Scale.
iii) Diagonal Scale.
iv) Time and Distance Scale
v) Space Scale

Unit II **A)** Definitions of Maps, Brief History of Maps, Classification of Maps,
B) Enlargement and Reduction of Map by Square Method

Unit III **A)** Methods of Showing Relief
i) Hachure's,
ii) Spot Height
iii) Bench Mark
iv) Hill Shading
v) Layer Tint
vi) Form Lines
vii) Contours
B) Representation of slopes with the help of contour lines by applying cross section method of
i) Even Slope
ii) Uneven Slope
iii) Gentle Slope
iv) Concave Slope
vi) Convex Slope
vii) Terraced Slope

Unit IV Representation of Landforms by Cross Section Method
I. Conical Hill
II. Ridge
III. Plateau
IV. Cliff
V. Waterfall
VI. 'U' Shaped valley
VII. 'V' Shaped Valley
VIII. Pass
IX. Spur

Unit – V **A) Conventional Signs and Symbols of SOI Maps**
B) Study of any three Indian topographical Maps Under the following Heads (Hilly, Plateau and Plain Area each one)
i) Introduction
ii) Relief
iii) Drainage
iv) Settlement
v) Transportation & Communication

Unit – VI **Certified Journal and Viva Voce**

Course Outcome: Paper – VI

Paper - VI
Climatology

Unit I : **Weather and Climate** – Definition, nature and scope of Climatology, Significance of Climatology, Composition and structures of atmosphere, weather and climate.

Unit II : Insolation and Temperature – Definition of Insolation and Temperature, Heat Budget of the Earth, Factors affecting the distribution of Solar energy, Distribution of Temperature – Vertical and Horizontal, Range of Temperature.

Unit III : Atmospheric Pressure and Winds- Evaporation and Condensation, Hydrological cycle, Types of precipitation, World pattern of rainfall, regional and seasonal distribution, Air Masses and Fronts :Concept, Classification and properties. Atmospheric disturbance : Tropical and Temperate cyclones: thunderstorms and tornadoes.

Unit IV : Role of Climate in human life:- Atmosphere pollution and global warming, general causes, consequences and measures of control.

Course Outcome: Paper – VII

Paper- VII
Population Geography

Unit I : **Population Geography – Definition, nature, scope and Significance, Sources of population data.**

Unit II : **Distribution of population – Factors affecting on population distribution and density. Population distribution patterns – World and India. Density, mortality and fertility population regions of the World..**

Unit III : **Composition of Population – Age and sex composition, rural- urban composition, Economic composition; determinates, World regional patterns; Composition, of population in India.**

Unit IV : **Migration – Meaning, classification and their determinates and consequences of migration, Migration in India.**

Course Outcome: Paper – VIII

Paper – VIII
"Oceanography"

Unit I : **Introduction of Oceanography –**
Definition, Nature and Scope, Surface configuration of Ocean floors.

Unit II : **Submarine Relief-**
General idea of submarine relief- Continental shelf, Continental slope, Abyssal plains, Oceanic trenches and deeps, Hypsographic Curve, Relief of Atlantic, Pacific and Indian Oceans.

Unit III : **Salinity and Temperature of Oceanic Water-**
Salinity of ocean water, its meaning, causes of salinity,
Factors affecting on salinity of oceanic water,
Distribution of salinity in the World.
Factors affecting the temperature of ocean water,
Distribution of temperature in ocean water.

Unit IV : **Marine Deposits and Coral Reefs-**
Ocean deposits- Shallow sea deposits, Deep sea deposits, Types of Corals.
Ocean as a storehouse of resources for the future.

Course Outcome: Paper – IX

Paper – IX
"Settlement Geography"

Unit I : **Settlement Geography –**
Nature, scope and content. Definition of rural and urban Settlements, merits and limitations.

Unit II : **Settlement site and structure –**
Internal Morphology, external forms, field patterns, Functions and house types.

Unit III : **Spatial organization –**
Size, spacing and hierarchy of settlements; emergence and characteristics of urban settlement.

Unit IV : **Silent features of human settlements in India.**

Course Outcome: Paper – X

Paper- Practical Geography
Paper No. – X

Total M

Unit I : Mechanism and Uses of Weather Instruments

I. Thermometer
II. Maximum and Minimum Thermometer
III. Dry and Wet Bulb thermometer
IV. Anerioid Barometer
V. Fortin's Barometer
VI. Wind Vane
VII. Cup Anemometer
VIII. Rain Guage
IX. Hygrometer

Unit- II A) Conventional Signs and Symbols Used in IDWR

B) Interpretation of IDWR of Winter Season, Summer Season, Rainy Season (At least one Map of each Season) Attach the Copy of Studied IDWR.

Unit III A) Cartographic Techniques, Definition- Nature & Scope, Importance of Cartography

B) Representation of Climatic Statistical data by Using Following Cartographic Techniques.

i) Climograph
ii) Hythergraph
iii) Star Diagram
iv) Wind Rose
v) Ergograph
vi) Isobars
vii) Isotherms
viii) Isohyets

Unit IV Representation of Statistical Data by Using following Methods

i) Line and Bar graph

ii) Polygraph
iii) Divided Circle
iv) Rectangle Divided
v) Dot Method
vi) Choropleth Map
vii) Proportional Circle (Located)
viii) Proportional Square (Located)
ix) Proportional Cube (Located)
x) Proportional Sphere (Located)

Unit V A) Latitude, Longitude, Direction, Area and Great Circle

B) Map Projection- Definition and Classification of Map Projection

C) Construction, Properties, Uses & Choice of the following Map Projection -

i) Zenithal Polar Gnomonic Projection
ii) Zenithal Equal Area Projection
iii) Simple Conical Projection
iv) Conical Projection with two standard parallel
v) Simple Cylindrical Projection
vi) Cylindrical Equal Area Projection

Unit VI Certified Journal and Viva-Voce

Course Outcome: Paper – XI

Paper No.XI

Mark : 30

Physical Geography of India

Unit I : India in the context of south east and south Asia. India: a land of diversities, unity within diversities, Shape, size, physical landscape of India

Unit II : Drainage systems of India their functional significance Climate: Regional and seasonal variations of climate. The monsoons.

Unit III : Soil types of India their distribution and characteristics

Unit IV : Natural Vegetation: Forest types and their distribution. In India.

Course Outcome: Paper – XII

Paper No.XII

Mark : 30

Geography of Environment

Unit I : Definition of environment science, nature and scope of environment, Types of environment.

Unit II : Ecology, Abiotic or physical factors, Temperature, soil, water, atmosphere, Biotic or Non Physical factors, organism, population and Biotic community.

Unit III : Ecosystem coordinal principles of Ecosystem. structure of Ecosystem (Producer, Consumer, Decomposer), Nutrient Cycling (Carbon cycle, oxygen cycle, Nitrogen cycle), Function of Ecosystem, Energy flow, food chain, food web, Ecological pyramid.
Types of Ecosystem (Natural Ecosystem and Cultural Ecosystem)

Unit IV : Problems of Ecosystem and environment Global warming, food security, Deforestation, Plastic bags, Acid rainfall.

Course Outcome: Paper – XIII

Paper No.XIII

Mark : 30

Industrial Geography of Maharashtra

Unit I : Nature, scope and recent developments of Industry In Maharashtra. Elements and factors of localization of Industries.

Unit II : Distribution and spatial pattern of Industries in Maharashtra.

1. Cotton and Textile Industries
2. Petro chemical Industries
3. Sugar cane Industries
4. Automobile Industries

Unit III : Industrial belt in Maharashtra and their Characteristics, Impact of industries on economic development of Maharashtra.

Unit IV : Role of globalization Industrial sector, shifting of industries and its impact on the urban fringe, Changing industrial policy in Maharashtra.

Course Outcome: Paper – XIV

Paper No. XIV

Mark : 30

Agricultural Geography of India

Unit I : Nature, scope significance and development of Agricultural geography. Origin and dispersal of Agricultural in India.

Unit II : Agriculture in India: Agricultural landuse, cropping Pattern, Regional pattern of productivity in India. Agricultural policy in India

Unit III : Distribution and production of major crops in India

1) Rice 2) Wheat 3) Jowar
4) Cotton 5) Sugarcane 6) Tea

Unit IV : Green Revolution in India.

Course Outcome: Paper – XV

Semester-VI- Subsidiary
Paper No. XV

Mark : 30

Geography of Natural Calamities

Unit I : Definition Nature and scope of Natural Calamities
Unit II : Earthquake, and volcano, causes and effect of Earthquake and volcano, world distribution of earthquake and volcano.
Unit III : drought and floods
1. Meteorological drought
2. Hydrological drought.
3. Agricultural drought.
causes and effects of drought, drought-prone-areas
Flood cause and effects
Biological Hazards
Unit IV : Global warming and green House effects,
Ozone deflation, Pollution Types, (Air, Water, and Soil)

Course Outcome: Practical Paper – XVI

Geography Practical
Paper – XVI (SOE)

Unit 1 - **Measures of Central Tendency -**
i. Mean
ii. Median
iii. Mode

Unit 2) - **Measures of Deviation -**
i. Mean Deviation
ii. Quartile Deviation
iii Standard Deviation

Unit 3- **Correlation -**
i) Spearman's Method
ii) Karl Pearson's Method

Unit 4- **i. Regression equation by Least Square Method**
ii. Regression Line 'X' on 'Y'
iii Regression Line 'Y' on 'X'
iv Chi-Square Test

Unit 5- **Participation in Geographical Excursion and Report Writing**

Course Outcome: Paper – XVII

Paper No.XVII

Mark : 30

Biogeography

Unit I : Nature, Scope and significance of Biogeography.

Unit II : Environment, Habitat and plant animal association, Biome types. Darwin's theory of Evolution.

Unit III : Elements of Plant geography, distribution of forests, successions in newly Formed landforms. Examples from flood plains and Glacial fore fields.

Unit IV : Zoo-geography and its Environmental Relationship Ecosystem forms and function. National forest Policy of India

Course Outcome: Practical Paper – XVIII

Geography Practical
Paper - XVIII (MAIN)

Unit 1 - A) Introduction of Instrumental Survey
1) Chain and Tape Survey
2) Plane Table Survey
3) Prismatic Compass Survey

B) Field Survey using Plane table and prismatic compass
i) Open Traverse Method
ii) Close Traverse Method

Unit 2 - A) Representation of Bearing -
i) Whole Circle Bearing
ii) Reduced Bearing
iii) FB, BB of WCB
iv) FB, BB of RB
v) Conversion of Bearing -
a) WCB into RB
b) RB into WCB

B) Correction of Bearing
ii. Closing Error By Bowditch Method
iii Determination of the Height with the Help of Abney Level

Course Outcome: Project work Paper – XIX

Project Work

Paper - XIX (MAIN - Practical)

Marks - 100

* **Report writing - 80 Marks**
* **Presentation - 20 Marks**

Candidates will be required to prepare a project report on any **one** topic. The topic for project may be selected from the list of suggested assignments given below or candidate can also take up a project of his / her choice in consultation with teachers of the department of geography, but the selection of the project must be related to the geographical or environmental topic / issues.

Topics / Issues for project:

1) Physical features related to the local level such as drainage pattern, slope analysis, soil and rocks type. Physiography of the region.
2) Impact of climate on agriculture, Vegetation, Biotic resources, Occupation and food habits of selected area.
3) Resources of selected area - agriculture, water, energy, minerals, soil, vegetation, biotic resources.
4) Social, economical, demographical, occupational, cultural, historical study of the selected area.
5) Environmental study of the selected area - Enviornmental degradation, sources of pollution of water bodies in the locality and determine the quality of water, sources of air pollution and quality of air, sources of land pollution and soil quality, sources of noise pollution and its consequences.
6) Study of disasters like earthquake, draughts, floods, landslides, cyclones, famines, hailstones.
7) Agriculture - Landuse pattern, crop combination, crop concentration and diversification, cropping pattern, agricultural production and productivity, any other issues related with agriculture.
8) Urban planning and landuse management, urban morphology, urban growth, CBD, functional classification of town, problems of urban development, rural settlement sire and structure, features of rural settlements.
9) Distribution of diseases, availability of health facilities, geographical / social / economic / environmental factors affecting human health and diseases arising from them.
10) Transportatien Network & Connectivity, availability of means of transportation, number of various types of vehicles, transportation system and local development, accessibility & flowchart, transpertations and frequency of accidents.

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Department of Physical Education

Programme Outcomes (PO)

On Completion of the course, students will be able to

- **PO1:** Develop the knowledge, motivation and competence to live a physically active life;
- **PO2:** Get valued physically, morally, intellectually and socially within an educational context.
- **PO3:** Take part of the core curriculum and is also offered as national qualifications;
- **PO4:** Offer a range of physical activities within, and beyond, the curriculum to engage children and young people in purposeful, worthwhile, enjoyable and enriching learning experiences;
- **PO5**: Address a broad range of educational objectives through well planned and developmentally appropriate physical education programmes.
- **PO6**: Development of scientific insight, intelligence and superior type of reflective thinking.
- **PO7**: A career in physical education to a wide range of career options like in Army, Police, MPSC, UPSC, PSI, also as sports instructors.

PROGRAMME SPECIFIC OUTCOME (PSO)

On Completion of the course, students will be able to

- **PSO1:** A part of the chosen sport, health clubs, sports good manufacturer, marketing, commentator, sports journalism, trainer, and many other similar options.
- **PSO2**: Find jobs as trainer or instructor for a game or sporting event, in sports journalism, marketing, commentator or other related fields.
- **PSO3:** Work as coach, team manager/sports manager, fitness instructor, athletic trainer, sports journalist, and photographer.
- **PSO4:** On retiring from active play can also look forward to satisfying jobs in assignments such as umpires and referees. Also in a country like ours where country spas and yoga centres are at a rise, one can also use his/her expertise for a job in such places, rehabilitative and therapeutic modalities like Cryotherapy, Thermotherapy, Electromagnetic Therapy etc.
- **PSO5:** Trained Physical Education personnel get priority in defence and police services with special recruitment drives.

Course outcomes (CO)

On completion of the course, students are able to understand

Course Outcome: Paper – I

Paper – I

TITLE : PHILOSOPHICAL, SOCIOLOGICAL FOUNDATIONS AND HISTORY OF PHYSICAL EDUCATION.

Time : 2 hours 04 Period per weeks
Marks : 50

UNIT – I PHILOSOPHICAL FOUNDATIONS

(a) Meaning and Definition of Philosophy of Physical Education.
(b) Components of Philosophy its Application in the field of Physical Education.
(c) Traditional and Modern Philosophies their implication in the programme of Education.
(d) Philosophies of Education applied to Physical Education.
(i) Idealism (ii) Naturalism
(iii) Realism and (iv) Humanism

UNIT – II SOCIOLOGICAL FOUNDATIONS

(a) Sociological Basic of Physical Education.
(b) Social Environment for development of Individual Personality.
(c) Socialization and Sports.
(d) Social Nature and Social Recognition

UNIT – III INTEGRATION OF PHYSICAL EDUCATION WITH OTHER FACULTIES.

(a) Integration of Physical Education with History
(b) Integration of Physical Education with Psychology.
(c) Integration of Physical Education with Sociology.

UNIT – IV MATURE OF PHYSICAL EDUCATION SYSTEM

(a) Ancient India and Medieval India.
(b) Physical Education in Ancient Civilization with reference to
i) India ii) Greece iii) Rome iv) Egypt
(c) Development of Physical Education with special reference to i) U.S.S.R. ii) U.S.A. iii) Germany

UNIT – V PHYSICAL EDUCATION IN INDIA DURING 20TH CENTURY

(a) Meaning, Definitions, Aims and Objectives of Physical Education.
(b) Physical Education Training Institutions
(c) Physical Education after Independence.
i) Central Advisory Board of Physical Education
ii) All India Council of Sports (AICS)
iii) Netaji Subhash National Institute of Sports (NSNIS)
iv) Laxmibai National Institute of Physical Education (LNIPE)
v) Sports Authority of India (SAI)

UNIT – VI HISTORICAL DEVELOPMENT OF ANCIENT OLYMPIC GAMES AND MODERN OLYMPIC GAMES

(a) Philosophy of Olympism and its impact on Sports movements in India.
(b) Current Trends in Physical Education.
i) Role of Federations and Associations.
ii) Courses and Coaching Centres.
iii) Policies of Central and State Government for Physical Education and Sports.
(c) Movements of Akhada and Vyayam Shalas in Maharashtra.

Course Outcome: Paper – II

Paper - II

TITLE : PRINCIPLES AND RECENT DEVELOPMENT OF PHYSICAL EDUCATION.

Time : 2 hours — 04 Period per weeks
Marks : 50

UNIT - I PRINCIPLES OF PHYSICAL EDUCATION

(a) Biological Principles of Physical Education.

(b) Sex Differences

(c) Principles of exercise.

(d) Body Types.

UNIT - II SOCIOLOGICAL PRINCIPLES OF PHYSICAL EDUCATION

(a) Social Values and Development of Traits.

(b) Social Welfare

(c) Physical Education as Sociological Agency.

UNIT - III CLASSIFICATION OF CHILDREN

(a) Psychological Bases of Classification.

(b) Biological Characteristics of Children.

(c) Physiological and Sociological Characteristics of Children.

UNIT - IV RECENT DEVELOPMENT OF PHYSICAL EDUCATION

(a) Status of Physical Education and Sports in Educational Institutions.

(b) Physical Education at Pre-Primary and Primary School Level.

(c) Physical Education at Secondary and Higher Secondary School Level.

(d) Physical Education at University and Professional Level.

UNIT - V SPORTS AND GAME ORGANISATION IN INDIA

(a) District Level Organizations.

(b) State Level Organizations.

(c) National Level Organizations.

(d) International Level Organizations.

UNIT - VI ROLL OF ASSOCIATION AND SPORTS BODIES

(a) Indian Olympic Associations (IOC).

(b) International Olympic Associations (IOC).

(c) Sports Authority of India (SAI).

(d) Central Advisory Board of Physical Education and Recreation

Course Outcome: Paper – III

PAPER – III

TITLE : PRACTICAL PHYSICAL EDUCATION

Time : 2 hours — 04 Period per weeks
Marks : 100 — 20 Students per Batch 3.20 Hrs.

TRACK AND FIELD EVENTS (Practicals)

A) EVENT WISE PERFORMANCES

(a) 100 mtrs. Sprint for (Men and Women) (20 Marks)

(b) Long Jump for (Men and Women) (20 Marks)

i) Introduction ii) Safety Suggestion

iii) Techniques iv) Teaching Steps

Teaching Steps – i) Approach Run ii) Take-off

iii) Flight in the ear iv) Body action in the air and

v) Landing.

(c) Shot Put (20 Marks)

i) Introduction ii) Safety Suggestion

iii) Techniques

Techniques - i) O, Brien Techniques ii) Rotary Techniques

iv) Teaching Steps

Step-I Leadups Step-II Shot put from standing position.

Step-III Shot put using the Glide Technique

Step-IV Shot put using Rotary Techniques.

(d) Common error and correction

(e) Training Schedule.

OPTED GAMES (Any one of the following Games) (30 Marks)

B) i) Kabbadi ii) Westling iii) Hockey iv) Hand Ball

a) History of the Games.

b) Rules & Regulations of the Games.

c) Different Training methods.

d) Training Schedule.

e) Fundamental Skills of the Game.

f) Tactics of the Games. 1) Offensive 2) Defensive

g) Ground Marking System.

C) Preparation of Record Books its submission compulsory on opted any one game and one Athletic event. (10 Marks)

i) Jumping event (Long Jump)

ii) Running event (100 mtrs. Sprint)

iii) Throwing event (Shot put)

Course Outcome: Paper – IV

Paper - IV

TITLE: HEALTH EDUCATION AND RECREATION IN PHYSCIAL EDUCATION AND SPORTS.

Time: 2 hours 04 Period per weeks

Marks: 50

UNIT – I HEALTH EDUCATION

a) Concept and objectives of Health Education.

b) Importance of Health Education.

c) Principles of Health Education.

UNIT – II CONTEMPORARY HEALTH PROBLEMS

a) Abuse of Alcohol and its effects on Individual, family and community.

b) Eating Habits and its effect on Health.

c) Effect of Drugs and Tobacco on Sports person.

UNIT – III FAMILY AND HEALTH EDUCATION

a) Meaning functions and importance of family as a social institution.

b) Role of parents in child Health Care.

c) Health Care during Disasters.

UNIT – IVRECREATION IN PHYSICAL EDUCATION AND SPORTS.

a) Meaning, Need and Scope of Recreation.

b) Principles of Recreation.

c) Types of Recreation.

UNIT – VPLANNING A PROGRAMME OF RECREATION

a) Urban Recreative Programme.

b) Rural Recreation Programme.

c) Industrial Recreative Programme.

UNIT – VIAGENCIES PROMOTING RECREATION

a) Facilities of Recreation.

b) Organization of Recreation.

c) Leadership in Recreation.

Course Outcome: Paper – V

Paper – V

TITLE: OFFICIATING, COACHING AND TRAINING METHODS IN PHYSICAL EDUCATION AND SPORTS.

Time: 2 hours 04 Period per weeks

Marks: 50

UNIT: 1 OFFICIATING OF GAMES AND SPORTS

a- Meaning and Definition of Officiating

b- Importance of Officiating in Physical Education and Sports

c- Qualities of Good Officials

d- Duties and Responsibilities of Official

e- Rules and Marking System of Indian and Foreign Games.

UNIT: II COACHING OF GAMES AND SPORTS

a- Meaning and Definition of Coaching

b- Impedance of Coaching In Games and Sports

c- Qualities of God Coach.

d- Duties and Responsibilities of Coaches.

UNIT: III ORIGINE AND DEVELOPNENT OF GAMES AND SPORTS

a) Fundamental and Advanced Skills of Indian Games.

i) Kabaddi ii) Kho-Kho

ii) Wrestling iv) Ball badminton

b) Fundamental and Advanced Skills of Foreign Games.

i) Volley Ball iii) Soft Ball

ii) Badminton iv) Table Tennis.

UNIT: V TRAINNING METODS IN GAMES AND SPORTS

a) Need of Sports Training.
b) Principles of Sports Training.
c) Factor's affecting the Sports Training.
d) Procedure and Planning of Specific Training.

UNIT: VI TYPES OF TRAINNING METHOD IN GAMES AND SPORTS

a) Weight Training
b) Circuit Training
c) Fartlek Training
d) Interval Training

Course Outcome: Paper – VI

Paper - VI

TITLE: PRACTICAL OF PHYSICAL EDUCATION.

Time: 3:30 hours — 04 Period per weeks

Marks- 100 — 20 Students per Batch

Track And Field Events (Practical's)

A) Event Wise Performances

a) 200 Metres Running For Men And Women (20 Marks)

b) Triple Jump (Men And Women) (20 Marks)

i) Introduction ii) Safety Suggestion

iii) Techniques iv) Teaching Steps

Teaching Steps:-

i) Approach Run ii) Take Off

iii) Flight in the air iv) Body action

v) Landing

c) Discuss Throw (20 Marks)

i) Introduction ii) Safety Suggestion

ii) Techniques

Techniques:-

i) Standing Throw ii) Rotational Throw

Teaching Steps :-

Step:- i) Holding The Discuss ii) Stance

iii) Action iv) Follow Throw

B) Opted Games:- (Any one of the following games) (30 Marks)

i) Volleyball ii) Ball badminton iii) Cricket

iv) Table Tennis

a) History of the games

b) Rules & Regulation of the games

c) Different Training Methods

d) Training Schedule

e) Fundamental Skills of the game

f)Tactics of the game i) Offensive ii) Defensive

g) Ground Marking System

C) Preparation of Record Books its Submission Compulsory on opted any one game and one athletic event (10 Marks)

i) Running Event (400 Mtrs.) ii) Jumping Event (Triple Jump)

iii) Throwing Event (Discuss Throw)

Course Outcome: Paper – VII

Paper – VII

TITLE: "ANCIENT & MODERN HISTORY OF PHYSICAL EDUCATION & SPORTS."

Time : 2 hours 04 Periods per week

Marks: 50

UNIT – I INTRODUCTION OF PHYSICAL EDUCATION IN ANCIENT INDIA.

(a) Vedic Period
(b) Epic Period
(c) Buddhist Period

UNIT – II PHYSICAL EDUCATION IN THE STATE OF SPARTA AND ATHENS.

(a) Physical Education in Ancient Rome.
(b) Physical Education and moral Education.
(c) Physical Education in Mughal Period

UNIT – III PHYSICAL EDUCATION IN INDIA AFTER INDEPENDENCE.

(a) Physical Education in British Period
(b) Ancient Olympic Games, Historical Background.
(c) Modern Olympic Games.

UNIT – IV GOVERNMENT BODIES & POLICIES IN PHYSICAL EDUCATION.

(a) Nature & Educational System in modern India.
(b) Education & Physical Education Policies in India
(c) Central Advisory board of Physical Education

UNIT – V SCHEME AND AWARDS RELATED TO PHYSICAL EDUCATION & SPORTS.

(a) Arjuna Award
(b) Dronacharya Award
(c) Rajiv Gandhi Khelratna Award.

UNIT – VI INSTITUIONS OF PHYSICAL EDUCATION IN INDIA.

(a) Y.M.C.A. College of Physical Education of Madras.
(b) LNIPE Gwalior & NSNIS Patiala.
(c) IIVPM Amaravati.

Course Outcome: Paper – VIII

Paper – VIII

TITLE: "SPORTS PSYCHOLOGY AND MANAGEMENT. IN PHYSICAL EDUCATION"

Time : 2 hours 04 Periods per week

Marks: 50

UNIT – I PSYCHOLOGY IN PHYSICAL EDUCATION & SPORTS.

(a) Meaning, Nature and Scope of Sports Psychology
(b) Importance of Psychology in Sports.
(c) Limitation of Psychology in Education.

UNIT – II GROWTH & DEVELOPMENT

(a) General Nature of Growth & Development.
(b) Age & Behavior Characteristics.
(c) Physical, Emotional & Social Development.

UNIT – III MOTIVATION.

(a) Meaning Need & Its role in Physical Education.
(b) Techniques of Motivation.
(c) Psychological Factor Influencing Motivation.

UNIT – IV MANAGEMENT IN PHYSICAL EDUCATION & SPORTS.

(a) Meaning, Definition & Philosophy of management.
(b) Aims, Objectives & Principles of Managements.
(c) Functions of Managements.

UNIT – V TECHING METHOD IN PHYSICAL EDUCATION.

(a) Meaning, Types and Factors affecting.
(b) Presentation Techniques Meaning and Factors.
(c) Teaching Aids in Physical Education.

UNIT – VI FACILITIES AND EQUIPMENTS.

(a) Care and Maintenance & equipments.
(b) Principles of Purchasing Equipments.
(c) Office Management, Meaning & Principles.

Course Outcome: Paper – IX

Paper – IX

TITLE: "ORGANIZATION, ADMINISTRATION & SUPERVISION IN PHYSICAL EDUCATION YOUTH WELFARE & YOUTH SERVICES."

Time : 2 hours 04 Periods per week

Marks: 50

UNIT – I ORGANISATION, ADMINISTRATION & SUPERVISION.

(a) Meaning & Scope of Organization & Administration.
(b) Objectives of Organization & Administration.
(c) Guiding Principles of Organization.

UNIT – II ORGANIZING & CONDUCTING TOURNAMENTS.

(a) Deferent types of tournaments & competition.
(b) Knock out league tournaments.
(c) Merits & Demerits of tournaments.

UNIT – III INTRAMURALS PROGRAMME.

(a) Need and importance.
(b) Objectives of Intramurals programme.
(c) Methods of grouping & fixture.

UNIT – IV EXTRAMURAL PROGRAMME.

(a) Need & Importance.
(b) Selection and coaching of team.
(c) Emotional Development of the Students.

UNIT – V SUPERVISION IN PHYSICAL EDUCATION.

(a) Meaning, Purpose & Scope of supervision.
(b) Objectives & Features.
(c) Qualities of Supervisor.

UNIT – VI YOUTH WELFARE & YOUTH SERVICES.

(a) Concept of youth welfare & youth services.
(b) Youth Organization in India.
(c) Social Services.

Course Outcome: Paper – X

Paper – X

TITLE: " ANATOMY, PHYSIOLOGY & KINESIOLOGY OF PHYSICAL EDUCATION."

Time : 2 hours 04 Periods per week

Marks: 50

UNIT – I INTRODUCTION TO ANATOMY.

(a) Meaning, Need & Importance of Anatomy.
(b) Definition of cell, meaning In structure.
(c) Blood Composition, Function & Circulation.

UNIT – II SKELETEL SYSTEM.

(a) Types of Bones & Its Functions.
(b) Major Bones of the body & there Location.
(c) Tissue Definition, Structure, Function & Classification.

UNIT – III INTRODUCTION TO PHYSIOLOGY.

(a) Meaning Need & Importance of Physiology .
(b) Essential Properties of Living Organism.
(c) Vital Capacity & its measurement.

UNIT – IV MUSCULAR SYSTEM.

(a) Meaning, Structure Function of Skeletal Muscles.
(b) Major Muscles of the body.
(c) Location of Major Muscles.

UNIT – V RESPIRATORY SYSTEM.

(a) Structure of Repertory organs.
(b) Function of Brain.
(c) Effect of Exercise on Repertory system.

UNIT – VI INTRODUCTION TO KINESOLOGY.

(a) Definition & Meaning of Kinesiology.
(b) Fundamental & Applied Kinesiology.
(c) Need & Importance of Kinesiology.

Course Outcome: Paper – XI

Practical – Subsidiary

Paper No. XI

Time: 3.30 hours 04 Period per week

Marks : 100 16 Students per Batch

Track And Field Events (Event Wise performance Test.)

A) 400 Mrts. Run (Men and Women) (20 Marks)

B) High Jump (Men & Woman) (20 Marks)

i) Introduction (ii) Safety Suggestion

(iii) Techniques (iv) Teaching States

a) Approach Run (b) Take off (c) Position in the Air

(iv) Body action in the Air (v) Landing

C) Javelin Throw. (20 Marks)

i) Grip of Javelin (ii) Approach Run

(iii) Releasing the Javelin (iv) Body Controlling

D) Students will have to opt any one major games of the following for skill test. (30 Marks)

i) Kho – Kho (ii) Football (iii) Soft ball (iv) Basketball

a) Fundamental Skills (b) offensive skills

(c) Defensive Skills (d) Techniques and Tactics

(E) Preparation of Record Book on any one Major Games / Event of the following which is compulsory. (10 Marks)

(a) 400 mtrs Running (b) High Jump

(c) Javelin Throw (d) Khoko / Football / Soft ball/ Basketball

Course Outcome: Paper – XII

Practical – Main
Paper No. XII

Time: 3.30 hours — 04 Period per week

Marks : 100 — 16 Students per Batch

Track And Field Events (Event Wise performance Test.)

A) 800 Mrts. Run (Men and Women) (20 Marks)

B) Officiating & Coaching and Rules of the Games (Any one Major Games) (20 Marks)

C) The Candidates will have to Perform any Two of the Following Asnas. (30 Marks)

i) Tradasanas (ii) Chakrasanas (iii) Vajrasanas

(iv) Padmasanas (v) Hallsanas (vi) Shawasanas

(D) Pranayama & surya namaskar. (10 Marks)

(E) Preparation of submission of Record Book on the following. (10 Marks)

(i) Track marking for 800 Mrts.

(ii) Rules & Regulation of any one major Games opted

(iii) Yogasanas (iv) Pranayana

Department of Physics

Programme Outcomes (PO)

On Completion of the course students will be able to

- **PO1:** Demonstrate, solve and an understanding of major concepts in all disciplines of physics.
- **PO2:** Solve the problem and also think methodically, independently and draw a logical conclusion.
- **PO3:** Employ critical thinking and the scientific knowledge to design, carry out, record and analyze the results of Physics experiments.
- **PO4:** Create an awareness of the impact of Physics on the society, and development outside the scientific community.
- **PO5:** Inculcate the scientific temperament in the students and outside the scientific community.
- **PO6:** Use modern techniques, decent equipments and Phonics soft-wares.
- **PO7:** Get job opportunities in teaching field, as scientists in space organizations, space vehicles, TV, radio, computer technology, atomic energy and nuclear weapons etc.

Programme Specific Outcomes (PSO)

This programme will --

- **PSO1:** Improve scientific attitude and to give emphasis on the development of experimental skills, data analysis, calculations, and also on the limitations of the experimental method and data and, results obtained.
- **PSO2:** Help students in understanding the concepts of Physics.
- **PSO3:** Underline the strength of equations, formulae, graphs, mathematical tools to tackle the problems.
- **PSO4:** Understand the conceptual development of the subject and thereby develop the interest in the subject. A topic on this is introduced in the Emerging Physics Course.
- **PSO5:** Improve the scientific awareness among the students. A discussion on Paradox etc. Is encouraged.
- **PSO6:** Create interest in the subject and improve technological aspect through mini projects, projects, models, demonstrations, etc.
- **PSO7:** Create interest in the subject to continue to work in the field of science in general and physics in particular.
- **PSO8:** Make students understand the role and contribution of Physics in the present day science and technology.
- **PSO9:** Motivate students to make career in Physics.
- **PSO10:** Make aware and handle the sophisticated instruments/equipments.
- **PSO11: U**nderstand the basic concept of mechanics, electrodynamics, quantum mechanics.
- **PSO12: U**nderstand the concepts of energy, work, power, the concepts of conservation of energy, elasticity, surface tension and viscosity.

- **PSO13: U**nderstand optical phenomena such as polarization, birefringence, interference and diffraction in terms of the wave model and to analyze simple examples of interference and diffraction phenomena.

Course outcomes (CO)

On completion of the course, students are able to understand

Course Outcome: Mechanics, Properties of Matter and Sound (Paper-I)

- **CO1: Mechanics: -** Compound Pendulum- expression of time period, Interchangeability of centre of suspension and oscillation, Kater's Pendulum. Newton's law of Gravitation, Gravitational Field , Gravitational Potential, Gravitational Potential of mass, Gravitational potential and field due to spherical shell and solid sphere (at a point, outside , inside and on the surface).
- **CO2: Elasticity: -** Introduction , Moduli of Elasticity (Elastic constants), Twisting couple on a cylinder, Bending of Beam – Bending moment, cantilever loaded at free end – (a) When weight of beam is ineffective, (b) When weight of beam is effective, Depression of Beam loaded at centre.
- **CO3: Viscosity and Surface Tension: Viscosity -** Introduction, energy of liquid in motion, Bernoulli's Theorem, practical applications: (i) Law of hydrostatic pressure (ii) Filter pump, Poiseuille's formula. **Surface Tension** - Introduction, Difference of pressure across a curved surface, Determination of S.T. by Jaeger's method.
- **CO4: Ultrasonic and Acoustics: Ultrasonic -** Piezo – electric effect, Piezo – electric Generator, Magnetostriction effect, Magnetostriction oscillator, Applications of ultrasonic – Depth of sea, Chemical effects, Medical applications. **Acoustics** - Reverberation, Acoustical demands of an auditorium, Sabine's Law – Derivation of Reverberation time, conditions of good acoustical designs of room.

Course Outcome: Heat and Thermodynamics (Paper-II)

- **CO1: Thermal Conductivity:** Transference of heat, Coefficient of thermal conductivity, Rectilinear flow of heat along a metal bar, Methods of radial flow of heat-(i)spherical shell method and (ii)Flow of heat along the wall of a cylindrical tube, comparison of conductivities of different metals.
- **CO2: Real Gases and Transport Phenomena: - Real Gases –** Introduction, Reason for modification of gas equation, Van der Waals equation of state , comparison with experimental curves, critical constants, constants of Van der Waals equation. **Transport phenomena**–Introduction, Mean free path, sphere of influence, and expression for mean free path, variation of mean free path with temperature and pressure, transport phenomena, viscosity, Thermal conductivity (their interrelationship, dependence on temperature and pressure).
- **CO3: Thermodynamics: -** Adiabatic process, Adiabatic equation of a perfect gas, Isothermal process, Indicator diagram, work done during isothermal process and adiabatic process, reversible and irreversible process, Second law of thermodynamics. (Kelvin and Clausius statement), Heat engines, Carnot's ideal heat engine, Carnot's cycle (work done and Efficiency).

- **CO4: Entropy and Thermodynamic relations: -** General notation of entropy, change of entropy is independent of path, change of entropy in reversible and irreversible process, Formulation of second law in terms of entropy, Maxwell's thermodynamical relations, Applications of Maxwell's relations –i) Clausius – Clapeyron equation , ii) T-ds equations.

Course Outcome: Practical (Paper III)

- **CO 1**. Determination of acceleration due to gravity by Kater's pendulum.
- **CO 2**. Y by bending of a beam loaded at center.
- **CO 3**. Determination of Y by Cantilever (Oscillation method)
- **CO 4**. η by Maxwell's needle.
- **CO 5**. M.I. by bifilar suspension.
- **CO 6**. Determination of Y and η of the material of a flat spiral spring.
- **CO 7**. S.I. by Jaeger's method.
- **CO 8**. Determination of coefficient of viscosity by Poisseuille's method.

Course Outcome: Geometrical and Physical Optics (Paper-IV)

- **CO1:** Cardinal points of optical system - Focal points, Principal points, Nodal points and corresponding planes, coaxial lens system - equivalent focal length and cardinal points. Huygens's Eyepiece, Ramsden's eyepiece and their cardinal points.
- **CO2: Interference**: - Interference in thin film due to reflected and transmitted light, wedge shaped thin film, Newton's rings by reflected light, determination of wavelength, Michelson's Interferometer, type of fringes, determination of wavelength and difference in wavelength.
- **CO3: Diffraction**: Introduction, Diffraction at a thin wire , Fraunhofer diffraction at double slit (Interference and diffraction maxima, minima), Plane Transmission diffraction grating, Determination of wavelength (Normal incidence), Resolving power of optical instruments (Rayleigh's criterion), R. P. of prism and grating.
- **CO4: Polarization**: - Introduction, Malus law, Double refraction, Huygens's theory of double refraction in uniaxial crystal, Nicol prism. Optical activity, Fresnel's theory of optical rotation, specific Rotation, Laurentz's half – shade polarimeter, Determination of specific rotation of sugar solution.

Course Outcome: Electricity and Magnetism (Paper-V)

- **CO1: Vector Algebra : -** Dot and cross product (Revision), scalar triple product and it's geometrical interpretation, vector triple product, gradient of a scalar and it's physical interpretation, Divergence and curl of vector function and their physical interpretation, line, surface and volume integrals, Gauss's divergence theorem and Stoke's theorem .
- **CO2: Electrostatics: -** Coulomb's Law , Electric field , field due to point charge, flux of electric field, Gauss's law (with proof) , Differential from of Gauss law , electric potential , potential due to a point charge, Potential and field due to electric dipole. Dielectrics, polarization of dielectric, Gauss's law in dielectrics, Relation between **D**, **E** and **P.**
- **CO3: Magnetostatics: -** Magnetic field , Magnetic induction , magnetic flux , Biot-Savart law, Magnetic induction due to straight conductor carrying current , magnetic

induction on the axis of solenoid ,Ampere's Law, Differential form Ampere's Law, Moving coil ballistic Galvanometer - expression for charge.

- **CO4: Transient Currents: -** Growth and decay of current in a circuit containing L and R, charge and discharge of a capacitor through resistor, Growth and decay of charge in LCR circuit.

Course Outcome: Practical (Paper VI)

- **CO 1**. Y by Searle's apparatus.
- **CO 2**. M.I. of fly wheel.
- **CO 3**. Thermal conductivity of bad conductor by Lee's disc method.
- **CO 4**. Study of CRO (Measurement of frequency and voltage sensitivity AC/DC.)
- **CO 5**. Field along axis of circular coil.
- **CO 6**. I-H curve.
- **CO 7**. Calibration of spectrometer.
- **CO 8**. Dispersive power of prism.
- **CO9**. **DEMONSTRATION OF EXPT:** 1. Signal generator and CRO (sine, Square wave signal, measurement of ac voltage and frequencies. 2. Spectrometer (Reading and scale, observe the spectrum, measure refractive index for different colors). 3. Electromagnetic induction using two coil. 4. Determination of least count and range for at least four measurement instruments.

Course Outcome: Mathematical, Statistical Physics and Relativity (Paper VII)

- **CO1: Differentiation and ordinary differential equation:** Limit of function, partial differentiation, successive differentiation, total differentiation, exact differentiation, chain rule. Ordinary differential equation, order and degree of differential equation, solution of first order differential equation, and solution of second order linear differential equation with constant coefficient Homogeneous equations, b) Inhomogeneous equation, Special case of exponential right hand to find P.I.
- **CO2: Statistical basis and classical statistics:** Introduction, probability, principle of equal a priori probability, probability and frequency, some basis rules of probability theory, permutation and combination, macrostates and microstates, phase space, thermodynamic probability, division of compartments into cells, Maxwell-Boltzmann energy distribution law, evaluation of gi, α and β, M.B. distribution function for ideal gas, M.B. Speed distribution law.
- **CO3: Quantum statics:** Need of quantum statistics, Bose-Einstein distribution law, Planck's radiation law, Fermi-Dirac distribution law, electron gas, Fermi level and Fermi energy, EFO for electrons in a metal, comparison of three static, difference between classical and quantum statistics.
- **CO4: Theory of relativity:** Introduction, frame of reference, Galilean transformation equations, Michelson Morley experiment, special theory of relativity, Lorentz transformation equation, length contraction, time dilation, addition of velocities, variation of mass-energy equivalence.

Course Outcome: Modern and Nuclear Physics (Paper VIII)

- **CO1: Photoelectric Effect :** Introduction, Lenard's method to determine e/m for photoelectrons, Richardson and Compton experiment, Relation between photoelectric

current and retarding potential, Relation between velocity of photoelectrons and frequency of light, photoelectric cells- (1) Photo- emissive cell (2) Photo- voltaic cell (3) Photoconductive cell, Applications of photoelectric cells.

- **CO2: X-rays :** Introduction, The absorption of X-ray's, Laue's experiment, Bragg's Law, The Bragg's X-ray spectrometer, powder crystal method, The Laue method, X-ray spectra, Main features of continuous X-ray spectrum, Characteristics x-ray spectrum.
- **CO3: Nuclear forces and models :** Introduction, Binding energy, Nuclear stability, Nuclear forces , Meson theory of nuclear forces, liquid drop model, shell model, Energy released in Fission , Chain reaction, Atom bomb, Nuclear Reactors, Nuclear fusion, Source of stellar energy.
- **CO4: Particle Accelerators and Detectors:** Linear accelerator, Cyclotron, Synchrocyclotron, Betatron, Ionisation chamber, proportional counter, Geiger – Muller counter.

Course Outcome: Practical (Paper IX)

- **CO1:** 'h' by Photo cell
- **CO2:** e/m by Thomson's tube method.
- **CO3:** Determination of absolute value of B_H and B_V using Earth Inductor
- **CO4:** Stefan's constant by using thermo couple
- **CO5:** Measurement of low resistance using potentiometer.
- **CO6:** Frequency of A.C. mains using sonometer.
- **CO7:** Specific rotation by Laurent's half shade polarimeter.
- **CO8:** Cauchy's constant by spectrometer

Course Outcome: Practical (Paper X)

- **CO1:** Thermal conductivity of rubber tube.
- **CO2:** Study of temperature dependence of total radiation.
- **CO3:** To draw the histogram of theoretical Gaussian curve.
- **CO4:** Comparison of capacities by Desauty's method.
- **CO5:** Velocity of sound using Helmholtz resonator.
- **CO6:** Surface tension by Ferguson's method.
- **CO7:** R. P. of Telescope/microscope.
- **CO8:** Determination of Wavelength of light by Newton's ring

Course Outcome: General Electronics (Paper-XI)

- **CO1: Semiconductor:** Introduction, Construction, Working and Characteristics of semiconductor diode, Zener diode, Zener diode characteristics, Transistor (PNP and NPN), Transistors characteristics (CE, CB and CC), Construction, Working and Characteristics of FET & MOSFET.
- **CO2: Transistor Biasing and Amplifiers:** Transistor biasing, Selection of operating point, bias stability, transistor biasing circuits - fixed bias or base bias, collector feedback bias, emitter feedback bias or self-bias. Single stage transistor amplifier, frequency response of RC coupled amplifier, Noise in amplifiers, feedback in amplifiers, Op-Amp characteristics, inverting & non-inverting amplifier, Op-Amp as an adder and subtractor.

- **CO3: Oscillators and Multivibrators:** Two port network representation of a transistor, Hybrid parameters or h – parameters, Positive feedback, Basic principle of Oscillators, requirements of feedback, RC Oscillator (Phase shift Oscillator), LC Oscillator (Hartley Oscillator) Transistorised. Astable multivibrator, monostable multivibrator, bistable Multivibrator,
- **CO4: Modulation and demodulation:** Modulation, Amplitude modulation, Modulation index, frequency modulation, phase modulation, demodulation, advantages of frequency modulation over amplitude modulation.

Course Outcome: Solid State Physics (Paper-XII)

- **CO1: Crystal Structure:** Introduction, Crystal lattice- plane lattice, space lattice, translation vectors, Unit cell, (primitive, non primitive Wigner-Sietz primitive cell) Basis, symmetry operations, point groups and space groups, type of lattices (two dimensional and three dimensional lattices), lattice directions and planes, Miller indices, Inter planer spacing, simple crystal structure.
- **CO2: Bonding and Band theory of solids:** Introduction, concept of inters–atomic forces, cohesive energy and types of bonding, primary bonds- (ionic bonds, covalent bond and metallic bond), secondary bonds- (Vander Walls bonds and hydrogen bonds). The Kroning-Penney model, Energy versus Wave vector relationship, differentrepresentations (Brillouin zone)
- **CO3: Thermal properties of solids:** Classical theory of lattice heat capacity (Concept and comparison with experimental values), Einstein's theory of lattice heat capacity, Debye's model of lattice heat capacity, density of modes, limitations of Debye's model.
- **CO4: Free electron theory of metals and Transport properties:** Drude-Lorentz's classical theory, electrical conductivity, thermal conductivity, Wiedemann Franz law, significance of Fermi energy level, Hall effect, Hall voltage and Hall coefficient, experimental determination of Hall coefficient, Importance of Hall effect.

Course Outcome: Practical (Paper-XIII)

- **CO1:** Energy band gap of semiconductor using thermister.
- **CO2:** I.V. Characteristics of solar cell.
- **CO3:** Calibration of bridge wire using Carry-Foster's bridge.
- **CO4:** Determination of absolute capacity of condenser using B.G.
- **CO5:** Full wave rectifier with filter.
- **CO6:** Viscosity of liquid using Searle's viscometer.
- **CO7:** High resistance by leakage through condenser.
- **CO8:** Viscosity of liquid by oscillating disc method

Course Outcome: Practical (Paper-XIV)

- **CO1:** Transistor characteristics in CE configuration.
- **CO2:** Transistor characteristics in CB configuration
- **CO3:** Study of CE amplifier
- **CO4:** Hartly Oscillator using transistor.
- **CO5:** Wien Bridge Oscillator using transistor/ Op-Amp
- **CO6:** Op-Amp as adder/substractor

- **CO7:** JFET characteristics. (r_p, g_m and μ)
- **CO8:** Self-inductance by Owen's Bridge

Course Outcome: Classical and Quantum Mechanics (Paper-XV)

- **CO1: Classical Mechanics:** Mechanics of Particle, Mechanics of system of particles Constraints, Classification of Constraints, Virtual Work, D'Alembert's principle, Lagrange's equation, Simple application of Lagrangian formulation –Simple Pendulum, Particle in space, Linear Harmonic Oscillator, Atwood's Machine .
- **CO2: Origin of Quantum theory:** Introduction, Failure of Classical mechanics, Black body Radiation (Distribution of Energy), Plank's Quantum theory-Plank's Quantum postulates, linear momentum of photon in terms of wave vector, Plank's radiation law-Wein's law and Rayleigh's law, Einstein's equation: Quantum theory of photoelectric effect, Quantum effect.
- **CO3: Wave Particle duality:** Introduction, de-Broglie's hypothesis for matter waves, de-Broglie's wavelength in terms of energy and temperature, de-Broglie phase velocity and particle velocity (relation between them), Group velocity, Relation between group velocity and phase velocity, Davisson-Germer Experiment, Heisenberg uncertainty principle, Applications of Heisenberg uncertainty principle (1) Nonexistence of electrons in nucleus (2) Binding energy of an electron in an atom.
- **CO4: The Schrodinger Equation and its applications:** Wave Function (Ψ) of a moving particle, Time dependent Schrodinger's wave equation, Expectation value, Operators, Time independent Schrodinger equation (steady state form), particle in one dimensional box, Quantization of energy and momentum.

Course Outcome: Electrodynamics (Paper-XVI)

- **CO1: Electrostatics-** Electric field lines , electric flux and Gauss law, the divergence of E, Curl of E, Application of Gauss law: i) Electric field due to a uniform charged sphere ii) Electric field due to charged cylinder, Gaussian pillbox, Poisson's equation, Laplace's equation, Uniqueness theorem (First and Second)
- **CO2: Time varying field-**Faraday's Law of Electromagnetic induction, Lenz's law, Self-Induction, Mutual Induction, equation of continuity, Maxwell's displacement current, Maxwell's equation (Derivation, Differential form)
- **CO3: Electromagnetic waves III -**Origin of electromagnetic waves, characteristics of electromagnetic wave, electromagnetic wave equations in a conducting medium, transverse nature of electromagnetic wave, plane polarized electromagnetic wave, The Poynting Vector, Poynting theorem, Polarization of Electromagnetic waves
- **CO4: Interaction of Electromagnetic waves with matter -**Boundary condition for the electromagnetic field vector –**B,E,D and H** at the interface between the two media, reflection and refraction at the boundary of two non conducting media.

Course Outcome: Practical (Paper-XVII)

- **CO1:** Thermal conductivity by Forb's method
- **CO2:** Rydberg constant
- **CO3:** B-H curve using magnetometer
- **CO4:** Determination of Debye's temperature (e.g. Tin)
- **CO5:** Determination of dielectric constant of liquid/solid
- **CO6:** Resistance measurement of semiconductor by Vaders Pau's method
- **CO7:** I-H Curve by Excel

- **CO8:** Rydberg constant Excel

Course Outcome: Practical (Paper-XVIII)

- **CO1:** Temperature coefficient of resistance of semiconductor
- **CO2:** Measurement of thickness of thin film by gravimeter/optical/electrical method
- **CO3:** Temperature of sodium flame
- **CO4:** Hartmann's dispersion formula
- **CO5:** Maxwell's bridge (measurement of inductance using impedance at different frequency)
- **CO6:** λ by grating (normal incidence)
- **CO7:** Transistorized Regulated power supply using Zener diode.
- **CO8:** Bridge Rectifier

Course Outcome: Atomic, Molecular Physics and LASER (Paper-XIX)

- **CO1: The Atom model -** Introduction, Thomson atom model, the Rutherford nuclear atom model, drawbacks of Rutherford atomic model, the Bohr's atom model, Bohr's theory of origin of spectral lines, diagrammatic representation of the series spectrum of the H-atom in the light of Bohr's theory.
- **CO2: Vector Atom Model -** Introduction-vector atom model, Quantum numbers associated with the vector atom model, L-S coupling, j-j coupling, The Pauli's exclusion principle, Selection rules, Intensity Rules, Interval Rule, Normal Zeeman effect, Anomalous Zeeman effect, Stark effect and its experimental study.
- **CO3: Molecular spectra -** Introduction, origin of pure rotational spectrum of a molecule, origin of vibrationrotation spectrum of a molecule, Rayleigh's law of scattering, Raman effect- Discovery, experimental study, Applications of Raman effect-molecular structure, Nature of liquids, Crystal Physics, Nuclear Physics, Chemical effects.
- **CO4: LASER -** Introduction, induced absorption, spontaneous emission, stimulated emission, population inversion, properties of laser beam, laser pumping, Types of laser-Ruby laser, He-Ne laser, carbon dioxide (CO_2) laser, Applications of laser-Biological, medical and industrial.

Course Outcome: Non-conventional energy sources and Optical fiber (Paper-XX)

- **CO1: Non-conventional energy sources -** Introduction, Biomass, wind energy, tidal energy/Ocean energy, geothermal energy, biogas hydro energy, wind energy, solar energy Biogas plant-fixed dome type. **Wind energy:** Introduction to wind energy, terms and definition: wind, wind farm, wind turbine, vertical axis wind turbine (VAWT), horizontal axis wind turbine (HAWT), propeller (wheel), wind mill,types of wind turbines generator units, monoblade HAWT, twin blade HAWT, merits and limitation of wind energy.
- **CO2: Solar Photovoltaic Systems:** Introduction to photovoltaic systems, Solar Cell fundamentals: i) Semiconductor, ii) P-N junction, iii) Generation of electron-hole pair by photon absorption, iv) I_V characteristics of solar cell **Electrical storage:** Lead acid battery, basic battery theory
- **CO3: Introduction of optical fiber -** Introduction, importance of optical fiber, classification of optical fiber- stepped index fiber, stepped index monomode fiber, Disadvantages of monomode fiber, plastic fiber, latest developed types of optical fibers- HPSUV; HPSIR; Halide; Tapered.
- **CO4: Fiber cables and fabrication- Fiber fabrication:** Classification of fiber fabrication techniques; external chemical vapour deposition (external CVD), axial vapour deposition (AVD), internal chemical vapour deposition (internal CVD), **Fiber Cables:** Construction,

Strength members, cable tensile loading, minimum bend radius losses incurred during installation of cables or during subscriber service testing of cable, selection criteria, optical cable fiber laying in telephone.

Course Outcome: Practical (Paper-XXI)

- **CO1:** Measurement of the focal length of a given convex lens using laser
- **CO2:** Spectral response of photoconductor (LDR)
- **CO3:** Diffraction of grating using laser beam
- **CO4:** e by Millikan's oil drop method
- **CO5:** Study of thermocouple (Fe-Cu) and to find inversion temperature
- **CO6:** Refractive Index R.I. of Optical fiber
- **CO7:** Constant of B.G. by standard condenser method
- **CO8:** Study of absorption spectra of iodine and determination of its wavelength using grating

Course Outcome: Practical (Paper-XXII)

- **CO1:** Beam divergence of a diode laser
- **CO2:** Determination of the diameter of a thin wire using laser
- **CO3:** To study the interference of light using optical fibers
- **CO4:** Determination of wavelength of He-Ne laser by transmission grating and reflection grating
- **CO5:** Y by Koenig's method
- **CO6:** Edser's A pattern
- **CO7:** e/m by Thomson methods by Excel
- **CO8:** Surface tension by Ripple's method

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Department of Chemistry

Programme Outcomes (PO)

On Completion of the course students will be able to

- **PO1:** Identify and become familiar with the scope, methodology and application of modern chemistry and learn to appreciate its ability to explain various aspects.
- **PO2:** Understand theoretical and practical concepts of instruments that are commonly used in most chemistry fields.
- **PO3:** Design and carry out scientific experiments and record the results of such experiments.
- **PO4:** Understand safety of chemicals, transfer and measurement of chemical, preparation of solutions, and using physical properties to identify compounds and chemical reactions.
- **PO5:** Explain how chemistry is useful for social, economic and environmental problems and issues facing our society in energy, medicine and health.
- **PO6:** Have a firm foundation in the fundamentals and application of chemicals and scientific theories including in inorganic, organic, physical and analytical chemistry and functional knowledge of all core areas of chemistry.

Programme Specific Outcomes (PSO)

- **PSO-1.** Gain the knowledge of Chemistry through theory and practical.
- **PSO-2.** To explain nomenclature, stereochemistry, structures, reactivity, and mechanism of the chemical reactions.
- **PSO-3.** Identify chemical formulae and solve numerical problems.
- **PSO-4.** Use modern chemical tools, Models, Chem-draw, Charts and Equipments.
- **PSO-5.** Know structure-activity relationship.
- **PSO-6.** Understand good laboratory practices and safety.
- **PSO-7.** Develop research oriented skills.
- **PSO-8**. Make aware and handle the sophisticated instruments/equipments.
- **PSO-9. Physical chemistry:** Review of conventional processes, recent advance techniques. Surface properties, ionic properties and other special characteristics of substances,
- **PSO-10. Inorganic chemistry:** Introduction to molecular symmetry, co-ordination of compounds and Bio-inorganic chemistry.
- **PSO-11. Organic chemistry:** Introduction to fundamental concepts and principles of process synthesis. Proficiency in Synthetic skill, Characterization by various analytical techniques, Micro- techniques and in-depth knowledge in subject is evaluated by allotting synthetic scheme.

Course Outcome (CO)

On completion of the course students will obtain knowledge about -

Course Outcome: Inorganic Chemistry (Paper- I)

- **CO1: Atomic Structure:** Atomic orbital's, Quantum numbers, Heisenberg uncertainty principle, shapes of s, p, d orbitals. Aufbau and Pauli exclusion principles. Hund's multiplicity rule. Electronic configurations of the elements, Bohr's atomic model (Qualitative aspect only).
- **CO2: Periodic Properties:** Atomic and Ionic radii, Ionization Energy, Electron affinity and Electro negativity. Trends in periodic table and application in predicting and explaining the chemical behaviour.
- **CO3: S-Block Elements:** Comparative study, diagonal relationship, salient features of hydrides, solvation and complexation tendencies including their functions in biosystems.
- **CO4: P - Block Elements:** Comparative Study (including diagonal relationship) of groups 13-17 elements, compounds like hydrides oxides of groups 13-16. Interhalogen compounds and its types.

Course Outcome: Organic Chemistry (Paper- II)

- **CO1: Structure and Bonding:** Localized and delocalized chemical bond; charge transfer complexes, resonance, hyper conjugation, inductive effect, hydrogen bonding, conjugative effect, steric effect.

- **CO2: Mechanism of Organic Reactions:** Homolytic and heterolytic bond breaking. Types of reagents eletrophiles and nucleophiles. Types of organic reactions. Energy considerations. Reactive intermediates - carbocations, carbanions, free radicals (with two examples each).
- **CO3: Stereochemistry of Organic Compounds :** Concept of Isomerism - Types of isomerism Optical Isomerism - elements of symmetry, molecular chirality, enantiomers, stereogenic centre, optical activity, properties of enantiomers, chiral and achiral molecules with two stereogenic centres, diastereomers, threo and erythro diastereomers, meso compounds. Relative and absolute configuration, sequence rules, D and L and R and S systems of nomenclature. Geometric Isomerism - Determination of configuration of geometric isomers. E and Z system of nomenclature, geometric isomerism in oximes and alicylic compounds.
- **CO4: Alkanes :** Methods of formation (Koble reaction, Corey - House reaction and decarboxylation of carboxylic acids) Physical properties and Chemical reactions of alkanes Chlorination, Nitration, Sulphonation, Catalytic oxidation.
- **CO5: Alkenes :** Nomenclature of alkenes, methods of formation, mechanisms of dehydration of alcohols and dehydrohalogenation of alkyl halides. The Saytzeff rule, Hofmann elimination, physical properties and relative stabilities of alkenes. Chemical reactions of alkenes - mechanisms involved in hydrogenation, electrophilic and free radical additions, Markownikoff's rule, hydroboration and oxidation with $KMnO_4$. Polymerization of alkenes with one example each.
- **CO6: Arenes and Aromaticity:** Nomeclature of benzene derivatives. The aryl group. Aromatic nucleus and side chain structure of benzene: molecular formula and Kekule structure. Resonance Structure, MO Picture. Aromaticity: The Huckel rule, aromatic ions Aromatic electrophilic substitution: General Pattern of the mechanism (Nitration, halogenations and Sulphonation) and Friedel Crafts reaction.
- **CO7: Alkyl and Aryl halides:** Polyhalogen Compounds: Chloroform, Carbon tetrachloride. Methods -formation of aryl halides, nuclear and side chain reaction.

Course Outcome: Practical (Paper- III)

- **CO1: Volumetric Analysis:** Preparation of 0.1N. NaOH solution and its standardization by given oxalic acid solution. · Preparation of 0.1 N oxalic acid solution and its standardization by given $KMNO_4$ solution.
- **CO2: Inorganic Qualitative Analysis:** Identify two acid and two basic radical from the given binary mixture. a] $CdSO_4 + NH_4Cl$ b] $BaCO_3 + Al_2(NO_3)_3$ c] $ZnCO_3 + KBr$ d] $MnCO_3 + MgSO_4$ e] $NiSO_4 + MgCO_3$
- **CO3: Physical Chemistry:** Eudiometer: Determination of Equivalent weight of mg. weight of mg. · Viscometer: To Determine Viscosity of given liquid (Water / Ethanol) by viscometer. · Staglanometer: To determine surface tension of given liquid. · Chemical Kinetics: *To study the effect of acid strength on the hydrolysis of an ester. *To determine the specific reaction rate of the hydrolysis methy1 /ethy1 acetate catalyzed by hydrogen io ns at room temperature. Colorimeter:- Verification of Lambert-Beer's law using Spectrophotometer. [Colorimeter].

Course Outcome: Physical Chemistry (Paper- IV)

- **CO1: Mathematical Concepts :** Logarithmic relations, curve sketching, linear graphs and calculation of slopes, differentiation of functions like $k_x e_x$, x_n, sin x, log x; maxima and minima, partial differentiation.
- **CO2:Gaseous States:** Postulates of kinetic theory of gases, kinetic gas equation, Deduction of Gas Laws : Boyles Law, Charles Law, Grahams Law of diffusion, Avogadro's hypothesis, deviation from ideal behavior, van der Waals equation of state. Critical Phenomena : PV isotherms of real gases.
- **CO3: Chemicals Kinetics and Catalysis:** Chemical Kinetics and its scope, rate of reaction, factors influencing the rate of reaction - concentration, temperature, pressure, solvent, light, catalyst concentration dependence of rates. Derivation of rate law and characteristics of simple chemical reactions - zero order, first order, second order, Pseudo order, half life. Effect of temperature on rate of reaction. Arrhenius equation, concept of activation energy. **Catalysis :** Definition, types, and characteristics of catalysis, homogeneous, heterogeneous catalysis - Enzyme catalysis and its application.
- **CO4: Liquid State:** Intermolecular forces, structure of liquids (a qualitative description). Differnce between solids, liquids and gases. Liquid Crystals: Classification, structure of nematic and cholestric phases.
- **CO5: Solid State:** Types of solids, Amorphous, crystalline and difference between them, Miller Indices. Laws of crystallography - (i) Law of constancy of interfacial angels (ii)Law of rationality of indices (iii) Law of symmetry. Symmetry elements in crystals. X-ray diffraction by crystals. Derivation of Bragg equation.
- **CO6: Colloidal State:** · Definition of colloids, classification of colloids. · Solids in liquids (sols) : properties - kinetic, optical and electrical; stability of colloids, protective action. Hardy - Schulze Law. · Liquids in liquids (emulsions) : types of emulsions, preparation. · Liquids in Solids (gels) : classification, preparation and properties, general applications of colloids.

Course Outcome: Inorganic Chemistry – II (Paper- V)

- **CO1: Chemistry of noble gases:** Chemical properties of the noble gases, chemistry of xenon, structure and bonding in xenon compounds.
- **CO2: Chemical Bonding:** (A) Covalent Bond - Valence theory and its limitations, directional characteristic of covalent bond, various types of hybridization and shapes of simple inorganic molecules and ions, Valence shell electron pair repulsion (VSEPR) theory of NH_3, SF_4, CIF_3, ICI_2 and H_2O. MO theory, homonuclear (He, N_2 and O_2) and heteronuclear (CO and NO) diatomic molecules, bond strength and bond energy, percentage ionic character from dipole moment and electro negativity difference. (B) Ionic Bonds - Definitions, Factors affecting ionic bond formation. (C) Hydrogen bonding, Van-der-Waals forces, Metallic bond and its free electron concept.
- **CO3: Nuclear Chemistry:** Definition; Atomic number, mass number, Isotopes, Isobars mass defect and Binding Energy, Packing fraction N/Z ratio, Radio activity, properties of α, β and γ, Artificial transmutation. Applications with respect to trans-uranic elements, carbon dating.
- **CO4: Theory of volumetric Analysis:** Types of titrations, volumetric apparatus, calibration of pipette and burette. Indicators used in pH - titrations, oxidizing agents used in titrations. Theory of Internal, External and self indicators for redox titration.

Course Outcome: Practical (Paper- VI)

- **CO1: Organic Qualitative Analysis:** Nature / Functional group / Element / Derivative / Physical constant * Benzoic acid, * salicylic acid, * β -naphthol, * p-nitroaniline, * Naphthalene, * Acetanilide.
- **CO2: Organic Estimation:** · Phenol by Bromination · Estimation of basicity, molecular weight of organic acid (oxalic/acetic acid)

Course Outcome: Organic Chemistry (Paper VII)

- **CO1: Alcohols:** Definition: *Monohydric Alcohols:* Methods of Formation by reduction of Aldehydes, Ketones, Carboxylic Acids and Esters (one e.g. each) Acidic Nature, Reactions of Alcohols. *Dihydric Alcohols:* Method of Formation of Ethylene Glycol-industrial method and From Alkenes using Oso4, Chemical Reactions of Ethylene Glycolnitration, Acylation, Oxidation (Using Pb (OAc)4 without Mechanism Pinacol-Pinacolone rearrangement, *Trithydric Alcohols:* Preparation of Glycerol from propane, Reactions of Glycerol.
- **CO2: Phenols:** Preparation of Phenol from Cholorobenzene, Cumene and Benzene Sulphonic Acid, Physical properties, Acidic Nature of Phenol, Resonance stabilization of Phenoxide Ion. Reactions of Phenols-Electrophilic Aromatics Substitution, Acylation, Carboxylation (Without Mechanism) Reactions with Mechanism-intermolecular Fries Rearrangement, Claisen Rearrangement, Gattermann Synthesis and reamer Tiemann Reaction.
- **CO3: Aldehydes and Ketones:** *Aldehydes:* Preparation of Aldehydes from Acid Chloride, Gattermann-Koch Synthesis *Ketones*-Preparation from Nitriles and from Carboxylic Acid, Physical Properties of Aldehydes and Ketones. Mechanism of Nucleophilic Additions to Carbonyl Group with particular emphasis on Benzoin, Aldol Knoenenagel condensations, Mannich Reactions. Use of Acetals as Protecting Group. Oxidation of Aldehydes using Chromium Trioxide, Baeyer-Villeger Oxidation of Ketones.
- **CO4: Carboxylic Acids:** Acidity of Carboxylic Acids, Effects of substituent's of substituents on Acid strength, preparation of Acetic Acid from Co2 from Nitriles, from Acid Chloride, Anhydride, Ester and Amide. Physical Properties and reactions of Carboxylic Acids-Synthesis of Acid Chloride, Ester and Amide, Hell-Volhard-Zelinsky Reaction. Reduction using LiAIH4, Mechanism of Decarboxylation, hydroxyl Acids-Malic, Tartaric and Citric Acid. Methods of Formation and Chemical reactions of Acrylic Acid.
- **CO5: Organic Compounds of Nitrogen**: Preparation of *Nitroalkanes.* Nitration of Benzene and Their Reduction in Acidic, Neutral and Basic Media. *Amines*-Basicity of Amines, Amine Salt as PTC. Preparation of Alkyl and Aryl Amines (Reduction of Nitro Compounds', Nitriles) Reductive Amination, Hoffmann Bromamide Reactions. Reactions of Amines-Electrophilic Aromatic Substitution in *Aryl amines,* Reactions of Amines with Nitrous Acid.

Course Outcome: Physical Chemistry (Paper VIII)

- **CO1: Thermodynamics I:** Definition: *of Thermodynamic Terms:* System, Surrounding types of system, intensive and extensive properties. Thermodynamic Process, Concept of

heat and work. Work done in reversible and irreversible process, concept of maximum work (Wmax), Numerical Problems. First law of Thermodynamics: Statement, Definition of Internal energy and Enthalpy. Heat capacity, heat capacities at constant volume pressure and their relationship. Calculation of W,q, du and dH for the expansion of ideal gases under isothermal and adiabatic conditions for reversible process, Numerical problems, Hess's law of heat Summation and its application.

- **CO2: Thermodynamic-II:** *Second Law of Thermodynamics:* Need for the law, different statement of the law Carnot Cycle and its efficiency, Numerical Problems. Carnot Theorem. Concept of Entropy: Definition, Physical significance, Entropy as a State Function, Entropy change in Physical change, Entropy as criteria of Spontaneity & Equilibrium Entropy Change in Ideal Gases. Gibbs and Helmholtz Functions: Gibbs Function (G) and Helmoltz Function (A) as Thermodynamic Quantities. A and G as criteria for Thermodynamic Equilibrium and Spontaneity, their Advantage over Entropy change. Variation A with P, V and T.
- **CO3: Chemical Equilibrium:** Equilibrium Constant and Free Energy. Thermodynamic Derivation of Law of Mass Action. Le Chatelier's Principle. Reaction Isotherm and Reaction Isochore. Clapeyron Equation, Clausius-Clapeyron Equation and its Application.

Course Outcome: Practical (Paper IX)

- **CO1: Section A (Physical Chemistry)** ***Non Instrumental***

1. To determine critical solution temperature of Phenol- water system.
2. To determine solubility of benzoic acid at different
3. Temperature and determine H of dissolution process.
4. To determine heat of neutralization (Hn) of Na OH and HCl
5. To determine heat of neutralization (Hn) of Na OH and Acetic acid.
6. Partition coefficient of Benzene-water system using benzoic acid.
7. To determine the equilibrium constant for the reaction: KI + I2 --- > KI3.
8. Determine the molecular mass of polymer from viscometry measurements.
9. To investigate the Kinetics of iodination of Acetone.

- **CO2: Section B (Inorganic Chemistry)** ***Gravimetric Estimation:***

1. Estimation of Zinc gravimetrically as Zinc ammonium phosphate (ZnNH4PO4)
2. Estimation of Mn gravimetrically as Manganese Ammonium Phosphate (MnNH4PO4)
3. Estimation of Nickel gravimetrically as Ni-DMG
4. Estimation of Barium gravimetrically as Ba-Chromate (BaCrO4)
5. Estimation of Aluminum as Aluminum Oxinate.
6. To determine the equilibrium constant for the reaction: KI + I2-KI3
7. Determine the molecular mass of polymer from viscometry measurements.
8. To investigate the Kinetics of Iodination of acetone.

- **CO3: Complexometric Titration:**

1. Estimation of Zinc by EDTA solution using EBT indicator.
2. Estimation of Nickel by EDTA using Murexide indicator
3. Estimation of copper by EDTA using fast sulphon black F indication
4. Estimation of Lead By EDTA using Xylenol Orange indicator.

Course Outcome: Inorganic Chemistry (Paper X)

- **CO1: Chemistry of Elements of First Transition Series:** General Characteristic features of d-block elements. Properties of the elements of the first transition series: Ionic Size, Atomic Size, Metallic properties, Ionization potential, magnetic properties, Oxidation State.
- **CO2: Co-ordination Compounds:** Werner's Co-ordination Theory and its experimental verification effective atomic Number concept, chelates, nomenclature of co-ordination compounds, isomerism in co-ordination compounds, valence bond theory of transition metal complexes.
- **CO3: Chemistry of Lanthanide Elements:** Occurrence and Isolation of Lanthanides,Electronic Configuration Oxidation states, Ionic Radii, Lanthanide Contraction and its Consequences.
- **CO4: Chemistry of Actinides:** Occurrence, Position in the periodic table, Electronic configuration. Oxidation State, chemistry of separation of Np, Pu and Am from U
- **CO5: Acids and Bases:** Arrhenius, Bronsted-Lawry, The Lux-Flood, Solvent System and Lewis Concept of Acids and Bases
- **CO6: Non- Aqueous Solvents:** Physical Properties of a solvent, Types of Solvents and their general Characteristics, Reaction in Non-Aqueous Solvents with reference to liquid NH_3 and liquid SO_2.

Course Outcome: Physical Chemistry-II (Paper XI)

- **CO1: Phase Equilibrium:** Statement and Meaning of the Terms*: Phase, Component,* Degree of Freedom, Derivation of Phase Rule Equation. Phase Equilibria of the One omponent System: Water System. Phase Equilibria of Two Components System: Solid-Liquid Equilibria, Simple Eutectic Pb-Ag. System Desilverisation of Lead. Solid Solutions: Compound Formation with congruent Melting Point (Mg-Zn) and Incongruent Melting Point (FeCl3-H2O) System. Freezing Mixture, Acetone-Dry Ice. Liquid-Liquid Mixture: Raoult's Law and Henry's Law. Ideal and Non-Ideal system. Azeotropes: HCl-H2O and Ethanol-Water System. Partially Miscible Liquids: Phenol-Water, Trimethyl Amine-Water, Nicotinewater System, Lower and Upper consulate Trimethyl Amine-Water, Nicotinewater system, Lower and Upper Consulate Temperature. Effect of Impurity on Consulate Temperature.
- **CO2: Electro Chemistry-I** Electrical Transport: Conduction in metals and in Electrolyte Solutions. Specific Conductance and equivalent conductance, measurement of equivalent conduction, variation of equivalent and specific conductance with dilution. Numerical problems. Kohlrausch's law and its application. Arrhenius Theory of Electrolyte Dissociation and its limitations. Weak and Strong Electrolytes, Ostwald's Dilution Law, its use and Limitations. Transport Number: Definition, Determination by Hittorfs Method and Moving Boundary Method. Conductometric Titration: Types and its advantages.
- **CO3: Electrochemistry-II** Types of Reversible Electrodes: Gas- Metal Ion, Metal-Metal Ion, Metal-Insoluble salt Anion and Redox Electrodes. Nernst Equation, Derivation of Cell, E.M.F. and single Electrode potential, Standard Hydrogen Electrode, Reference Electrodes, Standard Electrode Potential, Sign Conventions, Electro-Chemical Series and its significance. Electrolytic and Galvanic Cells, Reversible and Irreversible Cells, Conventional Representation of Electro Chemical Cells. E.M.F. of a cell and its measurement, Calculation of Thermodynamic Quantities of Cell Reactions (G, H and K) Definition of pH, pKa-Determination of pH using SHE and Glass Electrode by

Potentiometer method. Buffer-Acidic and Basic Buffers, Mechanism of Buffer Action, Henderson-Hasselbalch equation. Corrosion: Dry (Atmospheric) Corrosion and Wet (Electro-Chemical) Corrosion Electrochemical Theory of Corrosion.

Course Outcome: Practical (Paper XII)

- **Co1: Section A: Physical Chemistry** ***Instrumentation:***

1. To determine normality and strength of HCI using (0.1N) NaOH
2. Solution Conductometrically.
3. To determine normality and strength of acetic acid using (0.1N)
4. NaOH solution Conductometrically.
5. To determine normality and strength of HCI using (0.1N) NaOH
6. solution by pH-metrically.
7. To verify Lambert-Beers Law using $KMn0_4$ solution.
8. To estimate the amount of Sugar using Polarimeter.
9. To determine refractive index of ethanol water system.
10. To determine indicator constant of indicator colorimetrically.

- **Co2: Section B: Organic Chemistry Organic Derivatives:- Preparation, Crystallization and Physical Constant.**

1. Acetyl Derivatives : a) Aniline b) Salicylic Acid
2. Benzoyl Derivatives : a) Aniline b) B-naphtol
3. Hydrolysis Derivatives : a) Ethyl Benzoate b) Aspirin
4. Bromo-Derivatives : a) Phenol b) Cinnamic Acid
5. Reduction Derivatives : a) M-dinitrobenzene
6. Osazone Derivatives : a) Sucrose b) Glucose

- **Co3: Organic Estimations:**

1. Estimation of nitro group by reduction.
2. Estimation of glucose.
3. Estimation of ester by hydrolysis.
4. Estimation of amides by hydrolysis.

Course Outcome: Physical Chemistry (Paper XIII)

- **CO1: Elementary Quantum Mechanics:** Black body radiation, Planck's radiation law, photoelectric effect, Bohr's modes of hydrogen atom (no derivation) and its defects. Compton effect. De Broglie Hypothesis, the Heisenberg's uncertainty principles, Harmiltonian operator, Schrödinger wave equation and its importance, physical interpretation of the wave function, postulates of quantum mechanics. Schrödinger wave equation for H-atom, separation into three equations (without derivation), quantum numbers and their importance.
- **CO2: Spectroscopy:** Introduction - Electromagnetic radiation, regions of the spectrum, basic features of different spectrometers, statement of the Born-Oppenheimer approximation. Rotational Spectrum - Diatomic molecules, energy levels of a rigid rotor (semi classical principles), selection rule, rotational spectra of rigid diatomic molecule, determination of bond length, numerical problems.
- **CO3: Photochemistry:** Introduction of radiation with matter, difference between thermal and photochemical processes. Laws of photochemistry, Grothus - Drapper law, Stark-Einstein law, Jablonsiki diagram qualitative description of fluorescence,

phosphorescence, non-radiative processes (Internal conversion, Intersystem crossing), quantum yield, photosensitized reactions.

- **CO4: Physical properties and molecular structure:** Optical activity and its measurement, dipole moment and its measurement by temperature change method, magnetic property and its measurement by Guoy balance method, Applications of optical activity, dipole moment and magnetic property for determination of structure of molecule.
- **CO5: Nano Material:** Introduction to nano-materials Methods of Synthesis - i) High energy ball milling, ii) Physical vapour deposition (PVD) iii) Chemical vapour deposition (CVD) iv)Micro emulsion. Synthesis using micro-organisms and plant extract.

Course Outcome: Organic Chemistry (Paper XIV)

- **CO1: Spectroscopy-** Nuclear magnetic resonance (NMR) spectroscopy. Proton magnetic resonance (1H NMR) spectroscopy, nuclear shielding and deshielding, chemical shift and molecular structure, spin-spin splitting and coupling constants, areas of signals, interpretation of PMR spectra of simple organic molecules such as ethyl bromide, ethanol, acetaldehyde, 1, 2, 2 tribromoethane, ethyl acetate, toluene and Acetophenone. Problems pertaining to the structure elucidation of simple organic compounds using UV, IR and PMR spectroscopic techniques. (Combine and single λ max using woodwordfischer rule).
- **CO2: Organometallic Compounds:** Organomagnesium - compounds: Alkyl Magnesium halides-ethyl magnesium bromide formation, structure and chemical reactions. Organozinc compounddialkyl zinc formation and chemical reactions, organolithium compound- nbutyllithium formation and chemical reactions.
- **CO3: Organic Synthesis via Enolates-**Defination, Active methylene compounds, Preparation of Aceto acetic ester, (Claisen condensation with Mechanism), Acidity of alpha hydrogen, properties and reactions involving formation of mono, di and unsaturated carboxylic acids, also synthesis of ketone, di ketone, 4-methyl uracil from acetoacetic ester, ketoenol tautomerism. Preparation of diethyl malonate, properties and reactions involved in alkylation, formation of mono, di and unsaturated carboxylic acids, and also synthesis of amino acid and barbituric acids from diethyl malonate.
- **CO4: Fats, oils and detergents-** Natural fats, edible and industrial oils of vegetable origin, manufacture of soyabean oil by solvent extraction method and isolation and uses of essential oils. Types of animals fats and oils and definition of saponification value, iodine value, and acid value. Detergents: Definition, Introduction and preparation of sodium alkyl sulphonate, alkyl benzene sulphonate, and amide sulphonate, (one example each), Cleansing action of detergent.

Course Outcome: Practical (Paper XV)

- **CO1: Organic Chemistry Separation and Identification of both components**
  1. Benzoic Acid + β-naphthol
  2. Salicylic Acid + P- nitro aniline
  3. β-naphthol + Acetanilide
  4. m-nitroaniline + Naphthalene
  5. α-naphthol + O-nitroaniline
  6. Cinnamic Acid + Naphthalene
  7. Salicylic Acid + Naphthalene
  8. β-naphthol + m-dinitrobenzene

9. Cinnamic Acid + P- nitro aniline
10. Salicylic Acid + β-naphthol

- **CO2- Inorganic Chemistry**

1. Inorganic Qualitative Analysis (Semi-Micro Analysis)
2. Separation of calcium and Barium and estimation of Ca-volumetrically.
3. Separation of Cu and Ni from binary mixture solution and estimation of Cu-volumetrically.
4. Estimation of oxalic acid and H_2SO_4 in a given mixture Solution using NaOH and $KMnO_4$ solution.
5. Estimation of Fe by potassium dichromate using diphenyl ammine indicator.
6. Estimation of available chlorine in the given sample of bleaching powder.
7. Separation of calcium and Barium and estimation of Ba-gravimetrically.
8. Separation of Cu and Ni from binary mixture solution and estimation of Ni-gravimetrically.

Course Outcome: Practical Inorganic Chemistry (Paper XVI)

- **CO1: Metal-Ligand Bonding in Transition Metal Complexes**
  Limitations of Valence Bond Theory, An Elementary idea of Crystal Field Theory, Crystal Field Splitting in Octahedral, Tetrahedral and Square Planar Complexes Factors affecting Crystal Field Parameters
- **CO2: Electronic Spectra of Transition Metal Complexes**
  Types of Electronic Transitions, Selection rules for d -d transitions, Spectro -chemical series, Orgel Energy level diagram for d_1, d_5 and d_9 Electronic, Spectrum of $[Ti(H_2O)6]^{3+}$ complex ion.
- **CO3: Organometallic Compounds**
  Definition, Nomenclature and classification of Organometallic Compounds, Preparation, Properties, Bonding and Applications of alkyls and aryls of - Li, Al, Hg, Sn and Ti. A Brief account of metal - ethylenic Complexes Nature of bonding in metal carbonyls.
- **CO4: Bioinorganic Chemistry**
  Essential and trace elements in biological processes Metalloporphyrins with special reference to hemoglobin and myoglobin Biological role of alkali (Na^+, K^+) and alkaline earth metal ions(Mg^{2+}, Ca^{2+}). Nitrogen fixation
- **CO5: Chromatography**
  Definition and classification of chromatography, Paper and Thin Layer Chromatography, Method of Development (Ascending, Descending Chromatography), Locating Technique (UV-light / Chemicals), R f value Comparison between paper and TLC, Applications.

Course Outcome: Organic Chemistry (Paper XVII)

- **CO1: Heterocyclic Compounds-** Introduction: Molecular orbital picture and aromatic characteristics of pyrrole, furan, thiophene and pyridine, Methods of synthesis and chemical reactions with particular emphasis on the mechanism of electrophilic substitution. Mechanism of nucleophilic substitution reactions in pyridine. Comparison of basicity of pyridine, piperidine and pyrrole. Condensed Heterocyles: Introduction, Preparation of Quinoline (Skraups Synthesis), Isoquinoline (Bischler - Napirlaski) and Indole (Fischer indole Synthesis).

- **CO2: Carbohydrates-** Defination, Introduction and Classification. Monsaccharides- Interconversion of Glucose and Fructose, chain lengthening, chain shortening of aldoses. Conversion of Glucose in to mannose. Determination of openchain structure of glucose & pyranose ring structure of glucose . Mechanism of Mutarotation and Introduction to disaccharides (maltose, sucrose and lactose) and Polysaccharides (Starch and cellulose) without involving structure determination.
- **CO3: Synthetic Polymers-** Introduction, Classification based on nature of synthesis (without mechanism) with examples. (Addition and condensation polymers). Properties, uses and synthesis of polyvinyl chloride, polyvinyl acetate, polystyrene, polyacrylonitrile, Nylon 6, Nylon 66. Introduction to synthetic and natural rubber, properties, uses and synthesis of Buna N., Neoprene and silicon rubber.
- **CO4: Synthetic Dyes and Drugs-** Synthetic Dyes - Definition, colour and constitution (electronic concept) of dye, classification based on chemical constitution, synthesis of methyl orange, Congo red, malachite green, crystal violet, Alizarin and indigo dyes. Synthetic Drugs - Defination, introduction, classification of drugs. Properties of ideal drug. Synthesis of chloromycetien,paracetamol,phenacetien, sulphaguainidine.

Course Outcome: Practical Organic Chemistry (Paper XVIII)

- **CO1: Organic Estimation**

1. Estimation of Carbonyl group by hydrazone formation method
2. Estimation of vitamin C in commercial soft drink / Glucon D
3. Estimation of ascorbic acid
4. Estimation of Saponification value of oil

- **CO2: Organic Preparation and its purity by TLC**

1. Preparation of Hydrazobenzene from azobenzene.
2. Preparation of Phthalic anhydride from phthalic acid.
3. Preparation of 2, 4 dinitrophenyl hydrazone of acetone.
4. To prepare picrate of Naphthalene.
5. To prepare picrate of Anthracene**.**
6. Preparation of p – bromo acetanilide from acetanilide

- **CO3: Physical Chemistry – Instrumental**

1. Determine the Strength of HCl and CH_3COOH in a given mixture by titrating against strong base conductometrically.
2. Determine the strength of oxalic acid conductometrically using sodium hydroxide solution.
3. To determine empirical formula of ferric -5-sulphosalicylate
4. Determine the amount of Fe^{2+} in the given solution potentiometrically
5. To determine the refractive indices of series of salt solutions and to find out concentration of the salt in given unknown solution.

Non-Instrumental

6. To determine the interfacial tension between two immiscible liquids.
7. To study the effect of addition of an electrolyte NaCl / KCl on the solubility of benzoic acid at room temperature.
8. To determine the standard free energy change ΔG^0 and equilibrium constant for the reaction. $Cu + 2\ Ag^+ = Cu^{+2} + 2\ Ag$

Department of Industrial Chemistry

Programme Outcomes (PO)

On Completion of the course students will be able to

Programme Specific Outcomes (PSO)

- **PSO1:** Make the students well-grounded in the principles and through knowledge of scientific techniques of Industrial Chemistry.
- **PSO2:** Educate and train Chemists to acquire a meaningful picture of Chemical industries
- **PSO3:** Prepare students for professional participation in Chemical industries so as to adapt themselves to jobs which are problem solving
- **PSO4:** Train students to be result-oriented in the chemical, petrochemical, biochemical, allied technological fields
- **PSO5:** Environmental and Sustainability: Understand the issue of environmental context and sustainable development
- **PSO6:** Basics of polymer, Importance of sugar industry, Basic requirement of fermentation process, various cosmetics. Knowledge of various industrial aspects. Fuels and eco-friendly fuels, use of solar energy etc. Learn importance of various industries.

Course Outcome (CO)

Course Outcome: Fluid Mechanics & Unit Operations-I (Paper – I)

- **CO1: Flow of Fluids:** Definitions of fluids, Classification of fluids, Properties of fluids, Fluid Pressure, Pressure Head, Hydrostatic equilibrium for compressible and incompressible fluids.
- **CO2: Appliction of fluid statics:** Mamometers, U-tube manometer, Inclined Manometer, Differntial Manometer, Continuous gravity decanter.
- **CO3: Fluid Flow Phenomena:** Types of flow, Laminar flow, Shear Rate and Shear Stress, Turbulence-Reynolds Number & Transition from laminar to turbulent flow, Reynolds experiments Boundary layers, Flow in boundary layers, Laminar and Turbulent flow in bondary layers.
- **CO4: Basic Equations of fluid flow:** Equation of Continuty, Bernoulli's equation, Pump work in Bernoulli's equation and its application.
- **CO5: Transportation and Metering of fluids**: Transportation of fluids: Pipe, Tubing, Fittings & valves. Pumps: Classification of Pump, Developed head, Power requirement, Suction lift and cavitations, Positive displacement pumps, Reciprocating pumps, Rotary pumps,Centrifugal pumps, Centrifugal pump theory, Ideal pump, Actual pump performance, Power consumption, Efficiency, Air Binding and Pump Priming, Losses in Centrifugal Pump, Centrifugal Pump troubles & Remedies, Pump fails to start pumping, Pump is working but not up to the capacity and pressure, Pump starts and then stop pumping Pump takes too much power. Metering of fluids: Full bore meters – Principle, Construction and Working, Advantages and Disadvantages of Venturimeter, Orificemeter, Pilot Tube, Rotameter.

Course Outcome: Material Balance & Process Calculations (Stoichiometry)(Paper – II)

- **CO1: Units and Dimensions**: Introduction, Dimensions & Systems of Units, Fundamental quantities, Derived Quantities, Conversions & Problems.
- **CO2: Basic Chemical Calculations**: Introduction, Mole Atomic Mass & Equivalent Mass, Solids, Liquids & Solutions, Important Physical Properties of Solutins, Gases and Problems
- **CO3: Material Balances without chemical reactions**: Classification of Material Balance Problems, Material balances without chemical reactions, Outline Procedure for Material Balance calculations Distillation, Evaporation, Absorption, Extraction, Drying, Filtration, Mixing, Crystallization and problems on Material Balance.
- **CO4: Material balances with Chemical Reactions:** Stoichiometry, Stoichiometric eqquatins, Stoichiometric Coefficients, Stoichometric ratio, Limiting reactant , Excess reactant , Conversion, Yield and Selectivity and Problems on Material Balances with Chemical Reactions.

Course Outcome: Practical (Paper III)

- **CO1-** Determine the Co-efficient of Venutrimeter.
- **CO2-** Determine the Co-efficient of Orifice meter.
- **CO3-** Study the Characteristics of Centrifugal Pump.
- **CO4-** Verify Hagen-Poisellue's Equation.
- **CO5-** Study the Pipe Fittings Test Rig.
- **CO6-** Determination of PH, Turbidity, Conductivity , Temperature,
- **CO7-** TDS, of given water sample by water Quality Analyzer Elico-PE-138
- **CO8-** Determination of Hardness of water by Complex metric method using EDTA
- **CO9-** Determination of Calcium & Magnesium Hardness Using EDTA
- **CO10-** Determination of Dissolved Oxygen in a water sample
- **CO11-** Determination of Chemical Oxygen Demand
- **CO12-** Determination of BOD of a Waste Water Sample
- **CO13-** Experiment of Proximate Analysis of Coal:
- **CO14-** Determine 1. Moisture 2. Volatile Matter 3. Ash 4. Fixed Carbon
- **CO15-** Calculate Material Balance Rate of Evaporation for the given sample.
- **CO16-** Perform Material Balance Calculation & Rate of drying of the given sample (Chalk / Sawdust)
- **CO17-** Prepare various standard solution using (W/W , W/V , V/V) methods.

Course Outcome: Aspects of Industrial Chemistry and Heat transfer (Paper IV)

- **CO1: 1 Heat Transfer: Conduction:** Basic law of Conduction, Thermal conductivity, Compound resistances in series, Heat flow through a Cylinder. **Convection**: Classification of convection with mechanism.**Radiation:** Abosrptivity, Reflectivity and Transmissivity, Krichhoff's law, Laws of black body radiation, Steafan-Boltsmann law, Heat Transfer by radiation.
- **CO2: Heat Exchange Equipments**: Single pass tubular condenser, Double pipe heat exchanger, Counter Current and Parallel flow, Energy Balances, Enthalpy balances in heat exchangersm, Enthalpy balances in total condencsers, Overall Heat Transer

coefficients, LMTD . Individual Heat Transfer Coefficient, Calculation of Overall Coefficients from individual coefficeints, flouling factors.

- **CO3: Fuels:** Introduction , Calorific Value, Classification & Properties of Fuels. **Solid Fuels *:*** Properties,Composition & Analysis of Coal, **Gaseous Fuels**: Classification, Natural Gas, LPG **Liquid Fuels** : Petroleum, Composition & Classification, Definition of Flash Point & Fire Point, Knocking, Octane Number, aniline Point, Refining of Petroleum Cracking , Thermal & Catalytic Vracking, Reforming , thermal & Catalytic Reforming.
- **CO4: Water Analysis**: Chemical & Physical Examinatin of Water, Chemical substances affecting potability, colour,Turbidity, Odour, Taste, Temperature PH Conductivity , Suspended Solid, Acidity, Alkalinity, Free chlorine, Calcium & Magnesium , Dissolved Oxygen Biochemical Oxygen Demand , Chemical Oxygen Demand and Dissolved Solids.
- **CO5: Glass:** Introductin, Physical & Chemical Properties of Glass , Characteristics, raw Mateirals , Chemical Reactions, Methods of Manufacture of Glass & Uses.
- **CO6: Ceramics**: Intruduction , Classification and General Properties of Ceramics, Basic raw materials, Manufacturing Process, Manufacture of Porelain and China , Refractories, Classification, Properties, Manufacture of refractories, Manufacture of Fire Clay Bricks.
- **CO7: Cement:** Introduction, Composition, Types of cement, raw Materials, manufacture of Cement by wet & Dry process, Reaction in the Kiln, setting of cement, Testing & Uses of cement.

Course Outcome: Energy Balances & Process Calculations (Paper V)

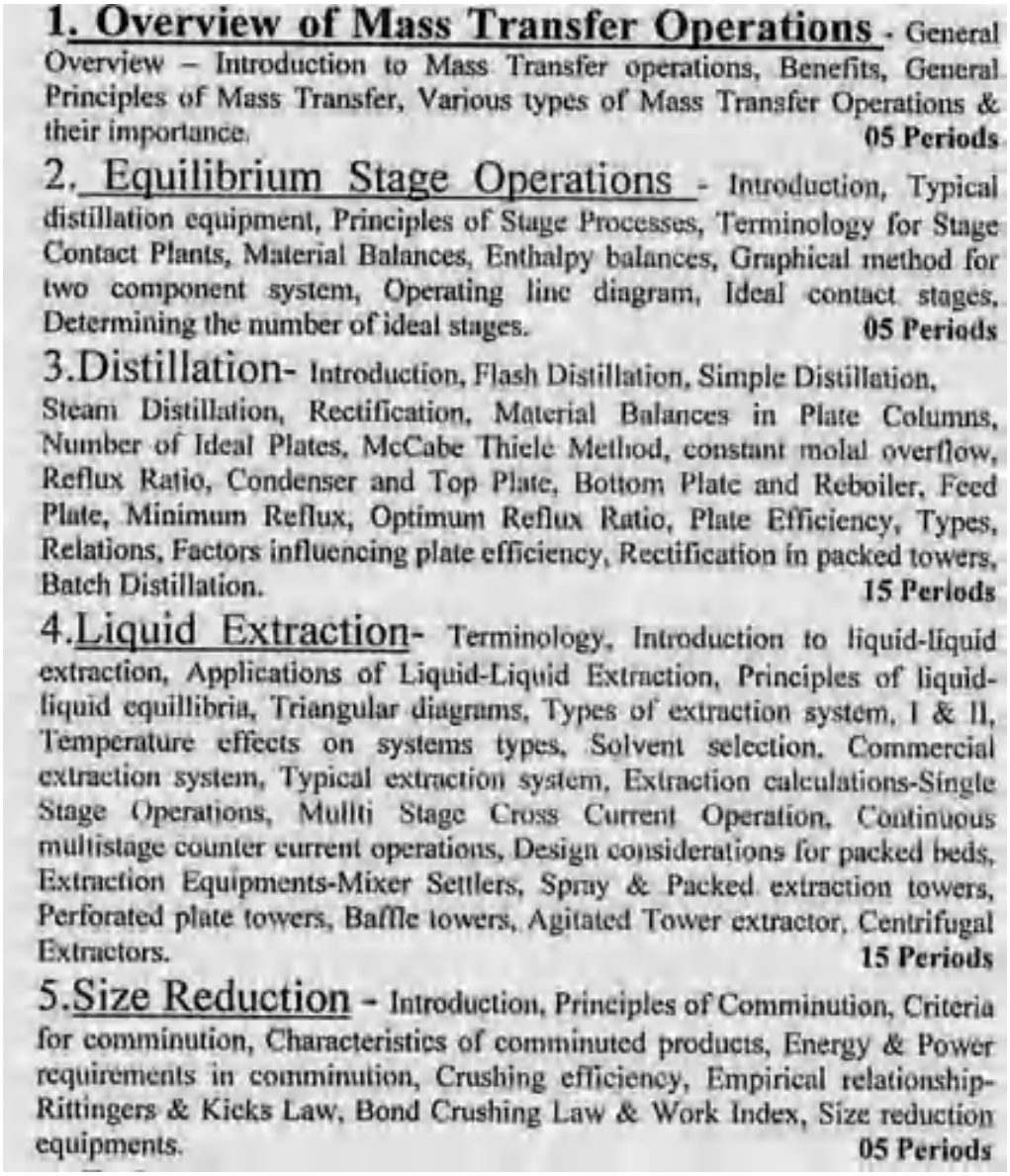
- **CO1: Recycle Operations:** Recycle stream , purging operation, Recycle ratio, and Problems
- **CO2: Energy balances**: Forms of Energy, Kinetic Energy , Potential Energy, Internal Energy, Heat, Work, General Energy Balance Procedure, Energy Balances on Closed Systems, Heat Capacity, Relation between Cp & Cv for an Ideal Gas, Empirical equation for Heat Capacities, Mean Molal Heat Capacities of Gases, Heat Capacities of gaseous mixture, Enthalpy Changes accompanying Chemical Reactions, Heat of Reactions, Heat of Formation, Standard Heat of Formation, Heat of Combustion, Hess's law of Constant Heat Summation, standard Heat of reaction from heat of formation, Standard Heat of Reaction from heats of Combustion, Effect of temperature on Heat of Reaction, Effect of Pressure on Heat of Reaction, Adiabatic Process, Adiabatic Reaction, Adiabatic Reaction Temperature, Phase Change Operation, Latent Heat of Vaporization Latent Heat of Fusion, Latent Heat of Sublimation, Energy Balance during Phase Change Operation, Heat of solution and Heat of Mixing .
- **CO3: Vapour Pressures**: Vaporization Boiling Point, Vapour Pressures of solids, Effect of Temperature on Vapor Pressure.

Course Outcome: Practical (Paper VI)

1. Determination of available Chlorine in Bleaching Powder
2. Estimation of Iron from Cement Volumetrically
3. Estimation of Calcium from lime stone
4. Determine Energy of Activation of the reaction between potassium persulphate
5. and potassium Iodide
6. Preparation of CUS04 from Cu and its Material Balance
7. Calculate Material Balance rate of Evaporation for the given
8. Perform Material Balance calculations and rate of drying of the sample
9. (Chalk/Sawdust)

10. To Study the Thermal Conductivity of Bad Conductor.
11. Determination of Acid Value of Lubricating Oil.
12. Determination of Saponification Value of Lubricating Oil.
13. Determination of Iodine Value of an Oil (Wij's Method)
14. Determination of Aniline Point of a Lubrication Oil.
15. Determination of Viscosity of Lubricant by Red Wood Viscometer.
16. Determination of Flash & Fire Point of Lubricating Oil by
a) Cleveland's Apparatus (Open Cup)
b) Abel's Apparatus (Closed Cup)
c) Pensky-Marten's Apparatus (Closed Cup).

Course Outcome: (Paper VI)



1. Overview of Mass Transfer Operations - General Overview – Introduction to Mass Transfer operations, Benefits, General Principles of Mass Transfer, Various types of Mass Transfer Operations & their importance. **05 Periods**

2. Equilibrium Stage Operations - Introduction, Typical distillation equipment, Principles of Stage Processes, Terminology for Stage Contact Plants, Material Balances, Enthalpy balances, Graphical method for two component system, Operating line diagram, Ideal contact stages, Determining the number of ideal stages. **05 Periods**

3.Distillation- Introduction, Flash Distillation, Simple Distillation, Steam Distillation, Rectification, Material Balances in Plate Columns, Number of Ideal Plates, McCabe Thiele Method, constant molal overflow, Reflux Ratio, Condenser and Top Plate, Bottom Plate and Reboiler, Feed Plate, Minimum Reflux, Optimum Reflux Ratio, Plate Efficiency, Types, Relations, Factors influencing plate efficiency, Rectification in packed towers, Batch Distillation. **15 Periods**

4.Liquid Extraction- Terminology, Introduction to liquid-liquid extraction, Applications of Liquid-Liquid Extraction, Principles of liquid-liquid equillibria, Triangular diagrams, Types of extraction system, I & II, Temperature effects on systems types, Solvent selection, Commercial extraction system, Typical extraction system, Extraction calculations-Single Stage Operations, Mullti Stage Cross Current Operation, Continuous multistage counter current operations, Design considerations for packed beds, Extraction Equipments-Mixer Settlers, Spray & Packed extraction towers, Perforated plate towers, Baffle towers, Agitated Tower extractor, Centrifugal Extractors. **15 Periods**

5.Size Reduction - Introduction, Principles of Comminution, Criteria for comminution, Characteristics of comminuted products, Energy & Power requirements in comminution, Crushing efficiency, Empirical relationship-Rittingers & Kicks Law, Bond Crushing Law & Work Index, Size reduction equipments. **05 Periods**

Course Outcome: (Paper VII)

Distillation:

1. To Perform a experiment on **Simple Distillation** using binary mixture (***Methanol+Water*** *or* ***Ethanol+Water***) & Verify the Rayleigh's Equation. Calculate the Material Balance for binary mixtures and find the composition of the distillate & the residue.
2. To Perform a experiment on **Steam Distillation** using ***Turpentine*** or ***Nitrobenzene*** and Calculate Material Balance for Steam Distillation..
3. To Perform a experiment on **Distillation with total reflux** using Binary mixture (***Methanol+Water or Ethanol+Water***) and Determine theoretical plates by McCabe-Thiele Method.

Liquid Extraction:

4. To study the experiment on Liquid-Liquid Extraction by using **Mixer Settler** System & Calculate Percentage of Extraction of a given liquid.
5. To study the Liquid-Liquid Equillibria for three component system **(Glacial Acetic Acid +Chloroform+ Distilled Water)** and Calculate the Percentage composition of each component at heterogeneous mixture

Drying:

6. To study the **Rate of Drying of solid** substances (***Saw dust or Card Board***)
7. To study the **Rate of Drying of Liquid** substances.
8. To study the rate of drying in **Tray Dryer**.

Crystillation:

9. To Crystallise the given sample of Phthalic acid from hot water using fluted paper and stemless funnel.
10. To Crystallise the given sample of Benzoic acid from hot water using fluted paper and stemless funnel.
11. To purify the given sample of naphthalene or camphor by simple sublimation method.
12. To purify the given sample of Succinic acid or phthalic acid by vacuum sublimation method.

Course Outcome: Practical (Paper VIII)

Paper: VIII Chemical Reaction Engineering

Introduction & Notation in Chemical Reaction Engineering **02 Periods**

1. Ovierview of Chemical Reaction Engineering

Typical Chemical Process, Classification of reactions, Variable Affecting the Rate of Reaction, Definition of Reaction Rate. **05 Periods**

2. Kinetics of Homogeneous Reactions

The rate equation, Concentration-Dependent Term of a rate equation, Single & multiple Reactions, Elementary & Non elementary reactions, Molecularity & Order of Reaction, Rate Constant(K), Representation of an Elementary Reaction, Representation of Non elementary Reaction, Kinetic Models for Non elementary Reactions-free radicals, ions & polar substances, Molecules, Transition Complex, Non Chain Reactions, Chain Reactions-Free radicals, Chain reaction mechanism, Molecular intermediates, non chain mechanism, Transition Complex , non chain mechanism. Temperature-Dependent Term of a Rate Equation-Temperature Dependency from Arrhenius Law, Comparison of Theories with Arrhenius law, Activation Energy and Temperature Dependency, (Example 2.3). **15 Periods**

3. Interpretation of Batch Reactor Data

Introduction of Batch Reactor, Constant-Volume Batch Reactor, Analysis of Total Pressure data obtained in a Constant-Volume System, Integral Method of Analysis of Data, Irreversible Unimolecular-Type First Order Reactions, Irreversible Bimolecular-Type Second Order Reactions, Zero Order Reactions, Overall Order of Irreversible Reactions from the Half-Life $t_{1/2}$, Irreversible reactions in Parallel, Homogeneous Catalyzed Reactions, Autocatalytic Reactions, Irreversible Reactions in Series, First Order Reversible Reactions, Second Order Reversible Reactions, Reactions of Shifting Order, Differential Method of Analysis of Data, Varying- Volume Batch Reactor, Differential Method of Analysis, Integral Method of Analysis, Zero Order Reactions, First Order Reaction, Second Order Reactions, The Search for a Rate Equation. **20 Periods**

Course Outcome: Practical (Paper IX)

1. Gas Absorption — 7 Periods

Introduction, Design of Packed Towers, Contact between Liquid & Gas, Pressure drop & Limiting flow rates, Principles of absorption material balances, Limiting gas-liquid ratio, Temperature variations in packed towers, Rate of absorption, Calculation of tower height, Number of Transfer units.

2. Evaporation — 8 Periods

Introduction, Liquid Characteristics, Types of Evaporators, Performance of Tubular Evaporators, Evaporator Capacity, Boiling Point Elevation and Dühring Rule, Effect of liquid head & friction on temperature drop, Heat Transfer Coefficient, Overall Coefficient, Evaporator economy, Enthalpy balance for single effect evaporator, Enthalpy balance with negligible heat of dilution, Single effect calculations, Multiple effect evaporators, Methods of feeding, Capacity and economy of multiple effect evaporator, Effect of liquid head and boiling point elevation.

3. Crystallization — 10 Periods

Importance of Crystal Size, Crystal Geography, Crystallographic systems, Invariant Crystals, Principles of Crystallization, Purity of Product, Equilibria & its yields, Enthalpy Balances, Super Saturation, Limits of Super Saturation, Temperature differential as a potential, Nucleation-Origins of Crystals in crystallizers, Primary nucleation, Homogeneous nucleation, Equilibrium, Kelvin Equation, Rate of nucleation, Heterogeneous nucleation, Secondary nucleation, Contact nucleation, Crystal Growth-Individual & overall Growth Coefficients, Growth Rate, Mass Transfer Coefficient, Surface Growth Coefficient, ΔL law of crystal growth, Crystallization Equipment-variations in crystallizers, Vacuum Crystallizers, Draft Tube Baffle Crystallizer, Yield of Vacuum Crystallizer.

4. Drying of Solids — 10 Periods

Introduction, Classification of Dryers, Solid handling in dryers, Principles of Drying- Temperature Pattern in dryers, Heat Transfer in dryers, Heat duty, Heat Transfer Coefficient, Heat Transfer Units, Mass Transfer in Dryers, Phase Equilibria-equilibrium moisture and free moisture, Bound & unbound water, Cross circulating drying-constant drying conditions, Rate of drying, Constant rate period, Critical Moisture Content & Falling Rate Period, Calculation of Drying Time under constant drying conditions, Drying Equipments-Dryers for Solids & Pastes, Dryers for Solutions & Slurries.

5. Mechanical Separations — 10 Periods

Screening, Screening Equipment, Comparison of Ideal & Actual Screens, Material Balances over Screens, Screen Effectiveness, Capacity & Effectiveness of Screens, Effect of Mesh Size on capacity of Screen, Capacities of Actual Screens, Filtration, Cake Filters, Filter Media, Filter aids, Principles of Cake Filtration, Pressure drop through filter cake, Principles of Centrifugal Filtration.

Course Outcome: (Paper X)

1. Introduction to Reactor Design 5 Periods

Broad Classification of Reactor Types, Material balance for an element of Volume of the reactor, Energy balance for an element of Volume.

2. Ideal Reactors for a Single Reaction 10 Periods

Three types of Ideal Reactors, Ideal Batch Reactor, Space Time & Space Velocity, Steady State Mixed Flow Reactor, (Example 5.1, Example 5.3), Steady State Plug Flow Reactor, (Example 5.5), Holding Time & Space Time for flow reactors.

3. Design for Single Reactions 20 Periods

Size Comparison of Single Reactors, Batch Reactor, Mixed versus Plug Flow Reactors, First & Second Order Reactions, Multiple-Reactor Systems-Plug flow reactors in series and or in parallel, (Example 6.1), Equal size Mixed Flow Reactors in Series, First Order Reaction, Mixed Flow Reactors of Different sizes in Series, finding the conversion in a given system, Determining the Best System for a given conversion, Maximization of Rectangles, Reactors of types in series, Recycle Reactor & its performance equation.

4. Design for Parallel Reactions 05 Periods

Introduction to Multiple Reactions-Qualitative Discussions about Product Distribution.

5. Basics of Non-Ideal Flow 05 Periods

The Residence Time Distribution(RTD), E,The Age Distribution of Fluid, Relation among F, C and E curve and 'mean time' for closed vessel.

Course Outcome: (Paper XI)

1. To Study the Performance of **Batch Reactor :** To study the Saponification of Ethyl acetate with NaOH in order to determine Order of reaction (n) & Rate constant (K) using Batch reactor.
2. To study the residence time distribution in **Mixed Flow Reactor (MFR).**
3. To Study the Performance of **Plug Flow Reactor (PFR):** To study the Performance of plug flow reactor used and to calculate thereotical & practical conversion for a second order reaction between Ethyl acetate & NaOH.
4. To find out Residence time distribution in **Plug Flow Reactor or Tubular reactor.**
5. To Study the Performance equation of **Coil Tube Reactor (CTR):** To study the Performance of plug flow reactor used and to calculate thereotical & practical conversion for a second order reaction between Ethyl acetate & NaOH.
6. To Study the **First Order Reaction:** Hydrolysis of an Ester (Methyl Acetate in presence of HCL).
7. To Study the **Zero Order Reaction:** Investigate the kinetics of Iodination of Acetone.
8. To Study the **Autocatalytic reaction:** Reaction between Potassium Permangnate & Oxalic acid.
9. To Study the Rate of reacation (r_A) between Ethyl bromo acetate & Sodium thiosulphate kinetically using **Batch Reactor.**
10. To determine the Order of reaction (n) of given reaction Kinetics by using **Substitution method. Fractional change method and Differential method.**
11. To determine the Rate Constant (K) of the reaction between Potassium Persulphate & Potassium Iodide having equal concentration of reacting species (a=b) by using **Mixed Reactor.**
12. To determine the Rate Constant (K) of the reaction between Potassium Persulphate & Potassium Iodide having an equal concentration of reacting species ($a \neq b$) by using **Mixed Reactor.**
13. To determine rate constant (K) of the reaction between Bromic acid and Hydroiodic acid having equal concentration of reacting species (a=b) using **Batch reactor.**
14. To determine the **Energy of Activation (E_a)** of hydrolysis of Ethyl acetate in presence of NaOH.
15. To determine the **Energy of Activation (E_a)** of the reaction between Potassium Persulphate & Potassium Iodide.

Course Outcome: Practical (Paper XII)

Evaporation

13. Determine the rate of evaporation of given liquid Sample (thin solution of Sugar + Water or NaCl + water or Sugar Cane Juice)in a open pan evaporator.

Size Reduction

1. To perform a study experiment on Size Reduction by using *Jaw Crusher*
2. To Calculate the efficiency of Sieves using Sieve Analyzer (use Coal or any nontoxic substance)

Miscellaneous

1. Determination of Copper and Nickel in the given solution (Idometric Method).
2. Estimation of Manganese dioxide in pyrolusite.
3. Determination of NaOH and Na2CO3 in the given alkali mixture solution.
4. Determination of iron in a water sample by colorimetry.

Note: 1. 20 % weightage be given to the viva-voce in the practical examination.

2. To Arrange Industrial visit for giving demo experiments on Drying, Mechanical Separation, Size Reduction and various unit operations carried out in the industries.

Course Outcome: (Paper XIII)

1. **Nitration:**
   Introduction, Nitrating Agents, Aromatic Nitration, Kinetics & Mechanism of Aromatic Nitration, Nitration of Paraffinic hydrocarbons, Nitrate Esters, N-Nitro Compounds, Process Equipment for Technical Nitration, Batch Nitration, Continuous Nitration, Mixed-acid compositions, DVS calculations, Typical Industrial Nitration Process- Preparation of Nitrobenzene, Preparation of m-dinitrobenzene
2. **Amination by Reduction:**
   Introduction & Definations, Methods of Reduction, Iron & Acid (Bechamp) Reduction-Reaction Mechanism, Chemical & Physical factors, Physical condition of Iron, Amount of water used, Amount of Acid used, Effect of Agitation, Reaction Temperature, Addition of Solvents, Yields of Amine. Equipment-Materials of Construction, Agitation, Jacketing of Reducers, Manufacturing of Aniline & Recovery of Aniline, Distillation of Aniline.
3. **Halogenation:**
   Introduction, Chlorination, Bromination, Fluorination, Iodination.
4. **Sulfonation & Sulfation:**
   Introduction, Sulfonating & Sulfating agents, Sulfonation of Aromatic compounds, Benzene & its derivatives, Naphthalene & its derivatives, Anthraquinone & its derivatives.
5. **Polymerization:**
   Introduction, Functionality, Polymerization Reactions, Polycondensation, Addition Polymerization, Free radical polymerization, Ionic Polymerization, Bulk Polymerization, Solution Polymerization, Emulsion Polymerization, Suspension Polymerization.

Course Outcome: (Paper XIV)

Process Equipment Design

1. **Distillation & Fractionating Equipment:**
   Introduction, Types of Column, Stresses in the column Shell, Determination of Shell thickness, Determination height "X', Allowable deflection, Column Internal details, Equillibrium stage column, Differential Column.
2. **Evaporation**- Introduction, types of evaporators-Equipments
3. **Crystallization**- Introduction, types of crystallization-Equipments
4. **Centrifugation**- Introduction, types of Centrifugation -Equipments
5. **Agitators:**
   Types of Agitators, Baffling.
6. **Reaction Vessel:**
   Introduction, Materials of Construction, Classification of Reaction Vessels, Heating Systems, Design Considerations.
7. **Corrosion:**
   Forms of Corrosion, Factors influencing corrosion, Factors preventing corrosion.

Course Outcome: Practical (Paper XV)

1. Preparation of P-nitroacetanilide from acetanilide & Calculate % Yield.
2. Preparation of m-dinitrobenzene from nitrobenzene & Calculate % Yield.
3. Preparation of tri-nitrophenol (picric acid) from Phenol & Calculate % Yield.
4. Preparation of P-nitroaniline from P-nitroacetanilide & Calculate % Yield.
5. Preparation of m-nitroaniline from aniline & Calculate % Yield.
6. Preparation of P-bromoaniline from Acetanilide & Calculate % Yield.
7. Preparation of P-Bromophenacyl bromide from P-bromoacetophenone & Calculate % Yield.
8. Preparation of P-Bromoacetanilide from Acetanilide & Calculate % Yield
9. Preparation of P-bromoaniline from p-bromoacetanilide & Calculate % Yield.
10. Preparation of 2,4,6-tribromoaniline from Aniline & Calculate % Yield.
11. Preparation of o-chlorobenzoic acid from anthranilic acid & Calculate % Yield.
12. Preparation of Sulphanilic acid from aniline & Calculate % Yield.
13. Preparation of Polystyrene by Bulk/Suspension/Emulsion Polymerization method & Calculate % Yield
14. Preparation of 6,6 and 6,10 thread by condensation & Calculate % Yield
15. Preparation of Novalac & Resole – Thermosetting resin & Calculate % Yield
16. Preparation of Urea formaldehyde resin & Calculate % Yield
17. Preparation of Polysulphide rubber(Thiokol) & Calculate % Yield

Course Outcome: (Paper XVI)

1. Industrial Process of Sulfur & Sulfuric acid
2. Nitrogen Industries: Ammonia, Nitric acid & Urea
3. Polymer Manufacturing Process:
    1. Polyethylene & Polypropylene
    2. Polyvinyl Chloride
    3. Phenol Formaldehyde
    4. Epoxy Polymers
    5. Butadiene-Styrene Copolymer.

Industrial Safety:

1. **Introduction-** Defination & terms used in context of safety, Accident-Non-reportable & reportable accidents, Hazard, Risk, Acceptance of risk, Responsibilities, Perception of Danger, Job Knowledge.
   Physical factors for Accidents- Accident ratio,
   Safety Training-Worker Training, Role of Supervisor in achieving a high standard of Safety, Supervisory Training
   Motivation for Safety-Safety Suggestion Scheme, Safety Committee, Safety Competition-Safety Contests, Safety Drives, Safety Exhibition & Poster.
2. **Fire & Explosion-** The Chemistry of Fire, Fire triangle, Classification of Fire, Stages of Fire, Causes of Industrial Fire-Electrical Equipment, Smoking, Mechanical Fault, Welding & Gas Cutting, Sparks, Explosives Dusts, Static spark, Runaway Chemical reaction, Fire Detection-Human Observation, Fire Alarm System, Fire Extinguishers-Fixed Fire fighting system.
   Portable fire Extinguishers-Soda acid type, Dry Chemical Powder type, Carbon dioxide type & Foam type Extinguisher.
3. **Personal Protective Equipment**-Hand Proctection, Foot Proctection, Head Proctection, Eye Proctection, Facce Proctection, Skin & Body Proctection, Protection against Fall, Noise Proctection, Respiratory Proctection-Care & Precaution, External air supply type & Self-Contained Breathing apparatus (SCBA), Selection of Personal protective equipment.

Course Outcome: (Paper XVII)

Process Instrumentation

Temperature Measurement

1. Filled-Bulb & Glass-Stem Thermometers.
    a) Glass-Stem Thermometers
    b) Filled Thermal Systems
    c) Liquid-Filled System
    d) Vapor System
    e) Gas-Filled System
2. Bimetallic Thermometers
3. Resistance Temperature Detector (RTD's)
4. Radiation & Pyrometers

Pressure Measurement

1. Manometers-U tube , Well, Inclined & Micromanoters.
2. Bourdon & Helical pressures Sensors-
    C-bourdon Pressure Sensors
    Spiral Bourdon Pressure Sensors
    Helical bourdon Pressure Sensors
3. Bellows Type Pressure Sensors
Motion Balance absolute Pressure
    Force Balance absolute Pressure
3. Diaphragm or Capsule type sensors
4. Pressure Gauges

Plant Utilities

1. Water-Sources of Water, Hard & Soft water, Causes of Hardness, Disadvantages of hard water, Methods of softening of water, Preboiling of water-Lime soda Process-Ion Exchange process. Essential characteristics of drinking water, purification of water-Screening, Sedimentation, Coagulation, Filteration. Treatment to Boiler Feed Water-Formation of Scale, Corrosion, Priming & Foaming, Caustic embrittlement.

2. Insulation-Introduction, Insulating Factors, properties of good insulator, Classification-Glass Wool Properties & application, Thermocole Properties & application, Cold Insulation, Low Temperature Insulation.

3. Steam & Steam Generator- Steam-Formation of Steam at constant Pressure, Enthalpy- Enthalpy of water, Enthalpy of Evaporation, Enthalpy of dry saturated steam, Wet Steam, Superheated Steam, Specific Volume of steam, Steam Generator- Classification, Factors for Boiler selection

4. Air- Compressed air, Fan air, Reciprocating Air Compressors, Multistage Compressors, Rotary Compressors.

Course Outcome: (Paper XVIII)

1. Submission of Design Thesis on technical Product

2. Writing of Synopsis on Thesis
   Write brief information about History, Physical & Chemical Properties, raw materials, methods of production, Manufacturing process description, Flow sheet, Material balance & Uses

3. Industrial Visit & Submission of visit report

Department of Computer Science

Programme Outcomes (PO)

On Completion of the course students will be able to

- **PO-1.** Develop problem solving abilities using a computer
- **PO-2.** Build the necessary skill set and analytical abilities for developing computer based solutions for real life problems.
- **PO-3**. Imbibe quality software development practices.
- **PO-4.** Create awareness about process and product standards
- **PO-5.** Train students in professional skills related to Software Industry.
- **PO-6.** Prepare necessary knowledge base for research and development in Computer Science
- **PO-7.** Help students build-up a successful career in Computer Science
- **PO-8.** Prepare the students for a career in Software Industry.
- **PO-9.** Student can work effectively both individually and as member of team.
- **PO10:** Create a learning environment to transform the students with strong .fundamentals in computer science, analytics, programming and problem solving.
- **PO11.** Provide exposure to students to latest tools & technologies in area of computer science
- **PO12.** There are brilliant job outlooks for Computer Science graduates in the recent Scenario.
- **PO13.** Computer Science graduates are competent in academic, Research, Industry, Government, Private and Business organizations with the acquired programming skills.
- **PO14.** The software and IT companies are the major employers of Computer Science graduates.

Programme Specific Outcomes (PSO)

- **PSO1:** Effectively communicating computing concepts and solutions to bridge the gap between computing industry experts and business leaders to create and initiate innovation
- **PSO2:** Effectively utilizing their knowledge of computing principles and mathematical theory to develop sustainable solutions to current and future computing problems.
- **PSO3:** Exhibiting their computing expertise within the computing community through corporate leadership, entrepreneurship, and/or advanced graduate study
- **PSO4:** Developing and implementing solution based systems and/or processes that address issues and/or improve existing systems within in a computing based industry.
- **PSO5:** Information on Emerging Trends: Give information about software design and development practices to develop software applications in emerging areas such as Cloud and High performance computing, Data analytics and Cyber security.
- **PSO6:** Successful Career and Entrepreneurship: The ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.
- **PSO7:** Demonstrate understanding of the principles and working of the hardware and software aspects of computer systems.
- **PSO8:** Design, implements, test, and evaluate a computer system, component, or algorithm to meet desired needs and to solve a computational problem.

- **PSO9:** Enhance skills and adapt new computing technologies for attaining professional excellence and carrying research.
- **PSO10:** An ability to apply knowledge of computing and mathematics appropriate to the discipline.
- **PSO11:** Those software systems are used in many different domains. This requires both computing skills and domain knowledge.
- **PSO12:** Software development fundamentals, including programming, data structures, algorithms and complexity.
- **PSO13:** Systems fundamentals, including architectures and organization, operating systems, networking and communication, parallel and distributed computation, and security.
- **PSO14:** Mathematics fundamentals, including discrete structures, statistics and calculus.
- **PSO15:** Software engineering fundamentals, including software analysis and design, evaluation and testing, and software engineering processes.
- **PSO16:** Application fundamentals, including information management and intelligent applications.
- **PSO17:** Multiple programming languages, paradigms, and technologies.
- **PSO18:** Microprocessors and microcontrollers.

Course Outcome (CO)

Course Outcome: Computer Fundamentals (Paper –I)

- **CO1:** Impart basic introduction to computer hardware components, computer numbering, how the CPU works, fundamental about algorithms and flowchart as well as different type of software.
- **CO2: Fundamentals of Computer System** - Characteristics & features of Computers. Components of Computers. Organization of Computer.
- **CO3**: **Algorithm and Flowcharts-** Algorithm, Characteristics, Advantages and disadvantages, Examples, **Flowchart-** symbols of flowchart, Advantages and disadvantages.
- **CO4**: **Computer Generation & Classification**- Generation of Computers: First to Fifth Classification of Computers, Distributed & Parallel computers.
- **CO5**: **Computer Languages**- Types of Programming Languages, Machine Languages, Assembly Languages, High Level Languages.
- **CO6**: **Computer Memory**- Memory Cell & Organization, Types of Memory (Primary And Secondary), RAM, ROM, PROM, EPROM, Secondary Storage Devices (FD, CD, HD, Pen drive, DVD, Tape Drive, DAT).
- **CO7**: **I/O Devices**- Input Devices: Touch screen , OMR, OBR , OCR, Light pen, Output Devices: Scanners, Digitizers, Plotters, LCD, Plasma Display, Printers.
- **CO8**: **Processor-** Structure of Instruction, Description of Processor, Processor Features, RISC & CISC.
- **CO9**: **Operating system Concepts**- Why Operating System, Functions of Operating System, Types of Operating System, Batch O.S., Multiprogramming O.S., Time Sharing O.S, Personal Computers O.S., Network O.S.

Course Outcome: Digital Electronics (Paper –II)

- **CO1:** Basic knowledge in digital logic and circuits and to introduce basic concepts of data communications. Student will be able to learn basic concepts of digital logic and the design of basic logic circuits using commonly used combinational and sequential circuits.
- **CO2:** Number Systems and Arithmetic, Decimal Number System & Binary Number System, Decimal to Binary conversion(Double-dabble method only), Binary to Decimal Conversion, Binary Arithmetic : Binary addition, subtraction, multiplication & division, Hexadecimal number system , Hexadecimal to binary, binary to Hexadecimal, Hexadecimal to decimal conversion, Hexadecimal arithmetic: Addition, subtraction, multiplication & division, Binary subtraction using 1' complement, 2's complement method.
- **CO3: Boolean Algebra and Logic Gates**- Postulates of Boolean Algebra, Theorems of Boolean Algebra: Complementation, commutative, AND, OR, Associative, Distributive, Absorption laws , De morgan's theorems, Reducing Boolean expressions, Logic Gates : AND, OR, NOT, Ex-OR, Ex-NOR. NAND as Universal building block, Logic diagrams of Boolean expressions Boolean expressions for logic diagrams.
- **CO4: Minimization Techniques-** Minterms and Maxterms, K-Map, K-map for 2 variables, K-map for 3 variables, K-map for 4 variables.
- **CO5: Combinational and Arithmetic Logic Circuits**- Half Adder & Full Adder, Binary parallel Adder, Half Subtractor, Full Subtractor, Adder/Subtractor in 2's complement system, BCD to Decimal decoder, 2 : 4 demultiplexer, 4 line to 1 line multiplexer.
- **CO6: Flip Flops**- RS FF, Clocked RS FF, D FF, Triggering, preset and clear, JK FF , T FF , Race around condition, Master slave FF.
- **CO7: Counters**- Asynchronous/ ripple counter, Modulus Counter , MOD-12 counter, Synchronous counter : Synchronous serial & synch parallel counter, BCD counter, Ring counter, Johnson counter.
- **CO8: Shift Registers**- Buffer register, Serial- in serial ‑ out, Serial-in parallel-out, Parallel-in serial-out, parallel-in parallel-out.

Course Outcome: Practical Office Lab and Digital Electronics Lab (Paper –III)

- **CO1: I**mpart the student hands on practice so that students should be able to: Create, Save, Copy, Delete, Organize various types of files and manage the desk top in general, use a standard word and spread-sheet processing package exploiting popular features.
- **CO2:** GUI Operating System: Mouse Practice, Starting, Login, Shutdown, Exploring Directories, Resizing, Moving, Minimizing, closing of software windows, familiarization with file icons, Launching Applications, Deleting, Renaming files, Managing Directories, Searching for files, Using Accessories. · Web Browser: Basic Browsing, Buttons: forward, backward, home, adding to favorites, stop, save, save as, Saving an Image from the Web, printing, Specifying a Home Page, Browsing: Using Web URLs, Anatomy of a URL, Membership Websites: Signing up for email service, Searching: Academic Search on the web.
- **CO3:** Word Processing Tool: Menus, Shortcut menus, Toolbars, Customizing toolbars, Creating and opening documents, Saving documents, Renaming documents, Working on multiple documents, Close a document ; Working With Text :Typing and inserting text, Selecting text, Deleting text, Undo, Formatting toolbar, Format Painter, Formatting Paragraphs: Paragraph attributes, Moving, copying, and pasting text, The clipboard, Columns, Drop caps; Styles : Apply a style, Apply a style from the style dialog box,

Create a new styles from a model, Create a simple style from the style dialog box, Modify or rename a style, Delete a style; Lists : Bulleted and numbered lists, Nested lists, Formatting lists Tables :Insert Table button, Draw a table, Inserting rows and columns, Moving and resizing a table, Tables and Borders toolbar, Table properties Graphics :Adding clip art, Add an image from a file, Editing a graphic, AutoShapes; Spelling and Grammar: AutoCorrect, Spelling and grammar check, Synonyms, Thesaurus; Page Formatting: Page margins, Page size and orientation, Headers and footers, Page numbers, Print preview and printing.

- **CO4:** Spreadsheet Basics: Screen elements, Adding and renaming worksheets, The standard toolbar - opening, closing, saving, and more; Modifying A Worksheet, Moving through cells, Adding worksheets, rows, and columns, Resizing rows and columns, Selecting cells, Moving and copying cells, Freeze panes; Formatting Cells: Formatting toolbar, Format Cells dialog box, Dates and times; Formulas and Functions: Formulas, Linking worksheets, Relative, absolute, and mixed referencing, Basic functions, Function Wizard, Autosum, Sorting and Filling: Basic ascending and descending sorts, Complex sorts, Autofill; Alternating text and numbers with Autofill, Autofilling functions; Graphics; Adding clip art; Add an image from a file; Editing a graphics; AutoShapes; Charts: Chart Wizard; Resizing a chart; Moving a chart, Chart formatting toolbar; Page Properties and Printing: Page breaks, Page orientation, Margins, Headers, footers, and page numbers, Print Preview, Print; Keyboard Shortcuts.
- **CO5:** Presentation Tool: AutoContent Wizard, Create a presentation from a template, Create a blank presentation, Open an existing presentation, Auto Layout, Presentation Screen: Screen layout, Views, Working with Slides: Insert a new slide, Applying a design template, Changing slide layouts, Reordering slides, Hide slides, Create a custom slide show, Edit a custom slide show Adding Content: Resizing a text box, Text box properties, Delete a text box, Bulleted lists, Numbered lists, Adding notes, Video and Audio Working with Text: Adding text, Editing options, Formatting text, Replace fonts, Line spacing, Change case Spelling check Color & Background: Color schemes, Backgrounds, Graphics, Adding clip art, Adding an image from a file, Editing a graphic, AutoShapes, WordArt Slide Effects: Action buttons, Slide animation, Animation preview, Slide transitions, Slide show options, Master Slides, Slide master, Header and footer, Slide numbers, Date and time Saving and Printing, Save as a web page, Page setup, Print.
- **CO6:** Integrating Programs Word, spreadsheet and Presentation.
- **CO7: Digital Electronics Lab-** Provide hands-on practice of the basic knowledge in digital logic and circuits and to provide hands-on practice in some commonly used combinational and sequential circuits.
- 1. Study and Testing of measuring instruments: Digital and Analog multimeters, CROs and Signal Generators – measurement of AC & DC voltages, measurement of frequency.
- 2. Study of Components: Identification and testing of resistors, capacitors, inductors, diodes, LEDs & transistors
- 3. Study of Logic Gates: Study of truth table of basic gates, realization of Boolean functions
- 4. Study of Half adder and Full Adder
- 5. Study of Half Subtractor and Full Subtractor
- 6. Study of Implementation of a 3:8 decoder,
- 7. Study of 4-line to 16 bit decoder
- 8. Study of BCD to 7-segment decoder

- 9. Study of Generating a Boolean expression with a multiplexer
- 10. Study of Clocked JK Flip Flop
- 11. Study of 4-bit ripple counter
- 12. Study of Parallel-in, serial-out, 4-bit shift register

Course Outcome: Operating Systems (Paper –IV)

- **CO1: Introduction to Software:** Software: Definition, classification and components of software, operating system as the main component of system software.
- **CO2: Operating System**- Fundamental, **Operating Systems:** OS as a resource manager, Structure of OS, OS functions, Characteristics of modern OS. **Types of O.S.:** Early systems, simple batch systems, multi programmed batch systems, Time sharing system, Personal Computer systems, Parallel systems, Distributed systems, Real time systems, **OS Structures:** Components of OS: Process management, Memory management, Storage management, File management, I/O management.
- **CO3: Process Management**- **Concept of Process:** Process State, Operation on Processes, thread. **CPU Scheduling:** Types of Schedulers, Criteria for scheduling, Scheduling Algorithms. **Process Synchronization:** Need for synchronization, Critical Section, Hardware Synchronization, Semaphores, Monitors, Problem of synchronization. **Deadlocks:** Concept of Deadlock, Deadlock Modeling, Methods for Handling Deadlock.
- **CO4: Storage Management- Memory Management:** Address Binding, Logical vs. Physical Address space, Memory Allocation, Paging, Segmentation, Segmentation and paging of Intel Pentium. **Virtual Memory:** Demand Paging, Page replacement Algorithms (FIFO, Optimal, LRU), Virtual Memory in windows Xp. **File System Interface:** Files, File Access, Directory Structure, Protection, **Implementation of File System:** Allocation Methods, Free space Management.
- **CO5: I/O System- I/O System Components:** I/O Devices , I/O Hardware , Application I/O interface, **Secondary Storage Structure :** Disk fundamental, Disk Scheduling , Disk Management.

Course Outcome: Programming in C (Paper –V)

- **CO1: E**xpose students to algorithmic thinking and problem solving and impart moderate skills in programming using C Language in aindustry-standard. Introduce students to learn basic features, Create, execute simple C programs using conditional statements, loops and arrays.
- **CO2: Introduction**- An Overview of C , History of C language, · C as a Structured Language, Features of C.
- **CO3: Basic Elements & Operators**- Character set, C Token, Identifier & Keywords, Variables, Constant and its types. Integer constant, floating point constant, character constant, string constants. **Operators:** Arithmetic, Relational, Logical, Unary operators: Increment & decrement Assignment and Conditional operator. Precedence & Associatively of Operators.
- **CO4: Data Types**- Data Types: int, char, float, double. Declaration & Initialization. · Type modifiers: long, short, signed and unsigned.
- **CO5: C Program & I/O statements**- Structure of C Program, Compilation & Execution of C program I/O: Introduction, Formatted Input/Output function: scanf & printf, Escape sequence characters. Library functions: General used & Mathematical.

- **CO6: Control and Iterative Statements:** Simple if, nested if, if-else, else if ladder · Switch-case statement · The conditional expression (? : operator), while and do-while loop, and for loop, break & continue statement, goto statement.
- **CO7: Arrays:** Declaration and initialization, Accessing array elements, Memory representation of array. · One dimension and multidimensional arrays, character array, Introduction to string.
- **CO8: Functions**- types of functions. Defining functions, Arguments, Function prototype,
- actual parameters and formal parameters, Calling function, Returning function results, Call by value, Recursion.

Course Outcome: Practical Programming in 'C' (Paper –VI)

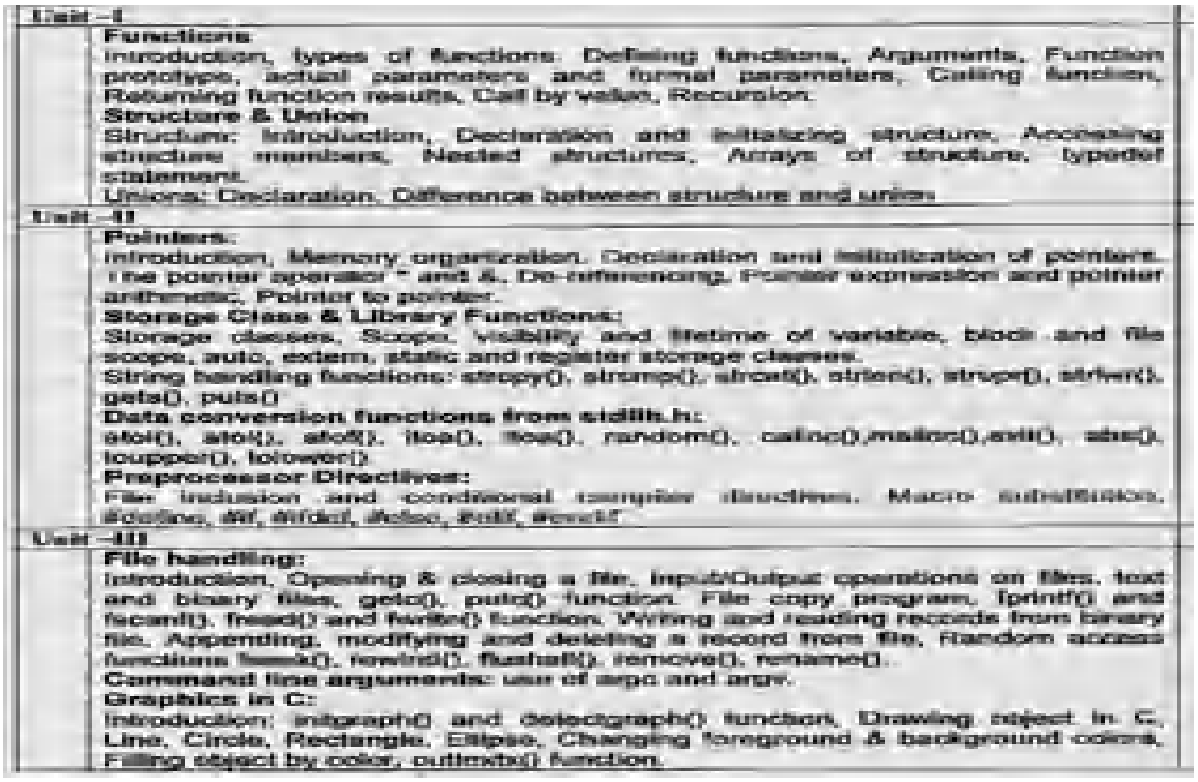
- **CO1: Operating System:**

1. Study of DOS Commands. 2. Study of Unix/Linux Commands. 3. Write a program to implement the FCFS Scheduling Algorithm. 4. Write a program to implement the SJF Scheduling Algorithm. 5. Write a program to implement the Priority Scheduling Algorithm. 6. Write a program to implement the Round Robin Scheduling

- **CO2: Algorithm.**

1. Find Area, Perimeter of Triangle & Rectangle. 2. Find maximum amongst 3 numbers. 3. Program for nested loops. 4. Program to Calculate x y. 5. Program to check Prime Number. 6. Program to find Armstrong Number. 7. Program to print the Fibonacci Series 8. Searching and element from array. 9. Transpose of matrices. 10. Multiplication of matrices 11. Sorting array using bubble sort technique. 12. Program for recursion e.g. factorial, reverse of digit. 13. Program for structure initialization. 14. Array of Structure e.g. student result, Employee pay slip , Phone bill. 15. Function with parameter & return values

Course Outcome: Advance C Programming (Paper –VII)



Unit –I	
	Functions: Introduction, types of functions: Defining functions, Arguments, Function prototype, actual parameters and formal parameters, Calling function, Returning function results, Call by value, Recursion. **Structure & Union** Structure: Introduction, Declaration and initializing structure, Accessing structure members, Nested structures, Arrays of structure, typedef statement. Unions: Declaration, Difference between structure and union.
Unit –II	
	Pointers: Introduction, Memory organization, Declaration and initialization of pointers, The pointer operator * and &, De-referencing, Pointer expression and pointer arithmetic, Pointer to pointer. **Storage Class & Library Functions:** Storage classes, Scope, visibility and lifetime of variable, block and file scope, auto, extern, static and register storage classes. String handling functions: strcpy(), strcmp(), strcat(), strlen(), strupr(), strlwr(), gets(), puts() **Data conversion functions from stdlib.h:** atoi(), atol(), atof(), itoa(), itoa(), random(), calloc(),malloc(),exit(), abs(), toupper(), tolower() **Preprocessor Directives:** File inclusion and conditional compilation directives, Macro substitution, #define, #if, #ifdef, #else, #endif, #error
Unit –III	
	File handling: Introduction, Opening & closing a file, Input/Output operations on files, text and binary files, getc(), putc() function. File copy program, fprintf() and fscanf(), fread() and fwrite() function. Writing and reading records from binary file, Appending, modifying and deleting a record from file, Random access functions fseek(), rewind(), fflush(), remove(), rename(). **Command line arguments:** use of argc and argv. **Graphics in C:** Introduction: initgraph() and detectgraph() function, Drawing object in C, Line, Circle, Rectangle, Ellipse, Changing foreground & background colors, Filling object by color, outtext() function.

Course Outcome: Data Structure (Paper –VIII)

Unit –I	
	Introduction to Data Structure: Introduction, Basic Terminology : Data item, Fields, Records, Files, Entity, Attributes Data Organization and Data Structure **Arrays** Representation of Linear Arrays, Traversing, Insertion and Deletions, Sorting & Searching Algorithms, Multidimensional Arrays : 2D & M-D Concept, Record: Record Structures, Representation in Memory
Unit –II	
	Linked List Concept of Linked List, Representation of Linked List in memory, Traversing a linked list, Searching a linked list : sorted and unsorted, Insertion & Deletion in Linked List Header Linked List & Two way List.
Unit –III	
	Stacks, Queues , Recursion Stack: Operation , Array Representation of Stack, linked representation of stack, Arithmetic Expression , POLISH & POSTFIX, Application of stacks: Quicksort, Recursion. Queue: Representation of queues & link, Types of Queues : Deques & Priority Queues

Course Outcome: Practical on Advance C Programming (Paper –IX)

1. Swapping of numbers by using call by reference.
2. Program to pass array to function.
3. Program for passing structure pointer to function.
4. String manipulation function e.g. string copy, concatenation, compare, string length, reverse,
5. Program for reading/writing text file.
6. Program for reading/writing binary file.
7. File copy program.
8. Program to modify a record from binary file.
9. Program to delete a record from binary file.
10. Program on conditional compiling.
11. Program on macro substitution.
12. Program for data conversion.
13. Program to draw simple pictures (human face, clock, hut, etc.) using graphics functions.
14. Program using command line arguments.
15. Program to demonstrate the storage class.
16. Program to sort names.

Course Outcome: Practical on Data structure (Paper –X)

Assignments: Write the Program using C (if applicable) :

1. Write a program using DIV(J,K) which reads a positive integer N>10 and determines whether or not N is a prime number.
2. Write a program which counts the number of particular character/word in the String.
3. Write a program which reads words WORD1 and WORD2 and then replaces each occurrence of word1 in text by word2.
4. Write the programs for traversing of n item using the array.
5. Write the programs for insertion and deletion of n item using the array.
6. Implement Linear and binary search algorithm using C.
7. Implement Bubble sort using C.
8. Write the programs for traversing of n item from the linked list.
9. Write the programs for push and pop operation using the stacks.
10. Write the programs for insertion and deletion of n item from the queues.

Course Outcome: Programming in C ++ (Paper –XI)

Unit –I

Introduction of OOPs

Procedural Vs Object Oriented Programming, Basic concepts of Object Oriented Programming, Class, Object, Data Abstraction, Encapsulation, Inheritance, Polymorphism, Dynamic Binding, Message Passing. Benefits and applications of OOP, History and overview of C++, C++ program structure. Reference variables, Scope resolution operator, Member de-referencing operators, new and delete, cin and cout, The endl and setw manipulator.

Functions in C++:

Function prototype, Call by reference (using reference variable), Return by reference, Inline function, Default arguments, Const arguments.

Unit –II

Function overloading:

Different numbers and different kinds of arguments

Objects and Classes:

Specifying a class, private and public, Defining member functions, Nesting of member function, Object as data types, Memory allocation for objects, static data members and member functions. Array of objects, Objects as function argument, returning objects, Friend function and its characteristics.

Unit –III

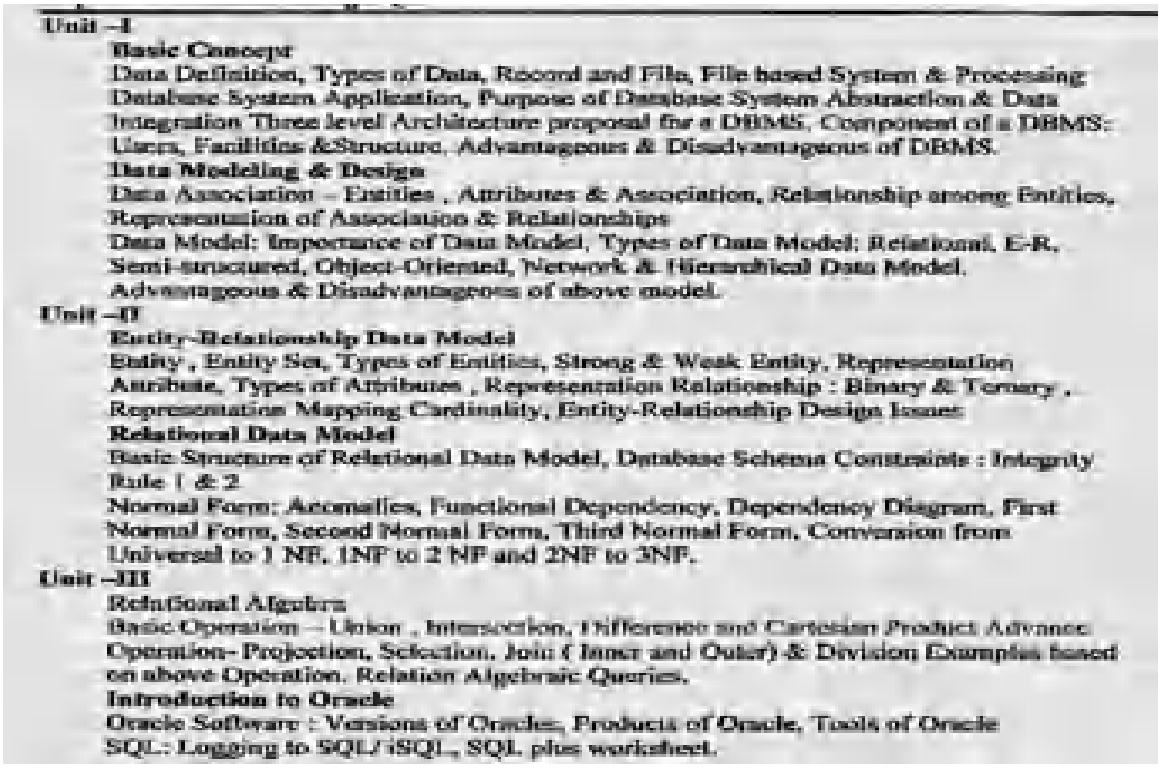
Constructors and Destructors:

Introduction, default and parameterized constructors, Multiple constructors in a class, Copy Constructor, Destructors

Operator Overloading:

Overloading unary operators, Rules for operator overloading, Overloading without friend function and using friend function, Overloading binary operators such as arithmetic and relational operators, Concatenating Strings, Comparison operators.

Course Outcome: DBMS using SQL (Paper –XII)



Unit –I

Basic Concept

Data Definition, Types of Data, Record and File, File based System & Processing Database System Application, Purpose of Database System Abstraction & Data Integration Three level Architecture proposal for a DBMS, Component of a DBMS: Users, Facilities &Structure, Advantageous & Disadvantageous of DBMS.

Data Modeling & Design

Data Association – Entities , Attributes & Association, Relationship among Entities, Representation of Association & Relationships

Data Model: Importance of Data Model, Types of Data Model: Relational, E-R, Semi-structured, Object-Oriented, Network & Hierarchical Data Model. Advantageous & Disadvantageous of above model.

Unit –II

Entity-Relationship Data Model

Entity , Entity Set, Types of Entities, Strong & Weak Entity, Representation Attribute, Types of Attributes , Representation Relationship : Binary & Ternary , Representation Mapping Cardinality, Entity-Relationship Design Issues

Relational Data Model

Basic Structure of Relational Data Model, Database Schema Constraints : Integrity Rule 1 & 2

Normal Form: Anomalies, Functional Dependency, Dependency Diagram, First Normal Form, Second Normal Form, Third Normal Form, Conversion from Universal to 1 NF, 1NF to 2 NF and 2NF to 3NF.

Unit –III

Relational Algebra

Basic Operation – Union , Intersection, Difference and Cartesian Product Advance Operation- Projection, Selection, Join (Inner and Outer) & Division Examples based on above Operation. Relation Algebraic Queries.

Introduction to Oracle

Oracle Software : Versions of Oracle, Products of Oracle, Tools of Oracle SQL: Logging to SQL/ iSQL, SQL plus worksheet.

Course Outcome: Practical (Paper –XIII and XIV)

Paper title: Practical Based on Programming in C++ **Paper No.: CSO13**

Minimum 12 Practicals to be performed as per the guidelines of teaching Faculty depending upon all theory units of concerned subject.

Course: B.Sc.(C.S.) (Opt.) **Semester : IV**

Paper title: Practical Based on Database Management System **Paper No.: CS O14**

1) Design five schemas for any organization like: College, school, hospital, travel agency, company, bank etc.
2) Normalize the above five selected schemas as per 1NF,2NF and 3NF
3) Draw E-R Diagram for the same.
4) Solve at least ten Relational Algebraic Queries

Course Outcome: Software Engineering (Paper –XV)

- **CO1: Software and Software Engineering-** What is Software, Characteristics of software, categories of Software, attributes of WebApps, software Engineering, Software Process, Essence Software Engineering Practice, General Principles, Software Myths.
- **CO2: Software Process and Process Models-** Software process Model Process Flow, Process Models, Waterfall model, Incremental Process Model, Evolutionary Process Models, Concurrent Models, Specialized Process Models, The Unified Process, Personal and Team Process Models, Product and Process, **Agile-**Introduction to Agility, Agility and the Cost of Change, Agile Process, Agility Principles, Human Factors, Extreme Programming (XP), XP Values, XP Process, Industrial, Critics of XP.

- **CO3: Principles That Guide Practice-** Principles That Guide Process, Principles That Guide Practice, Communication Principles, Planning Principles, Modeling Principles, Construction Principles, Deployment Principles.

Course Outcome: Web Designing (Paper –XVI)

- **CO1: Introducing HTML5 -**Understanding HTML, XHTML, and HTML5, Introducing semantic markup, Syntax, Attributes, Working with elements, Creating an HTML document Embedding content, Embedding HTML by using inline frames, Working with hyperlinks, Adding images to your HTML document, Embedding plug-in content **Advances of HTML5-**HTML5 Layout container Format using element Working with Tables: creating regular and irregular tables, heading, columns and rows, captions, header, footer.
- **CO2: Introducing JavaScript-** Basic of JavaScript JavaScript Variables, Operators & Its Precedence, Special Values, Predefined Built-Infunctions, Functions Declaration & Call String Functions Conditions and looping structure, Inline JavaScript & External JavaScript. **Advances in JavaScript-**Object in JavaScript, Concept of array, how to use it in JavaScript, types of an array, array methods DOM Concept in JavaScript, DOM Objects, DOM Search Methods Event handling in JavaScript: Capturing & Bubbling, Subscribing, Unsubscribing and Cancelling Event, Windows Event, Keyboard and Mouse Events.
- **CO3: Cascading Style Sheet-**Introduction to CSS3 Defining and Applying a Style, Inline, Embedded and External Style Sheet. Selectors: element, id and class selector, grouping selector, attribute, Specificity and cascading CSS properties: Color, box Model, border, padding, margin, float, clear.

Course Outcome: VB.NET (Paper –XVI)

- **CO1: Introduction:** Introduction to .NET and .NET Framework, Difference between CUI & GUI, Event Driven Programming, the VB IDE, Operators, Conditional statements and looping statements. Sub Procedure, functions and exception handling.
- **CO2: Windows Forms :** General Properties, Events handling events like mouse, keyboard, Types of forms MDI, adding removing controls at run time. **Controls** : The control class, Text Box, Rich Text Box, Label, Buttons, Checkbox, Radio Button, Panels, Group Boxes, List Box, Combo Box, Picture Box, Scroll Bars, Splitters, Track Bars, Pickers, Timer.
- **CO3: Object-Oriented Programming :** Class and Object, Class Vs. Object Members, Creating Classes, Objects, Structures, Modules, Constructors, Data Members, Methods, Properties, Event.

Course Outcome: Practical (Paper –XVII)

- **CO1: Software Engineering Case Study-** Using any Software engineering model case study on development of a software.
- 1. Create a simple website by using Visual Studio Express
- 2. Create additional pages
- 3. Embedding Content
- 4. Create a webpage using <table> and elements
- 5. Create a webpages using conditional and looping statements.

- 6. Create a calculator webpage
- 7. Create a Webpage to introduce National Bird/Animal/Emblem/Flower
- 8. Learn more about positioning by adding more elements to the webpage to define a header and footer for the page. Use CSS style rules to set the position.
- 9. Learn more about CSS selectors by adding more elements to the page and try setting the format by selecting the elements without using an id.
- 10. Learn more about colors by changing the color scheme, using RGB values.

Course Outcome: Practical Web Designing (Paper –XVIII)

- **CO1:** Practical to be performed as per the guidelines of teaching Faculty depending upon all theory units of concerned subject.

Course Outcome: Data Communication and Networking (Paper –XIX)

- **CO1:** Communication System, Components of communication system, Computer network Advantage and applications of computer n/w. point-to-point and multipoint line configuration, LAN, MAN and WAN. Analog and Digital signals, Data Transmission: Parallel and Serial, Synchronous and Asynchronous transmission, Transmission Mode: Simplex, half-duplex and full-duplex. Network Topologies Mesh, Star, Tree, Bus and Ring and Hybrid Topology (Advantages and disadvantages of each).
- **CO2: Transmission media -**Guided and unguided media, Twisted-pair, UTP and STP cable, coaxial cable, Optical Fiber cable, Radio waves, Microwaves, Satellite Communication (*Transmission characteristics and advantages of each type*) **Modulation & Multiplexing -**Concept of modulation and demodulation, Digital-to-analog conversion, Amplitude Shift Keying (ASK)/AM, Frequency Shift Keying (FSK)/FM, Phase Shift keying (PSK)/PM.
- **CO3: The Mobile Telephone System**:- First Generation(1G), Second Generation(2G), Third Generation(3G), Internet over cable, Spectrum Allocation, cable Modem, ADSL Versus Cable.

Course Outcome: Ethics and Cyber Law (Paper –XX)

- **CO1:** Basic Concepts of Technology and Law, Understanding the Technology of Internet, Scope of Cyber Laws, Cyber Jurisprudence. Law of Digital Contracts. The Essence of Digital Contracts.
- **CO2:** The System of Digital Signatures. The Role and Function of Certifying Authorities. The Science of Cryptography, E-Governance, Cyber Crimes and Cyber Laws. Introduction to Intellectual Property.
- **CO3: Information Technology Act 2000 Cyber Law-**Issues in E-Business Management. Major issues in Cyber Evidence Management, Cyber Law Compliancy Audit, The Ethics of Computer Security. Relevant Rules Notifications, Information Technology (Amendment) Act, 2008.

Course Outcome: E-Commerce (Paper –XX)

- **CO1:** IT and business, E-commerce: Concepts Electronic Communication, PCs and Networking, E-mail, Internet and intranets. EDI to E-commerce, EDI, UN/EDIFACT.
- **CO2:** Concerns for E-commerce Growth, Internet bandwidth, Technical issues, Security issues. India E-commerce Readiness, Legal issues, Getting started. Security Technologies: Encryption, Symmetric key Encryption, Public key encryption, Public key encryption using digital Signatures. Hashing techniques, Certification and key Distribution, Cryptographic.
- **CO3:** The elements of E-commerce. SSL-Secure Socket Layer, SET-Secure Electronic Transaction Protocol for Credit card payment, E-Cash, E-check, Smart cards. Electronic Payment System: Digital Cash, Digital Wallets, Digital checking payment systems, Electronic Billing, Wireless payment systems. Software Package: PGP e-mail encryption software.

Course Outcome: Seminar (Paper –XXI)

- **CO1: S**hould prepare and present a seminar on any latest topic should be related to Computer Science.

Course Outcome: E-Commerce (Paper –XXII)

- **CO2:** Students group (maximum 3 students) should design and develop a project.

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Department of Botany

Programme Outcomes (PO)

On Completion of the course students will be able to

- **PO-1.** Students know about different types of lower & higher plants their evolution in from algae to angiosperm &also their economic and ecological importance.
- **PO-2.** Cell biology gives knowledge about cell organelles & their functions
- **PO-3.** Molecular biology gives knowledge about chemical properties of nucleic acid and their role in living systems.
- **PO-4.** Genetics provides knowledge about laws of inheritance, various genetic interactions, chromosomal abrasions & multiple alleles.
- **PO-5.** Structural changes in chromosomes.
- **PO-6.**Student can describe morphological & reproductive characters of plant and also identified different plant families and classification.
- **PO-7.**They knows economic importance of various plant products & artificial methods of plant propagation
- **PO-8.** Use modern Botanical techniques and decent equipments.
- **PO-9.**To inculcates the scientific temperament in the students and outside the scientific community.

Programme Specific Outcomes (PSO)

- **PSO1:** Provide knowledge of the medicinal plants to the students and promote them to use them as earning source
- **PSO2:** Motivate the Botany students for exploration of regional flora
- **PSO3:** Preserve the rare medicinal plants of region
- **PSO4:**Create recognized laboratory for the students of Botany and provide guidance to the research students
- **PSO5:** Create awareness about plant propagation
- **PSO6:** Develop open natural laboratory for the students of Botany
- **PSO7:** Students acquire fundamental Botanical knowledge through theory and practicals.
- **PSO8:** Explain basis plant of life, reproduction and their survival in nature.
- **PSO9:** Help to understand role of living and fossil plants in our life.
- **PSO10:** Understand good laboratory practices and safety.
- **PSO11:** Create awareness about cultivation, conservation and sustainable utilization of biodiversity.
- **PSO12:** Know advance techniques in plant sciences like tissue culture, Phytoremediation, plant disease management, formulation of new herbal drugs etc.
- **PSO13:** Students able to start nursery, mushroom cultivation, biofertilizer production, fruit preservation and horticultural practices.
- **PSO14:** Understand the physiological process in plants
- **PSO15:** Study biotechnological process, use of various plants resources at commercial level.
- **PSO16:** Study the variation of plants life at all levels of biological organization.

Course Outcome: Diversity of Cryptograms I (Paper –I)

Unit - 1

1.1 Viruses:
General characters, classification based on host, economic importance, TMV – structure and multiplication (04)

1.2 Mycoplasma:
General characters (01)

1.3 Bacteria:
General characters, ultra structure, classification based on shape, reproduction, economic importance (05)

1.4 Cryptogams:
General characters, classification according to G.M. Smith up to class level (01)

1.5 Lichens:
General characters, nature of association, forms of thalli, economic importance, structure and reproduction in *Usnea* (04)

Unit – 2

2. Algae:
2.1 General characters, classification according to F.E. Fritsch (1935) up to the class level, economic importance. (02)
2.2 Systematic position, occurrence, thallus structure, reproduction:-vegetative, asexual and sexual, (excluding development of sex organs) and graphic life cycle with respect to following types:
i. Cyanophyceae – *Nostoc* (02)
ii. Chlorophyceae – *Chara* (03)
iii. Xanthophyceae – *Botrydium* (02)
iv. Phaeophyceae – *Sargassum* (03)
v. Rhodophyceae – *Batrachospermum* (03)

Unit – 3

3. Fungi:
3.1 General characters, classification according to Alexopoulous and Mims (1979) up to the class level, economic importance (03)
3.2 Systematic position, occurrence, structure of mycelium, reproduction - asexual, sexual and graphic life cycle with respect to the following types:
i) Oomycetes – *Albugo* (03)
ii) Zygomycetes – *Mucor* (02)
iii) Ascomycetes – *Eurotium* (02)
iv) Basidiomycetes – *Agaricus* (03)
v) Deuteromycetes – *Cercospora* (02)

Course Outcome: Morphology of Angiosperms (Paper –II)

Unit – 1

1.1- Basic body plan of flowering plant, modular type of growth, diversity of plant forms – Herbs, Shrubs, Trees, Climbers; annuals, biennials and perennials. (02)

1.2 Morphology of vegetative organs:
a) **Root:** Characteristics, functions, regions of root, types - tap and adventitious, modification of root for storage, mechanical support (stilt root) and vital functions (Pneumatophore). (04)
b) **Stem:** Characteristics, functions, modification – underground, sub aerial and aerial (03)
c) **Leaf:** Parts of typical leaf, phyllotaxy, types (simple and compound), diversity in shape and size, venation and modifications of leaf. (06)

Unit – 2

2. Morphology of reproductive organs:
2.1 Inflorescence: Racemose, cymose and special types. (05)
2.2 Flower: Definition, parts of typical flower, forms of thalamus, androphore, gynophore, gynandrophore, insertion of floral whorls on thalamus (hypogyny, perigyny and epigyny), structure, function and modification of calyx, corolla, androecium, gynoecium, aestivation and placentation (15)
2.3 Fruit: Types of fruits (06)
2.4 Fruit and Seed: dispersal strategies. (04)

Course Outcome: Practical (Paper –III)

Diversity of Cryptogams- I

Note: Study of specimens of Bacteria, Algae, Fungi, through temporary mounting, permanent slides, field work and biovisual aids. Observation of disease symptoms in hosts infected by Fungi may be observed.

1. Study of simple and compound microscope
2. Virus: Tobacco Mosaic Virus
3. Gram staining in bacteria, forms of Bacteria
4. **Algae:**
   a) Nostoc
   b) Chara
   c) Botrydium
   d) Sargassum
   e) Batrachospermum
5. **Fungi:**
   a) Albugo
   b) Mucor,
   c) Eurotium
   d) Agaricus
   e) Cercospora
6. **Lichens:** Form – Crustose, Foliose, Fruticose; *Usnea*

Morphology of Angiosperms

Note: Study of the following with the help of temporary mountings, permanent slides, charts, models, specimens and biovisual aids.

1. **Study of root and its modifications:**
   a) Tap root
   b) Adventitious root
   c) Storage roots
   d) Stilt root
   e) Respiratory root.
2. **Study of stem and its modifications:**
   a) Underground stem
   b) Sub aerial stem
   c) Aerial stem
3. **Study of leaf and its diversity:**
   a) Types of leaf (Simple, Compound)
   b) Shape and size
   c) Venation
   d) Phyllotaxy
   e) Modifications
4. **Study of inflorescence:**
   a) Racemose
   b) Cymose
   c) Special
5. **Study of flowers:**
   a) Typical flower (*Hibiscus / Datura*)
   b) Hypogynous, Perigynous and Epigynous
   c) Aestivation
   d) Forms of corolla – cruciform, papilionaceous, infundibuliform and bilabiate
   e) Parts of typical stamen, adhesion and cohesion.
   f) Parts of typical carpel and placentation
6. **Study of flowers with respect to pollination mechanism:**
   a) Calotropis
   b) Ocimum
   c) Salvia
   d) Helianthus
   e) Ficus
   f) Clitoria
7. **Study of fruits:**
   a) Simple: legume, capsule, caryopsis, achene, drupe, berry.
   b) Aggregate: an etaerio of berries, an etaerio of follicles.
   c) Composite fruit: sorosis, syconus.

Course Outcome: Diversity of Cryptograms II (Paper –IV)

Unit- 1

1. Bryophytes:

1.1 General characters of bryophytes, classification as per G. M. Smith (02)

1.2 Systematic position, occurrence, thallus structure (external and internal), reproduction -vegetative, asexual, and sexual (excluding developmental stages), graphic life cycle and alternation of generations of the following types:

a) Hepaticopsida – *Marchantia* (07)

b) Bryopsida – *Funaria* (06)

Unit-2

2. Pteridophytes:

2.1 General characters of Pteridophytes, classification as per G. M. Smith (02)

Systematic position, occurrence, external and internal structure of sporophyte and gametophyte, reproduction (excluding developmental stages), graphic life cycle and alternation of generations of the following types:

a) Psilopsida – *Psilotum* (03)

b) Lycopsida – *Lycopodium, Selaginella* (12)

c) Sphenopsida – *Equisetum* (06)

d) Pteropsida – *Marsilea* (07)

Course Outcome: Histology, Anatomy and Physiology (Paper –V)

Unit – 1 Histology:

a) Types of tissue:

i. Meristematic tissue – Meristem, structure and types based on origin and position.

ii. Permanent tissues: Simple, Complex and Secretary

iii. Epidermal tissues: Trichomes and Stomata

b) Histological organization of root and shoot apices

c) Various theories of cellular organization

Unit – 2

Anatomy:

a) Primary structure of root, stem and leaf of Monocot (Maize) and Dicot (Sunflower)

b) Secondary growth in root and stem of Dicot (Sunflower)

c) Wood anatomy: Growth rings, heart wood and sap wood

d) Periderm: Origin, structure and functions.

Unit – 3

Embryology:

a) Structure of anther, microsporogenesis and development of male gametophyte.

b) Structure and types of ovule, megasporogenesis and development of female gametophyte (Polygonum type).

c) Pollination -Mechanism, types and agencies.

d) Double fertilization and its significance

e) Development of Dicot embryo (Crucifer type).

f) Structure, development and types of endosperm.

g) Structure of Dicot and Monocot seed

Course Outcome: Practical (Paper –VI)

Diversity of Cryptogams – II

Note: Study of specimen of Bryophytes, and Pteridophytes through temporary mounting,
permanent slides, field work and biovisual aids.

a) Bryophytes:
i. *Marchantia*
ii. *Funaria*

b) Pteridophytes:
i. *Psilotum*
ii. *Lycopodium*
iii. *Selaginella*
iv. *Equisetum*
v. *Marsilea*

Histology, Anatomy and Embryology

Histology:
1. Meristem: root apex and shoot apex
2. Permanent tissues – simple, complex and secretary
3. Epidermal tissues: trichomes and stomata

Anatomy:
1. Anatomy of young dicot (Sunflower) and monocot (Maize) root. (Double stained permanent slide preparation)
2. Anatomy of young dicot (Sunflower) and monocot (Maize) stem. (Double stained permanent slide preparation)
3. Anatomy of dicot (Sunflower) and monocot (Maize) leaf. (Double stained permanent slide preparation)

Embryology:
1. Study of T.S. of anther
2. Structure of ovule (anatropous), types of ovules
3. Study of Dicot and Monocot seed (embryo)

Course Outcome: Taxonomy of Angiosperms (Paper –VII)

- **CO1:**

1. Salient features, origin and evolution of Angiosperms.
2. Systems of classification –Introduction of Natural, Artificial and Phylogenetic.
3. Bentham and Hooker's system of classification up to series level, its merits and demerits.
4. Taxonomy in relation to anatomy, embryology, palynology, ecology and cytology.
5. Concept of Binomial Nomenclature and its advantages .
6. Concept of genus, species and epithet.
7. Herbaria:- What is herbaria, procedure for collection of plants, pressing of the plants specimen, drying of specimen, poisoning, mounting, labelling of specimens, storing of specimen, function of herbaria and some important herbaria of the India; Digital herbaria. Botanical Gardens: What is botanical garden, functions of botanical garden and major botanical gardens of India.

- **CO2:** Study of the following families: systematic position, salient features, floral formula, floral diagram, common examples and their economic importance.

i. Annonaceae, ii. Malvaceae, iii. Leguminosae, Fabaceae (Papilionaceae), Caesalpiniaceae, Mimosaceae, iv. Apocynaceae, v. Solanaceae, vi. Acanthaceae, vii. Lamiaceae (Labiateae), viii. Nyctaginaceae, ix. Liliaceae, x. Poaceae (Gramineae)

Course Outcome: Plant Ecology (Paper –VIII)

- **CO1: Plant and environment- A) Climatic factors** –a) Light as an ecological factor, global radiation and photosynthetically active radiation b) Temperature as an ecological factor. c) Water as an ecological factor, physicochemical properties of water. **B) Edaphic factor** –Soil formation, soil profile, physicochemical properties of soil, major soil typesof India, soil erosion and soil conservation.
- **CO2: 1. Response of plants to water-**Morphological, physiological and anatomical response of plants to water:–hydrophytes, xerophytes, halophytes and epiphytes. **2. Phytogeography:** Biogeographical regions of India, vegetation types of India.
- **CO3:1. Community ecology:** Community characteristics -frequency, density, life forms, biological spectrum. **1. Ecosystem:** Structure -biotic and abiotic components, food chain, food web, ecologicalpyramids, energy flow, biogeochemical cycles-nitrogen and phosphorus.

Course Outcome: Practical on Taxonomy of Angiosperms (Paper –IX)

- **CO1: Angiosperms:** Study of locally available plants of the following families :

1. Annonaceae, 2. Malvaceae, 3. Leguminosae - a) Fabaceae (Papilionaceae), b) Caesalpiniaceae
c) Mimosaceae, 4. Apocynaceae, 5. Solanaceae, 6. Acanthaceae, 7. Lamiaceae (Labiatae), 8. Nyctaginaceae, 9. Liliaceae, 10. Poaceae (Gramineae)

Course Outcome: Practical on Plant Ecology (Paper –X)

- **CO1:**

1. Study of morphological and anatomical adaptations in hydrophytes – *Hydrilla*, *Eichhornia*, *Typha* and *Nymphaea* .
2. Study of morphological and anatomical adaptations in xerophytes -*Aloe*, *Nerium, Casuarina.*
3. Study of morphological adaptations in halophytes -Pneumatophore, Stilt roots.
4. Study of morphological and anatomical adaptations in epiphytes.
5. Study of vegetation by quadrat method.
6. Estimation of Importance Value Index (IVI) of grassland ecosystem on the basis of relative frequency, relative density and relative abundance.
7. Determination of water holding capacity of different soils.
8. Study of meteorological instruments -Rain gauge, Hygrometer, Barometer.
9. Determination of percent leaf area injury of different infected leaf samples.
10. Estimation of salinity of different water samples.
11. Determination of pH of different soils by pH papers/universal indicator/pH meter.

Course Outcome: Gymnosperms and Utilization of Plants (Paper –XI)

- **CO1: Gymnosperms:** 1. Salient features, classification as per Sporne 1965, economic importance. 2. Geological time scale, fossilization, types of fossils, *Lyginopteris*, fossil fuels. 3. Contributions of Prof. Birbal Sahani. 4. Study of morphology, anatomy, reproduction (excluding developmental stages) and graphical representation of life cycle of the following types:a) Cycadales – *Cyca,* b) Coniferales – *Pinus,* c) Gnetales - *Gnetum*
- **CO2: Utilization of Plants:** 1. Domestication of plants and their centers of origin. 2. History, origin, cultivation, harvesting, improved varieties and economic importance of

the following plants: i. Food plants – Wheat, Jowar. ii. Sugar – Sugarcane. iii. Fibers - Cotton, Jute. iv. Vegetable oils – Groundnut, Sunflower. v. Beverages – Tea, Coffee. vi. Mushroom e. g. (Oyster) *Pleurotus*. 3. Botanical name, family name and economic importance of the following plants: *i.* Medicinal plants – Korphad, Aswagandha, Turmeric and Nirgudi. ii. Timber and Gum – Teak, Neem, Babul, Sisham. iii. Cosmetics and Perfumes – Rose, Mogara, Tuberose. iv. Spices – Clove, Black pepper, Cumin, Coriander, Cinnamon.

Course Outcome: Plant Physiology (Paper –XII)

- **CO1: 1. Plant water relations:** a) Diffusion, osmosis, plasmolysis and imbibition.b) Water absorption and ascent of sap (Transpiration pull theory). c) Transpiration – Definition, types -cuticular, lenticular and stomatal, structure of stomata, mechanism of opening and closing of stomata (starch – sugar hypothesis). **2. Mineral nutrition:** a) Macro and microelements: roles and deficiency symptoms of N, P, K, Mg, Ca, Fe, Zn, Bo, Mo. b) Mineral uptake – passive (ion exchange theory) and active (carrier concept) . **3. Translocation of solutes:** Mass flow hypothesis, protoplasmic streaming theory, Source and sink relationship.
- **CO2: 1**. **Enzymes:** Chemical nature holoenzyme , apoenzyme, prosthetic group, cofactor and coenzyme, properties , nomenclature, classification based on type of reactions, mechanism of enzyme action . **2. Growth**: Definition, Phases of Growth, Sigmoid growth curve. **3**.**Growth regulators**: Discovery, structure, roles and practical applications of Auxins, Gibberellins, Cytokinins, Abscisic acid and Ethylene.
- **CO3: 1. Photosynthesis:** Definition, ultrastructure of chloroplast, photosynthetic pigments, Light reactions -Hill reaction, red drop and Emerson enhancement effect, two pigment systems (PS I, PS II), photophosphorylation – cyclic and non cyclic, Z-scheme; Dark reactions -C3, C4 and CAM pathways. **2. Respiration:** Definition, Ultrastructure of mitochondria, types of respiration, Glycolysis, TCA Cycle, Electron transport system, alcoholic and lactic acid fermentation.

Course Outcome: Practical on Gymnosperms and Utilization of plants (Paper –XIII)

- **CO1: Gymnosperms:** ***a) Cycas-*** i. Habit, young leaf, bulbils, male cone, microsporophyll, megasporophyll, pollen grains, mature seed. ii. Study through permanent slides-Normal root (T.S.). Stem (T.S.), Ovule (L.S.). iii. Study through hand section-Coralloid root (T.S.), Rachis (T.S.), Leaflet (T.S.). ***b) Pinus-*** i. Habit, long and dwarf shoot, scale leaves, foliage leaves, male cone, female cone, pollen grains (W.M.), winged seed. ii. Study through hand sections and permanent slides Root (T.S.), Stem (T.S.), Needle (T.S.). iii. Study through permanent slide - T.L.S. & R.L.S. of stem, L.S. of male cone, L.S. of female cone. **c)** ***Gnetum-*** i) Habit, T. S. of Stem, Male cone and female cone.
- **CO2: Paleobotany:** a) Types of fossils (Specimens). b) *Lygynopteris* (Specimen / Permanent slide).
- **CO3: Utilization of plants:** a) Food plants – Study of the morphology, structure,and histochemical tests of food storing tissue in Jowar & Wheat. b) Histochemical test of lignin and cellulose. c) Cultivation of Oyster (*Pleurotus*) mushroom on agricultural waste. d) Vegetable oils – hand section of Groundnut & Sunflower Seed and staining of oil droplets by Sudan III. e) Study of the sources of Timber, Gum, Medicinal plants, Cosmotics and Perfumes. f) Study of Black pepper, Clove, Cinnamon, Cumin, Coriander.

Course Outcome: Practical on Plant Physiology (Paper –XIV)

1. Osmosis by egg membrane and potato osmoscope.
2. Plasmolysis in *Tradescantia* leaves.
3. Effect of different conc. of organic solvents on membrane permeability.
4. Determination of water potential of any tuber.
5. Detection of mineral elements in plant ash.
6. Digestion of starch by amylase.
7. Detection of enzyme activity : oxidase, peroxidase, catalase and dehydrogenase.
8. Separation of chloroplast pigments by paper chromatography.
9. Demonstration of Hill reaction.
10. Effect of different intensities of light on photosynthesis.
11. Effect of different colors of light on photosynthesis.
12. Fermentation by Kuhnes fermentation vessel.
13. Isolation of starch.
14. Isolation of pectin.
15. Estimation of total and reducing sugars in fruit juice by Fehling solution.
16. Separation of amino acids by paper chromatography.
17. Effect of IAA and Gibberellins on seed germination.

Course Outcome: Cell Biology & Molecular Biology (Paper –XV)

- **CO1:** 1. Cell: Structure of Prokaryotic cell (Bacterial cell) and Eukaryotic cell (plant cell) 2. Cell wall and cell organelles: Structure and functions of cell wall and Cell organelles – Golgi complex, Endoplasmic reticulum, Lysosomes 3. Nucleus:Ultra structure, (nuclear membrane, nucleolus, chromatin material,nucleoplasm), Functions of nucleus.
- **CO2:** 1. Cell division: a) Cell cycle -G1 phase, S phase, G2 phase and M phase b) Mitosis – definition, process and significance. c) Meiosis-definition, process and significance. 2. Nucleic acids: a. DNA: Definition, structure, chemical composition (nitrogenous bases, purines, pyrimidines, nucleosides, nucleotides, phosphate and sugars) Watson and Crick's model, Z - DNA, B - DNA, functions of DNA b. Replications of DNA – conservative, semi conservative and dispersive. c. RNA: Structure, types and functions.
- **CO3:** 1) Chromosome: morphology-size, shape, number, Ultra structure – chromatid, chromonema, chromomere, centromere, kinetochore, secondary constriction, satellite, telomere, heterochromatin, euchromatin, Nucleosome model (Woodlock 1973), chemical composition, Functions of chromosome, Giant chromosomes-polytene and lampbrush chromosome. 2) Chromosomal aberrations : a) Structural-deletion, duplication, inversion and translocation b) Numerical: – euploidy and aneuploidy.

Course Outcome: Plant Pathology (Paper –XVI)

- **CO1:** Fundamentals of plant pathology: 1. Plant pathology – history, scope, losses due to pathogens, importance and need to study plant pathology 2. Classification of plant diseases on the basis of symptoms and causal organisms – animate and inanimate 3. Plant pathological institutes – IARI (Indian Agricultural Research Institute), ICRISAT(International Crop Research Institute for Semi Arid Tropics) 4. Seed pathology – concept and importance of seed pathology, seed borne pathogens, methods to study

seed borne pathogens 5. Study of air borne pathogens: methods and applications 6. Field and laboratory diagnosis of plant disease - Koch's postulates.

- **CO2:** Plant diseases: Study of the following diseases with respect to symptoms, causal organism, disease cycle and disease management: 1) Cereals: a. Black stem rust of wheat b. Grain smut of jowar c. Ergot of bajra 2) Pulses: a. Wilt of pigeon pea b. Yellow vein mosaic of bean 3) Vegetables: a. Late blight of potato b. Little leaf of brinjal c. Black rot of onion (Aspergillus) 4) Oil seeds: a. Tikka disease of groundnut b. Damping off of mustard 5) Cash crops: a. Grassy shoot of sugarcane b. Downy mildew of grapes c. Angular leaf spot of cotton d. Citrus canker 6) Ornamentals: a. Powdery mildew of rose 7) Weeds: a. Rust of Euphorbia 8) Trees: a. Cercospora on Albizzia fruits.

Course Outcome: Practical Cell Biology & Molecular Biology (Paper –XVII)

- **CO1:** 1. Study of the cell structure from onion leaf or Tradescantia leaf. 2. Preparation of cytological (AA, FAA etc.) fixatives and stains (acetocarmine, aceto-orcein). 3. Study of electron micrographs of viruses, bacteria and cyanobacteria 4. Study of electron micrographs of eukaryotic cell and different cell organelles. 5. Preparation of slides for the study of mitosis (root tips of onion). 6. Preparation of slides for the study of meiosis (Rhoeo, Aloe or onion flower buds). 7. Preparation of idiogram from the given micrograph of karyotype. 8. Observation of giant chromosomes in Chironomous larvae 9. Preparation of wool models of mitosis, meiosis, cell structure, Chromosome, DNA and RNA.

Course Outcome: Practical Cell Biology & Molecular Biology (Paper –XVII)

- **CO1:**

1. Study of the cell structure from onion leaf or Tradescantia leaf
2. Preparation of cytological (AA, FAA etc.) fixatives and stains (acetocarmine, aceto-orcein).
3. Study of electron micrographs of viruses, bacteria and cyanobacteria
4. Study of electron micrographs of eukaryotic cell and different cell organelles
5. Preparation of slides for the study of mitosis (root tips of onion)
6. Preparation of slides for the study of meiosis (Rhoeo, Aloe or onion flower buds)
7. Preparation of idiogram from the given micrograph of karyotype
8. Observation of giant chromosomes in Chironomous larvae
9. Preparation of wool models of mitosis, meiosis, cell structure,
10. Chromosome, DNA and RNA.

Course Outcome: Practical Plant Pathology (Paper –XVIII)

- **CO1:** 1.Study of Koch's postulates – isolation, inoculation and disease development. 2.Study of the following diseases with respect to symptoms, causal organism, disease cycle and disease management 1) Cereals: a. Black stem rust of wheat b. Grain smut of jowar c. Ergot of bajra 2) Pulses: a. Wilt of pigeon pea b. Yellow vein mosaic of bean 3) Vegetables: a. Late blight of potato b. Little leaf of brinjal c. Black rot of onion (Aspergillus) 4) Oil seeds: a. Tikka disease of groundnut b. Damping off of mustard 5) Cash crops: a. Grassy shoot of sugarcane b. Downy mildew of grapes c. Angular leaf spot of cotton d. Citrus canker 6) Ornamentals: Powdery mildew of rose 7) Weeds: Rust of Euphorbia 8) Trees: Cercospora on Albizzia fruits.

Course Outcome: Genetics and Biotechnology (Paper –XIX)

- **CO1: -**1. Mendelism: i. -G.J. Mendel ii. Mendelian principles –Law of Dominance , law of segregation, law of independent assortment, back cross and test cross 2. Interaction of genes: i. Allelic interaction: incomplete dominance, co dominance, lethal genes and blood group inheritance ii. Non allelic and non epistatic -comb shapes in fowls iii. Non allelic and epistatic: a) Complementary genes or duplicate recessive epistasis (9:7) b) Supplementary genes or recessive epistasis (9:3:4) c) Dominant epistatic genes or dominant epistasis (12:3:1) d) Duplicate genes or duplicate dominant epistasis (15:1) 3. Sex determination: i. Chromosomal theory of sex determination ii. Mechanism of sex determination in man (xx -xy), Drosophila (xx and xy), birds (zz-zw), grasshopper (xx-xo) and genic balance theory in Drosophila iii. Sex determination in plants – Melandrium
- **CO2:** 1. Sex linked inheritance: X, XY and Y linked inheritance: i) Colourblindness and hemophilia in man ii) Holandric genes iii) White eye colour in Drosophila iv) Gynandromorphs 2. Structure and function of gene: i. Fine structure of gene (Seymour Benzer) ii. One gene one enzyme hypothesis iii. Genes and related diseases – phenylketonuria, and alkaptonuria iv. Detection of genetic diseases – amniocentesis Genetic counseling
- **CO3:** Biotechnology: 1. Concept of genetic engineering and recombinant DNA technology 2. Restriction endonucleases, their properties and uses 3. Cloning vectors - plasmids and phage vectors 4. Techniques of genetic engineering -isolation of desired gene, gene cloning, transfer of gene into plants 5. Applications of genetic engineering.

Course Outcome: Microbiology and Disease Management (Paper –XX)

- **CO1:** 1. Microbiology Microorganisms in biological world, their classification and features of different groups 2. Microbial techniques: a. Microscopy – simple, compound and electron microscope b. Micrometry – Principle, working and uses c. Staining – common stains used in pathology, their preparation and significance, (cotton blue and Gram's Stain) d. Sterilization of glass wares and media 3. Culture media for isolating plant pathogen Industrial application of microorganisms - organic acids, alcohol, milk products, antibiotics and bio pesticides
- **CO2:** Disease management: 1. Preventive methods: field sanitation, use of clean planting material, crop rotation, trap crops, time of sowing, planting distance and tillage 2. Control methods –a. Seed treatment: concept, objective, traditional and modern methods of seed treatment b. Soil sterilization: concept, objectives and methods c. Fungicides: Definition, classification and ideal characteristics of fungicides, study of fungicides with respect to active ingredients, formulations, methods of application, mode of action and uses i. Sulphur fungicides – Inorganic – Wettable sulphur, Organic – Thirum ii. Copper fungicides iii. Mercuric chloride – Agrosan – GN iv. Heterocyclic nitrogenous compounds – Captan v. Benzene compounds – Dexon vi. Antibiotics – Streptomycin and Aureofungin vii. Systemic – Bavistin and Vitavax d. Pesticides: Nicotin,Neem and pyrethrum e. Rhodenticides – Zinc phosphoid f. Nematicides- Nemagon, Propoxar g Weedicides- 2,4-D h. Biological control- definition, need, examples and role Plant quarantine 3. Control measures and environment: pollution due to chemicals, residual effects, toxicity, safe measures, colour code, antidote, symptoms of poisoning,

precautions in using pesticides 4. Pesticide application equipments: principle and working -pneumatic air pump knapsack sprayer, mist blower and duster, types of nozzles 5. Plant clinic: Concept, objective and need 6. Recent techniques in plant pathology: Genetically modified organisms (GMO's), B. T. Cotton, Pheromones.

Course Outcome: Practical Genetics and Biotechnology (Paper –XXI)

1. Quiz
2. Working out laws of inheritance by using seed mixtures
3. Problems based on gene interaction
4. Problems based on sex linked inheritance

Course Outcome: Practical Microbiology and Disease Management (Paper –XXII)

1. Study of fungicides as per theory syllabus
2. Preparation of Bordeaux mixture, burgundy mixture and Bordeaux paste
3. Study of insecticides with respect to active ingredient, colour code, formulation, mode of action, antidote and uses
4. Study of Trichoderma culture
5. Study of plant protection equipments -pneumatic air pump, knapsack sprayer, mist blower cum duster
6. Principle and working of autoclave, laminar air flow, Tilak air sampler
7. Use of aerobiological techniques to study fungal spora (gravity slide method, Tilak air sampler)
8. Calibration of microscope and measurement of fungal spores
9. Sketching of fungal spore by camera lucida technique
10. Detection of organic acids from healthy and infected leaves by circular paper chromatography
11. Detection of Amino acids from healthy and infected leaves by circular paper chromatography
12. Study of pathogens in fruits from local market
13. Study of fungi from locally available seed samples
14. Preparation of sterile media - nutrient agar, potato dextrose agar
15. Preparation of stains and mounting media - cotton blue, lacto phenol and gram stain

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Department of Zoology

Programme Outcomes (PO)

On Completion of the course students will be able to

- **PO-1.** Demonstrate, solve and an understanding of major concepts in all disciplines of Zoology.
- **PO-2.** Solve the problem and also think methodically, independently and draw a logical conclusion.
- **PO-3.** Understand the evolution, history of phylum.
- **PO-4.** Create an awareness of the impact of Zoology on the environment, society, and development outside the scientific community.
- **PO-5.** Study and understand the classification of whole phyla includes in Non chordates with the help of charts/models/pictures.
- **PO-6.** To inculcate the scientific temperament in the students and outside the scientific community.
- **PO-7.** Use modern techniques, decent equipments and Zoology softwares

Programme Specific Outcomes (PSO)

On Completion of the course students will be able to

- **PSO-1.** Gain the knowledge of Zoology through theory and practicals.
- **PSO-2**. Study and understand the DNA Recombinant technology.
- **PSO-3.** Understand the testing of hypothesis.
- **PSO-4**. Use modern Zoological tools, Models, Charts and Equipments.
- **PSO-5**. Know structure-activity relationship.
- **PSO-6.** Understand good laboratory practices and safety.
- **PSO-7.** Develop research oriented skills.
- **PSO-8.**Make aware and handle the sophisticated instruments/equipments.
- **PSO-9.** Study the range from diversity to Molecular Biology
- **PSO-10.** Serve as a valuable foundation for understanding human anatomy, physiology, genetics, molecular biology and entomology.
- **PSO-11.** Study application of Zoology for benefit of mankind.

Course Outcome (CO)

On Completion of the course students will be able to

Course Outcome: PROTOZOA TO ANNELIDA (Paper –I)

- **CO1: A**nimal kingdom, Outline classification Protozoa, Parazoa, Metazoa and Major Phyla.
- **CO2:** Protozoa : - General characters *Plasmodium vivax*: - Structure of sporozoite, Life cycle; pathogenecity, Control, Prevention and Treatment of Malaria. *Entamoeba*

histolytica: Structure, Life cycle and Control. *Euglena*: Morphology and Reproduction. *Paramicium*: Morphology and Reproduction

- **CO3:** Porifera : - General characters Sycon (Scypha): - Morphology, Different types of cells in sycon, canal system in Porifera.
- **CO4:** Coelenterata: - General characters Obelia: - Morphology of Obelia colony, Development of Hydra, Polymorphism in coelenterates.
- **CO5:** Helminths : - General characters Fasciola hepatica: - Structure, Life cycle, Pathogenecity & Control Measures Taenia solium: - Structure of scolex, Mature and gravid proglottids, Life cycle, pathogenecity, and control measures. Ascaris lumbricoides: - Structure of male & female, Life cycle, Pathogenecity & control measures.
- **CO6:** Annelida: - General characters Leech: - Morphology, Digestive, Excretory & Reproductive systems.

Course Outcome: CELL BIOLOGY (Paper –II)

- **CO1:** General structure of cell. Structure of prokaryotic cell. Ultra structure of eukaryotic cell. Cell Cycle, Mitosis, Meiosis
- **CO2:** Organization of cell A) Study of Various cell organelles Plasma Membrane: - Structure and function. Endoplasmic reticulum: - Structure and function. Golgi Bodies: - Structure and function Mitochondria: - Morphology, Ultra-Structure, function and biogenesis. Nucleus: - Structure and function. DNA Structure. Types of RNA Lysosome: - Structure, function and polymorphism Ribosome: - Structure and function B) Cytology of Cancer, Types of Cancer.
- **CO3:** Methods in Cell Biology (in brief) A) Light Microscope Phase contrast microscope Electron microscope B) Micro techniques, (Microtomy) Fixation & Staining.

Course Outcome: Practical (Paper –III)

1. Study of slides from Ciliates, Opalinates, and Flagellates(any five)
2. Study of museum specimen and slides from Porifera to Annelida. (Three from each phyla)
3. Dissection: Dissection of Leech for Digestive, Excretory & Reproductive systems. Dissection of Earthworm for Nervous System & Reproductive system
4. Mounting of any five of the following. Sponge spicules, Gemmule, Obelia colony, Jaws of Leech. Spermatica, testes nerve ring of Earthworm, Parapodia of Nereis.
5. Study of cell organelles by using Models, Charts, Slides & Electron micrographs.
6. Squash preparation of Onion root tip to study Mitosis.
7. Preparation of polytene chromosome in chironomous larva/fruit flies.
8. Microtechnique: - Fixation, dehydration, Block preparation,
9. Microtomy and Staining of Rat tissue.
10. Study of Microscopy: - Simple, Compound, & Phase Contrast Microscope

Course Outcome: ARTHROPODA TO ECHINODERMATA AND PROTOCHORDATA (Paper –IV)

- **CO1:** Arthropoda: - General characters Prawn: - Structure, Digestive, Nervous, & Reproductive systems. Cockroach: External Characters, Digestive, Respiratory and Reproductive systems.
- **CO**2: Mollusca: - General characters Pila: - External Characters, Respiratory, Circulatory, Nervous and Reproductive systems
- **CO3:** Echinodermata : - General characters Asterias (Sea Star): - Morphology of oral & aboral view, Water vascular system, Reproductive system including development.
- **CO4:** General characters and Classification of Protochordata Amphioxus: - External features, Digestive, Circulatory, Reproductive systems including development. Hemichordata: - General characters and affinities Herdmania: - General characters and morphology

Course Outcome: Genetics-I (Paper –V)

- **CO1:** Elements of heredity & variation Mendel's laws of heredity in short
- **CO2:** Gene interaction modifications in Mendelian phenotypic ratio like, Epitasis Supplementary gene Complementary gene
- **CO3:** Multiple Alleles Coat Colour in rabbit. ABO Blood group in man, Rh factor
- **CO4:** Cytoplasmic inheritance.Definition of maternal effect. Coiling shell in snail *(Limnea peregra*) Male sterility. CO2 sensitivity in *Drosophila.* Kappa particles in *Paramecia.*
- **CO5:** Sex Determination Chromosome theory in sex determination Genic balance theory of sex determination Triploid intersexes and Gynandromorphs in *Drosophila.* Sex linked inheritance: X linked and Y linked
- **CO6:** Mutation Brief introduction Gene mutation: - Definition and classification Chromosomal aberration (structural & numerical) Spontaneous & induced mutation

Course Outcome: Practical (Paper –VI)

- **CO1:** Study of museum specimen & slides of relevant Invertebrates & Protochordata.
- **CO2:** Dissections: Dissection of Prawn for Nervous system, Dissection of Cockroach for Digestive and Nervous Systems. Dissection of Pila for Nervous system. Dissection of Sea Star for Water Vascular System.
- **CO3:** Mounting of any five of the following. Mouthparts of Cockroach, Mosquito, House fly, Bed bug and Honeybee. Salivary glands of cockroach. Redula of Pila, Pedicillaria of Star fish.
- **CO4:.** Culture of Drosophila- experimental organism in genetics Observation of common mutants of drosophila
- **CO5:.** Determination of human blood groups A, B, AB, and O, Rh factor.
- **CO6:** Major and minor problems in genetics

Course Outcome: VERTEBRATE ZOOLOGY (Paper –VII)

- **CO1:** Agnatha:- Out line classification, general characters and affinities of Cyclostomata
- **CO2:** Pisces : - Out line classification and general characters. *Scoliodon*: - External characters, Digestive system, Respiratory system, Blood Vascular System and Nervous System.

- **CO3:** Amphibia: - Out line classification and general characters. Development of frog: - Fertilization Cleavage Blastula Gastulation and formation of germinal layers. Neotony in Amphibia Parental care in amphibia.
- **CO4:** Reptilia: - Out line classification and general characters. *Calotes*:-External features, Respiratory system and Blood vascular system. Poisonous and non- poisonous snakes.
- **CO5:** Aves: - Out line classification and general characters. *Columba livia*: - External features, Respiratory system, Embryology of chick.-Cleavage Blastula Gastulation and formation of germinal layers and extra embryonic membranes. Flight adaptation in birds. Migration in Birds.
- **CO6:** Mammalia: - Out line classification and general characters. *Ratus ratus:* - External features, Blood Vascular System, Urino-genital System and Adaptive radiation in mammals. Placentation in Mammals.

Course Outcome: GENETICS – II (Paper –VIII)

- **CO1:** Genes and its expression :- concept and function of gene. Transcription of gene: - Initiation, elongation and termination. Genetic code:- Concept of codon, properties of genetic code Translation of gene: - Initiation, elongation and termination.
- **CO2:** Population Genetics :- Gene Pool., Gene Frequency. Herdy-weinberg's Law. Application of Herdy-weinberg's Law.
- **CO3:** Human Genetics: - Human chromosomes. Sex linked inheritance- X and Y Linked. Dizygotic and monozygotic twins. Inborn errors in metabolism: - PKU, Albinism. Genetic disorders:- Down's syndrome, Turners' syndrome, Klinefelter's syndrome. Use of human genetics in medical science: - Disease diagnosis Gene therapy and DNA finger printing.
- **CO4:** Microbial Genetics: - Transformation. Conjugation. Transduction.
- **CO5:** Genetic Engineering: - Concept and significance. Restriction enzymes: - Concept and types. Cloning vectors: - Plasmid, cosmid, phase. Construction of r-DNA. Application of r-DNA technology.

Course Outcome: Practical -VERTEBRATE ZOOLOGY (Paper –IX)

- **CO1: 1.** Museum study of vertebrates. 2. Dissection of Scoliodon / Labeo Afferent and efferent, Cranial Nerves. Brain 3. Dissection of Rat/ Frog ; Urinogenital system, Arterial system, Venous System, Brain of Rat.
- **CO2:** Mounting of Placoid, Cycloid and Ctenoid scales of fish
- **CO3:** Study of Embryological development of chick according to hours of incubation.
- **CO4:** Visit to Zoological museum/Zoo Park is compulsory and Submission of report
- **CO5:** Write a report on common birds/mammals in your locality, scientific names and economic importance.

Course Outcome: Practical - GENETICS – II (Paper –X)

- **CO1: 1.** Preparation of paper model of DNA and study of DNA structure 2. Study of protein synthesis with the help of charts/models. 3. Estimation of DNA from animal tissue with the help of Diphenyl amine method. 4. Study of preparation of Normal Karyotype of human.

- **CO2:** Karyotypic study of Down's syndrome, Turner's syndrome, Klinefelter's syndrome with the help of photograph.
- **CO3:** Detection of Barr body from epithelial cell. Problems on sex linked inheritance.
- **CO4:** Problems based on Hardy – Weinberg's law.
- **CO5:** Study of gene frequency and mutants of man; Attached and free ear lobe. Colour of eye. Rolling of tongue. Blood group frequency.

Course Outcome: ANIMAL PHYSIOLOGY (Special Emphasis on Mammals) (Paper – XI)

- **CO1:** Digestion :- Brief Introduction to digestive system. Buccal digestion - salivary secretion and digestion. Gastric digestion - gastric secretion and digestion. Intestinal digestion - Pancreatic secretion, bile juices and digestion in Small intestine, digestion and absorption in large intestine.
- **CO2:** Respiration :- Respiratory organs. Breathing mechanism. Respiratory pigments: - Properties and function of respiratory pigments. External respiration. Internal respiration. Transport of gases.
- **CO3:** Circulation :- Working of mammalian heart. Blood and its composition. Mechanism of blood clotting.
- **CO4:** Excretion :- Structure of kidney. Structure of uriniferous tubules. Urine formation: - Ultra filtration selective, re-absorption and tubular secretion. Counter current multiplier system.
- **CO5:** Nerve Physiology :- Structure of nerve cells and neuron. Neurotransmitters. Synapses: - Ultra structure and function.
- **CO6:** Muscles Physiology :- Ultra structure of smooth muscle, striated muscles, and cardiac muscles. Muscle contraction. Simple twitch and fatigue
- **CO7:** Reproduction :- Structure of gonads, Gametogenesis. Role of sex hormones in Reproduction. Reproductive cycles – oestrous and menstrual cycle.

Course Outcome: BIOCHEMISTRY AND ENDOCRINOLOGY (Paper –XII)

- **CO1:** A-BIOCHEMISTRY - 1. Enzymes :- concept and nomenclature, Properties, classification, Mechanism of enzyme action, Factors affecting enzyme action (Temperature, pH, Substrates & Co-enzyme.). 2. Carbohydrates :- Classification, monosaccharide, disaccharides, oligosaccharides and polysaccharides. Metabolism: - Glucogenesis, Gluconeogenesis, Glycolysis, TCA. & oxidative phosphoration. 3. Proteins :- Definition , classification -simple , conjugated and derived proteins, Structure of proteins: - Primary, secondary, tertiary and quartery. Metabolism: - Deamination and transamination. 4. Lipids: classification, simple, compound and derived lipids. Metabolism: - β oxidation and cholesterol biosynthesis . 5. Vitamins: - Sources and deficiency
- **CO2:** B- ENDOCRINOLOGY- 1. Endocrine system of vertebrates: - Paracrine and Autocrine system. Significance of endocrine and neuro - endocrine system. 2. Pituitary gland: - Morphology & histological structure, Hormones and their function. 3. Thyroid gland: - Morphology & histological structure, Hormones and their function. 4. Adrenal gland: - Morphology & histological structure, Hormones and their function. 5. Pancreas: - Islets of langarhance- Histological structure Hormones and their function.

Course Outcome: Practical on ANIMAL PHYSIOLOGY (Paper –XIII)

1. Study the digestive enzymes from cockroach/Human Saliva.
2. Total count of RBC /WBC from given blood sample.
3. Preparation of Heamatin crystals from blood sample.
4. Hb% from given blood sample.
5. Effect of isotonic, hypotonic, and hypertonic solutions on blood cell (RBCs)
6. Detection of nitrogenous west product from the extract of different animals
7. Detection of nitrogenous west product in fish/frog water tank.
8. Estimation of O2 consumed by fish in relation to temperature by Wrinkle's method.
9. Typographic reading of skeletal muscle properties , heart beating in
10. Toad / Rat. (Demo only)
11. Histological study of following. T.S. of Kidney, T.S. of Testis, T.S. of Ovaries, T.S. of Pancreas, T.S. of Intestine

Course Outcome: Practical on BIOCHEMISTRY AND ENDOCRINOLOGY (Paper – XIV)

- **CO1:** Preparation of solutions of given percentage, normality and molarity.
- **CO**2. Study of analytical instrument principle and applications. pH meter, Colorimeter, Centrifuge Electrophoresis
- **CO**3. Factors affecting enzymes activity temperature and pH.
- **CO**4. Detection of amino acid by paper chromatography.
- **CO**5. Qualitative test for organic compound. Carbohydrate. Protein. Fats.
- **CO6.** Quantitative estimation of protein from animal tissue using Lawry's method.
- **CO**7. Study of permanent histological slides of endocrine glands. T.S. of Pituitary gland, T.S. of Thyroid gland, T.S. of Adrenal Gland, T.S. of Islets of langarhance. T.S. of Testis T.S. of Ovaries.

Course Outcome: ECOLOGY (Paper –XV)

1. Introduction : 02
   - Definition, basic concept, terminology used in ecology.

2. Abiotic environmental factors. 08
   - Temperature; Concept, temperature fluctuation in different environment. Range of temperature tolerance, effect of temperature on animals. Thermal adaptation.
   - Light-Concept Light variation in different environment, effect of light on animals.
   - Adaptation to salinity and moisture

3. Biotic environmental factors :- 08
   - Competition: - Definition, types, intraspecific and interspecific composition.
   - Predation: - Definition, characteristics of predation.
   - Commensalisms: - Definition and types with examples.
   - Mutualism: - Definition and example.
   - Parasitism: - Definition and types with examples.

4. Population :- 06
   - Definition and basic concepts
   - Characteristics of population; Density, Natality, Mortality, Dispersion and Age distribution.
   - Population growth.
   - Population regulation.

5. Community :- 06
   - Definition, basic concept and types.
   - Structure of community; producer, consumers and decomposers.
   - Characters; ecological niche, diversity, abundance, dominance, ecotone, edge effect.
   - Community succession; example of succession and climax

6. Ecosystem :- 15
   - Definition, concept and types.
   - Components of ecosystem,
   - Dynamics of ecosystem: - primary production, secondary production, food chain, food web, tropic level, energy of flow, ecological pyramids.
   - Brief introduction to major ecosystems: - Marine ecosystem, Pond ecosystem, Forest ecosystem and Desert ecosystem.

Course Outcome: Fishery Science - I (Paper –XVI)

1. Introduction
   Definition and history
   General characters and classification
   Concept of blue revolution
   Importance of fishes.

2. Freshwater fisheries.
   Status of freshwater fisheries, past, present and future
   Freshwater capture fisheries, cat fishes, rout.
   Effect of aquatic pollution on fisheries.

3. Reverine and reservoir fisheries.
   Major river systems of India
   Important fisheries of Indian rivers system
   Major reservoirs of Maharashtra
   Reservoir fisheries and its management.
   Exploitation of reservoir fisheries

4. Brackish water fisheries
   Principle fisheries of brackish water, milkfish, mullet, tilapia.
   Fisheries of the chilka, pulicat and Kolleru Lake

5. Marine water fisheries.
   Oil sardine
   Mackeral
   Ribbon fish fisheries.
   Bombay-duck
   Pomfret-fishery

6. Application of remote sensing technique in pelagic fisheries.

Course Outcome: PRACTICAL ON ECOLOGY (Paper –XVII)

1. Estimation of productivity of pond ecosystem using white and dark bottle method. **02**

2. Determine the following parameters of soil. **04**
   - pH
   - Alkalinity
   - Chlorinity
   - Salinity
   -

3. Analysis of DO, CO_2, Salinity, Chlorinity of water sample. **04**

4. Study of animal association ship with example (Charts/photo) -Competition, mutualism, parasitism, predation and commensalisms. **01**

5. Estimation of population density by Quadrats method on field and by Simulation method. **04**

6. Preparation of permanent slides of following
   Spirogyra, Verticella, Odogonium, Daphnia, Cyclops, Mysis, Cypris, keratella

7. Project report: - Forest or freshwater ecosystem.

Course Outcome: PRACTICAL (Paper –XVIII)

FISHERY SCIENCE – I (PRACTICAL)
(Elective Paper)

1.	Study of freshwater fishes. Major carps Other carps. Cat fishes Clupoides	03
2.	Study of brackish water fishes. *Hilsa hilsa, Chanos chanos (milkfish), Lates calcarifer, Tilapia*	02
3.	Study of marine ware fishes Oil sardine Mackerel Ribbon -fish Bombay-duck Pomfret Sole Polynemus	03
4.	Water analysis	05
5.	Visit to local or any reservoir and marine fish landing centre and student should be submit a project report at the time of practical examination	02

Course Outcome: Evolution (Paper –XIX)

1. Concept of organic evolution :- **06**
   - Definition and concept.
   - Theories of organic evolution in brief; Preformation theory, Bear's Law, Biogenetic law, catastrophism, Lamarckism, Darwinism and Germplasm theory.
2. Origin of Life :- **03**
   - Definition, Abiogenesis, Biogenesis.
   - Chemical evolution of life.
3. Evidences of Organic Evolution :- **04**
   - Anatomical evidences.
   - Embryological evidences.
4. Darwinism :- **05**
   - Introduction :- Natural selection theory.
   - Artificial selection theory and sexual selection theory.
5. Elemental forces of evolution :- **07**
   - Mutation: - Concept and role in evolution.
   - Recombination: - Concept and role in evolution.
   - Natural selection: - Concept and role in evolution.
   - Isolation: - Concept and role in evolution.
   - Genetic Drift. : - Concept and role in evolution.
6. Basic patterns of evolution :- **09**
   - Sequential and divergent evolution.
   - Microevolution: - Concept, silent features and mechanism with example.
   - Macro evolution: - Concept, silent features and mechanism with example.
   - Mega evolution: - Concept, silent features and mechanism with example.
7. Species and speciation:- **07**
   - Species: - Morphological concept, Genetical concept, biological concept of species
   - Speciation: - Definition, concept, mechanism of speciation.
   - Allopatric, Sympatric and Parapatric speciation.
8. Fossils :- **04**
   - Definition , fossil formation
   - Types of fossils.

Course Outcome: Fishery Science - II (Paper –XX)

FISH CULTURE AND FISH TECHNOLOGY

A. fish culture

1.	Introduction a) Types of freshwater ponds-perennial and seasonal. b) Different types of ponds-nursary, rearing and stoking ponds. c) Design, contruction and maintenance of nursery, rearing and stocking ponds d) Productivity of ponds e) principles of fish collection f) Fish culture methods g) Culture – cat fisheries h) Sewage fed fisheries	15
2.	Fish crop production (fish diseases) Protozoan, fungal, bacterial, viral worms diseases	06
3.	Breeding of fishes a) Natural spawning of carps c) Artificial breeding by hypophysation d) Common carp breeding	08

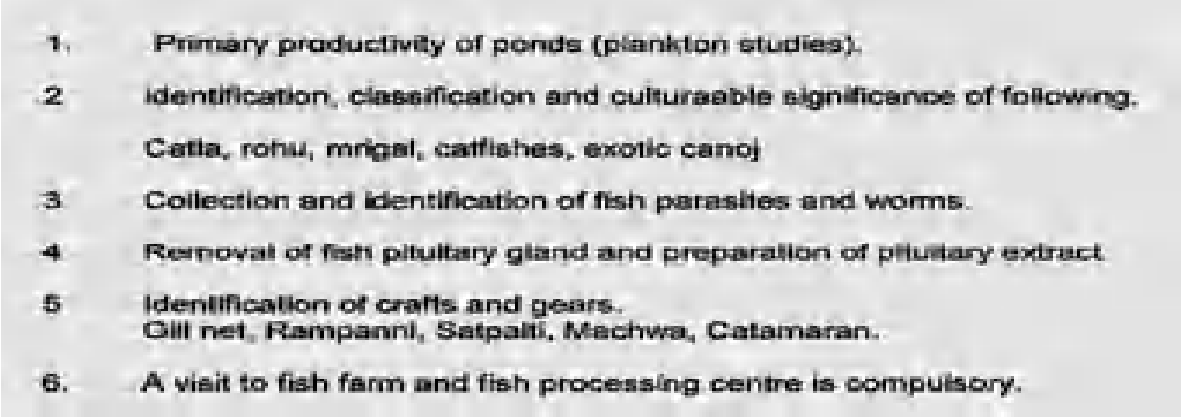
B. fish technology

4.	Fish preservation and processing a) Fish processing methods b) Fish –spoilage c) Value added products d) Sanitation and HACCP	08
5.	Crafts and gears a) Different types of gears b) Different types of crafts c) Preservation of gears	08

Course Outcome: Practical on Evolution (Paper –XXI)

1. Embryological evidences of evolution with the help of slide/chart/pictures.
2. Adaptive modification in teeth of birds and mouth parts of insects
3. Study of successive stages of evolution with the help of models/charts
   - Horse
   - Human
4. Discuss on on patterns of speciation with the help of charts /pictures.
   - Allopatric speciation
   - Sympatric speciation.
5. Study the homologous and analogous organs.
6. Study of natural selection using *E.coli* bacteria against antibiotics (Tetramycin/ Penicillin)
7. Study of geographical era.

Course Outcome: Practical on Fishery Science - II (Paper –XXII)



1. Primary productivity of ponds (plankton studies).
2. Identification, classification and culturaeble significance of following.
   Catla, rohu, mrigal, catfishes, exotic carp
3. Collection and identification of fish parasites and worms.
4. Removal of fish pituitary gland and preparation of pituitary extract.
5. Identification of crafts and gears.
   Gill net, Rampanni, Satpalli, Machwa, Catamaran.
6. A visit to fish farm and fish processing centre is compulsory.

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Department of Fishery Science

Programme Outcomes (PO)

On Completion of the course students will be able to

- **PO 1- P**erfect in Induced breeding technique by hypophysation.
- **PO 2- E**asily identify Fresh Fish and Spoiled Fish.
- **PO 3**- Know layout of fish farm.
- **PO4**- Know the setting and maintenance of aquarium fishes.
- **PO5**- Acquire knowledge about fishing& make profit in fish market.

Programme Specific Outcomes (PSO)

- **PSO1-** Acquire skill to identify and classify different fishes i.e. student should have the detail knowledge of taxonomy of fishes.
- **PSO2-** Student should know all the medicinal use of fishes.
- **PSO3-** Student should know the technique of integrated fish farming (Fish culture with livestock & Paddy cum Fish culture).
- **PSO4**-Student should know about aquaculture and the history of Fish culture.
- **PSO5**-Be familiar with host (fish) pathogen relationship in order to study the life cycle of various fish diseases.

Course Outcome: Morphology and Taxonomy (Paper –I)

- **CO1:** 1) External character of Fishes. 2) Fins and Locomotion: Fins and locomotion, Types of locomotion, speed of travels. 3) Median and Paired fins: Types of caudal fins, pectoral and pelvic fins and their origin, gill arch theory and fin fold theory.

- **CO2:** 1) Epidermis and Exo-skeleton: Structure and functions of the skin, types of scales and their functions. 2) Origin and Evolution of fishes: Introduction, origin of cartilaginous and bony fishes, Evolution of fishes. 3) General Characters, Identification and systematic position of fishes among chordates.
- **CO3:** 1) Broad outline of classification of fishes : Introduction, Classification (Berg, Romer Berlin and Aram Bourg, Green Wood et al. Oul lander and line and plough et. al) 2) Cyclostomes : Petromyzontia, Mysxinodea, Lampreys and Hag Fishes. Affinities of cyclostomes. 3) Elasmobranches: General Characters of sharks and rays. Holocephali :- Salient Feature and its affinities. Dipnoi : General Characters and Affinities Teleostomes :- Characteristic Features up to major orders.

Course Outcome: Anatomy and Physiology (Paper –II)

- **CO1:** 1) Axial Skeleton 2) Visceral and appendicular skeleton. 3) Alimentary canal and associated digestive glands, physiology and digestion.
- **CO2:** 1) Structure and function of gill, Physiology of respiration, accessory respiratory organs. 2) Structure and function of heart, Arterial and Venous system, Blood and its components. 3) Structure and its function of Kidney osmoregulation.
- **CO3:** 1)Male and Female Reproductive Organs, Maturation and spawning. 2) Structure of Brain, Cranial Nerves and Spinal Nerves. **3)Endocrine glands in Fishes :** Structure and function of Pituitary gland and Thyroid gland.

Course Outcome: Practical (Paper –III)

- **CO1: Identification and Classification of fishes** a) Holocephali – (Two from each class). b) Dipnoi – (Two from each class). c) Elasmobranchs –(Two from each class). d) Teleosts – (Two from each class).
- **CO2: Median and Paired fins – Different types of caudal fin.**
- **CO3: Temporary and permanent mounting of scales.**
- **CO4: Dissection :** (Any locally available bony fish) a) Digestive system. b) Respiratory system. Gills and accessory respiratory organs. c) Heart, Afferent and Efferent Branchial Vessels. d) Brain, Cranial nerves. e) Male and Female Reproductive System.
- **CO5: Histology :-** 1) T.S. of Stomach 2) T.S. of Intestine 3) T.S. of Liver 4) T.S. of Kidney 5) T.S. of Ovary 6) T.S. of Testis 7) T.S. of Pituitary glands.

Course Outcome: Fish Ecology and Adaptation (Paper –IV)

- **CO1: 1) Introduction of Ecology** – · Primary Productivity of water mass and fish production. · Tropic levels of Fish in food chain. · Pyramid of numbers. · Predator – Prey relationship. **2) Ecology of fresh water:-** Ecology of managed fish farm, Ponds, Rivers, Streams, Reservoirs and Lakes. **3) Ecology of Brackish and Marine Water.**

- **CO2: 1) Water Pollution :-** Introduction, Causes of Pollution, Type of Pollution, Effect of pollutants on fishes, preservation and control of water pollution. **2) Migration of Fishes :- 3) Adaptations of Fishes to Environment –** a) Density and pressure of the water. b) Salinity. c) Temperature. d) Salt Content. e) Gases in Solution. f) Light. g) pH.
- **CO3:** 1) Adaptation in the Hill stream fishes. 2) Adaptation in Deep Sea fishes. 3) Adaptation in Exotic Fishes.

Course Outcome: Fish Pathology and Parasitology (Paper –VI)

- **CO1:** 1) Introduction. 2) Inflammation and immune response and pathological changes in tissues. 3) Sings of sickness and effect on fish and mode of contractions of infection.
- **CO2:** Nutritional diseases and elements from environmental factors. 1) Disease caused by parasites and pathogens and its control measures. 2) Fungal Diseases, Bacterial Diseases.
- **CO3:** 1) Protozoan Diseases. 2) Worm Diseases. 3) Crustacean Diseases**.**

Course Outcome: Practical (Paper –VI)

- **CO1: Identification of Fishes From Different Habitat.** a) Fresh water habitat – b) Brackish water habitat – c) Marine water habitat –
- **CO2: Identification of Fishes with special reference to the Adaptive characters of the following.** Exocoetus, Hippocampus, Echienus, Pristis, Hemirampus, Zygaena, Trygon, Cynoglossus, Diadon, Tetradon, Ostracian, Lophius.
- **CO3: Water Analysis :-** Estimation of O_2, CO_2, pH and Alkalinity.
- **CO4:** Identification and Collection of Endo and Ectoparasites of fishes.

Course Outcome: Capture Fisheries (Paper –VII)

- **CO1: 1) Inland Fisheries resources of India -**Riverine Fisheries – The Ganga river system, Brahmaputra river system, East coast river system. West coast river system. Reservoir fisheries. Cold water fisheries **2) Estuarine fisheries resources of India.** Principle fisheries of brackish water. Fisheries of Chilka, Pulicat and Kolleru Lake.
- **CO2: 1) Marine capture fisheries resources of India-**Commercially important fisheries in India (Taxonomy; distribution, food and feeding ,methods of catching and Catch trends of the following fisheries Oil Sardine fishery Mackerel fishery Bombay duck fishery Pomfret fishery Sole fishery Hilsa fishery.
- **CO3: 1) Fisheries of Non fish organisms.** Prawn and Shrimp capture fishery Crab capture fishery Molluscan fisheries Chank fisheries.

Course Outcome: Culture Fisheries- I (Paper –VIII)

- **CO1: 1) Introduction and history of aquaculture 2) Purpose, importance and advantages of aquaculture 3) Fresh water fish culture** Planning, layout and construction of fish farm Procurement of fish seed by induced breeding Technique and hatcheries (Happa, Chinese hatchery, CIFE D- 80 and D-86 model) Characteristics of cultivable species (major carps And Exotic carps)
- **CO2: 1) Preparation and management of nursery,** Rearing and stocking ponds, Predatory and weed fishes and their control, Fertilization of the pond Aquatic weeds and their control, Fish food organisms and their production Stocking, artificial feeding and harvesting **2) Brackish water fish culture** Construction and management of brackish water, Fish farm, Bhasa- Bhada and Non – Gheri farms. Milk fish, Mullet and Tilapia culture.
- **CO3: Culture of Air Breathing fishes.**

Course Outcome: Practical (Paper –IX)

- **Co1: 1) Study of Inland Capture Fishes** a) Other carps b) Cat fishes c) Clupeids d) Other miscellaneous fishes
- **Co2: Study of Marine and brackish water Fishes** *Rastrelliger kanagurta, Sardinella. Longiceps, Harpodon nehereus, Pampus – Argenteas, Cynilossus spp. Trichurus sp. Polynemous sp.Chonos, Mugil corsula,Hilsa ilisha*
- **Co3: Study of Non Fish organisms.** Prawns, Lobsters, Crabs, Shrimps, Edible oyster, Chank, Sea weed (Gracillaria, Sargassum, Digenia)
- **Co4: Collection of fish species from different areas.**

Course Outcome: Practical (Paper –X)

- **CO1: 1) Identification, Classification and Culturable Significance of the following** *a)* **Fresh water fishes-** *Catla catla,Labeo rohita, Cirrhina mrigala Cyprinus carpio, Channa Sp. Notopterus Sp., Clarius batrachus, Heteropheustes Fossilis.* **b) Brackish Water Fishes –** *Tilapia mossambica, Mugli cephalus, Chanos chanos.* **c) Non Fish organisms** –i) Prawns – Macrobrachium rosenbergii And Penaeus sp. ii) Lobsters iii) Mussels – Mytilus Sp.
- **CO2: Identification and Mounting of plankton** – i) Phytoplankton ii) Zooplankton **3) Identification of Aquatic insects –** Dragonfly (Nymph), Anisop, Ranatra, Balostoma, Dytiscus
- **CO4: Plankton slides and collection of Fish species, fish food and fertilizers.**

Course Outcome: Fish Technology and Population Dynamics (Paper –XI)

- **CO1: 1) Fishing Craft** a)Catamaran b) Satpati c) Musula d) Machwa e) Tuticorin **2) Fishing Gears** A) a) Spear and harpoon b) Fish poison c) Hook and linesd) Fish traps e) Types of nets- Dip net or lift net, Cast net, Purse Seine net, Trawl or Drag net and Bag net. **B) Preservation of Gears**
- **CO2: 1) Preservation and Processing of fish** Methods of Fish Preservation – Chilling, Freezing, Freeze drying, sun-drying, smoking, Salting, brining and canning; use of

chemical and Radiation. **2) Fish Population** Structure of population Estimation of fish population (Direct / Indirect methods) Population dynamics (fluctuation)

- **CO3: 1) Different stages of wooden boat – construction** Lofting, setting up the back bone assembly, Temple fixation, planking, farming, Deck laying, Mechanical and electrical installations. **2) Care and maintenance of boats**

Course Outcome: Culture Fisheries – II and Aquarium Management (Paper –XII)

- **CO1: 1) Mari Culture** Cultivable Crustacean resources and their culture i) Prawn ii) Crabs Cultivable Molluscan resources and their culture i)Mussels ii) Edible oyster iii) Pearl oyster iv)Sea weed culture **2) Fish Culture Methods –** Pen culture Cage culture Sewage fed fish culture
- **CO2: 1) Integrated fish farming practices** Paddy cum fish culture Poultry cum fish culture Live stock fish culture
- **CO3: 1) Aquarium Management** Setting of aquarium (Gravels/Pebbles, Plants Fishes and Ornamental objects) Selection of aquarium fishes and plants Maintenance of Aquarium – Cleaning, Water Quality, Control of algal growth Common Diseases and treatment of aquarium fishes.

Course Outcome: Practical (Paper –XIII)

- **CO1: Study of fishing crafts (Models) Catamaran, Machwa, Satpati, Masula, and Tuticorine Type.**
- **CO2: Study of fishing gears (Models) Harpoon, Hook and lines, Dip net, cast net Gill net, Drag net.**
- **CO3: Preservation of fish by sun drying and salting.**
- **CO4: Identification of fishing materials** a) Types of floats and sinkers i) Glass ii) Aluminium, Steel, HDP , Lead, Iron Chain b) Fishing gear accessories – i) Anchor shackle, Iron Sooivel, Marline spike, Thimble,G.link, Hook, Purse ring.
- **CO5: Make the following knots, Hitches and Bends in fishing gear.** a) Knot- Overhand knot, Reef knot sheep Shank knot, figure of eight knot. b) Hitches – Rolling hitch, Two half hitch, Marline hitch, Round turn and two half hitch, Clove hitch. c) Bends – Single sheet bend, Double sheet bend, Fishermen bend.
- **CO6: Survey of Inland fishery resources of local reservoir**
- **CO7: Submission of fishing gear.**

Course Outcome: Practical (Paper –XIV)

- **CO1: Identification of predatory and weed fishes.** ii) Predatory fishes- Wallago, Anabus, Ophiocephallus,**Mystus** iii) Weed fishes – Punctius, Aplocheilus, Rosbora
- **CO2: Identification of Aquatic Weeds –** i) Floting Weeds _ Pistia, Lemma, Azolla, Wolfia, Eichhornia ii) Emergent Weeds – Nelumbium, Nymphoides, Nymphea iii) Submerged Weeds – Vallisneria, Ceratophylum, Utricuaria, Potamogeton, Hydrilla, Nojons iv) Marginal Weeds – Typha, Sagittaria, Lpomea, Cyperus, Colocasia,
- **CO3: Removal of fish pituitary gland and preparation of pituitary extract.**
- **CO4: Preparation of home aquarium.**
- **CO5: Identification of balanced and unbalanced aquarium.**
- **CO6: Preparation of artificial fish food.**
- **CO7: Identification of aquarium fishes.**

- **CO8: Educational tour to fresh water, Coastal water fish Farming and aquarium centre**

Course Outcome: Fish Economics (Paper –XV)

Unit A: 1. Economic Terminology

1. Scarcity
2. Choice
3. Scale of Preference
4. Definitions in Economics
5. Macro Economic Tools
6. Economic systems
7. Market Economy
8. Disadvantages of market economy
9. Planned economy
10. Mixed economic systems.

2. Functions of an economic system-

a) Aquaculture economics.

Unit B: Demand and Supply of Fish

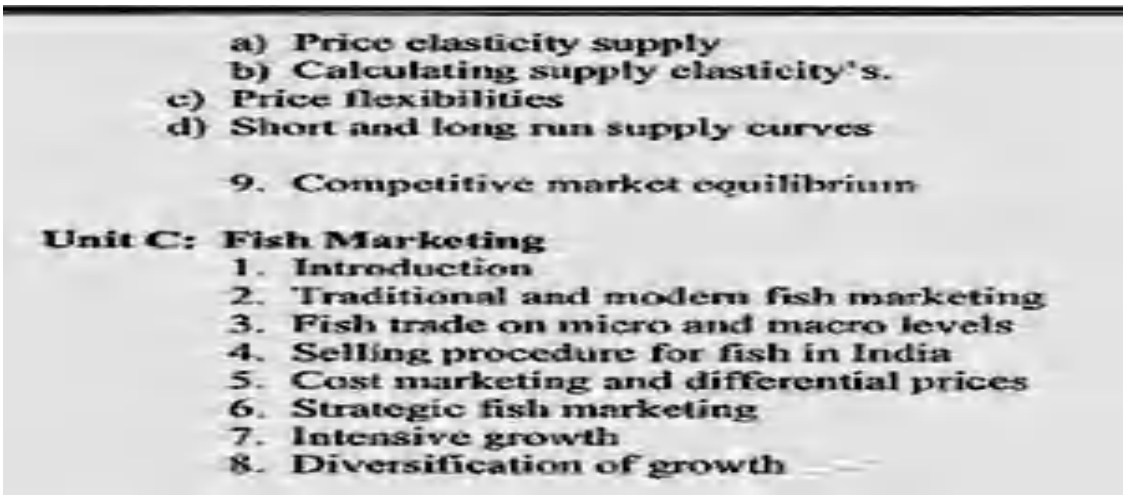
Introduction

a) Consumer Demand

1. Demand Schedule
2. Demand Curve
3. Demand and quantity Demand
4. Factors affecting the demand for fish and fish products
5. Population size and distribution
6. Consumer income and distribution
7. Prices and availability of substitutes
8. Consumer tastes and preferences

b) Elasticity of Demand

1. Price elasticity of demand
2. Calculation of own price elasticity of demand
3. Determinants of price elasticity
4. Income elasticity
5. Cross-Price elasticity
6. Elasticity, total and marginal revenue
7. Producer supply
8. Elasticity of supply



a) Price elasticity supply
b) Calculating supply elasticity's.
c) Price flexibilities
d) Short and long run supply curves

9. Competitive market equilibrium

Unit C: Fish Marketing

1. Introduction
2. Traditional and modern fish marketing
3. Fish trade on micro and macro levels
4. Selling procedure for fish in India
5. Cost marketing and differential prices
6. Strategic fish marketing
7. Intensive growth
8. Diversification of growth

Course Outcome: Modern trends in fishery science -I (Paper –XVI)

Unit A: Principles of Fish Genetics and Biotechnology 10

1. Fish Genetic (Germ Plasm) Resources
2. Chromosomes and Genes.
3. Karyotyping
4. Cryopreservation of gametes (Gene banking)
5. Sex determination
6. Monosex culture
7. Sterile fish

Unit B: Hybridization 20

1. Hybridization in Indian Carps
2. Intra Specific and intergenetic hybrids
3. Natural Hybridization
4. Important hybrids
5. Inbreeding, cross breeding and selective breeding
6. Application of hybridization in fisheries

Unit C: Chromosomal engineering 15

1. Genome
2. Gynogenesis
3. Androgen sis
4. Polyploidy (Triploids or Broiler fish)
5. Production of monosex super male and female by hormonal and six reversal technique.

Course Outcome: Practical (Paper –XVII)

1. Economics of pond culture (Fish culture, prawn culture). 03
2. Field level data collection, tabulation, analysis and Report writing (Inland fishery catch from nearby villages) 05
3. Study of organizational structure and their role in fisheries viz.
4. Fishermen co-operative society
5. Report writing – State fish organization.
6. State and central Government organization i.e. ministry of fisheries.
7. Visit to Fish processing unit. 08

Total **15×3**

= 45

Study

1. Organizational structure and their role in fisheries Govt. of Maharashtra.
2. Study of Economics of fishermen co-operative society from nearly villages.

Course Outcome: Practical (Paper –XVIII)

1. Collection and observation of gametes from fresh water fishes
2. Polyploidy evaluation using erythrocyte measurements
3. Cryopreservation of gametes
4. Chromosome karyotyping
5. Sex determination in fin-fishes and shell-fishes
6. Determination of hybrids in major carps
   (Rohu – Catla hybrid)

Course Outcome: (Paper – XIX)

(Fish statistics, Management and Extension)

Unit A: Statistics

1. Definition and scope of statistics
2. Collection and organization of data
3. Representation of data by graphs, charts and diagrams
4. Classification of data according to attributes and class intervals
5. Construction of frequency tables and the criteria governing formulations of good table
6. Methods of computing mean, median and mode of grouped and ungrouped data

25

Unit B: Management and Extension

1. Nature of fisheries extension
2. Fisheries extension and traditional management
3. Extension and co-operative development
4. Role of co-operative development in fisheries
5. Fisheries extension system India problems.
6. Future of fisheries extension
7. Communication and flow of information 15

Unit C: 1. Techno Socio-economic problem of fishermen
2. Role of women in fisheries
3. Needs of technical knowledge to fishermen 05

Course Outcome: (Paper – XX)

Modern Trends in fishery Science – II

Unit A: Immunology of fishes

1. **Introduction**
2. Methods of immunology
3. Antibodies
4. Immunoglobulin's of fish
5. Specificity of fish antibodies
6. Blood groups in fishes
7. Cellular basis of immunological response

Unit B: Microbiology

1. Introduction to aquatic microbiology
2. Distribution of microorganism in environment
   -Aquatic micro organisms in ponds and lakes
   -Aquatic microorganisms in sea
3. Importance of aquatic microbes
   -Productivity of aquatic eco-systems
   -Bio-geochemical transformations
4. Microbiology of sewage or waste water

Unit C: Contamination, preservation and spoilage of fish and other sea Foods.

1. Contamination
2. Preservation .
   -Use of heat.
   -Use of low temperature.
   -Use of irradiation.
   -Preservation by drying.
   - Use of preservatives.
3. Spoilage.
   -Enzymatic spoilage.
   *Autolysis.
   -Chemical spoilage.
   * Rancidity.
   * Rego mortis and post-mortem Changes
   -Factors influencing kind and rate of spoilage.
   -Evidences of spoilage.
   -Bacteria and causing spoilage.
   -Spoilage of special kind of fish and sea foods. 15

Unit D: Application of remote sensing techniques for locating pelagic fish Concentration. 05

Course Outcome: Practical (Paper – XXI)

1. Study of socio-economic conditions of fishermen from near by Villages 05
2. Preparation of extension material like pamphlets, leafleis and posters And wall posters 02
3. Preparation of Radio talks and Television.
4. Participation in Exhibitions. 01
5. Interview of fish farmers

A detailed project of the above cited areas should be submitted at the time of examination.

Course Outcome: Practical (Paper – XXII)

1. Microbial analysis of fish

E-Coli

S-aureus

And identification of Salmonella and V-Cholera

2. Determination of blood groups in fishes
3. Fish hematology
4. Total plate count. Fish/prawn
5. Methods of preservation salting, sundrys (Any locally available fish/prawn).

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Department of Mathematics

Programme Outcomes (PO)

On Completion of the course students will be able to

- **PO1.** Understand the concepts of algebra which include equations, numbers and algebraic structures.
- **PO2**. Students will be able to use the concepts of analysis in solving problems. The concepts include sets, numbers, functions and convergence.
- **PO3.** Understand mathematical ideas from basic axioms.
- **PO4.** Identify the applications of mathematics in other disciplines and society.
- **PO5**. On completion of the program the students are well poised to pursue careers in academia, industry and the other areas of Mathematics.

Programme Specific Outcomes (PSO)

On Completion of the course students will be able to

- **PSO1:** Demonstrate an understanding of the common body of knowledge in maths and demonstrate the ability to apply analytical and theoretical skill to model and solve the mathematical problems
- **PSO2:** Understand the nature of mathematical proofs and be able to write clear and concise proofs.
- **PSO3:** Communicate effectively in oral and written form
- **PSO4:** Write simple computer programs to perform the mathematical competition.
- **PSO5:** Learn about application of mathematics in other field and gain experiences in mathematical modelling
- **PSO6:** Develop the ability to read, understand and use basic definition in linear and abstract algebra and real analysis and be able to prove simple consequence of this definition
- **PSO7:** Communicate idea effectively and to digest new information and concepts independently.
- **PSO8:** Encouraged to develop intellectual and become involved with professional organization
- **PSO9:** Communicate mathematical ideas both orally and in writing
- **PSO 10:** Investigate and solve unfamiliar maths problems
- **PSO11:** Demonstrate the proficiency in writing proofs

Course Outcome (CO)

Course Outcome: Differential Calculus (Paper –MAT-101)

1. Prerequisite:

Functions: Domain and range of a function, independent and dependent variables, polynomial functions and rational functions, constant functions and identity functions, one-one functions, onto function, invertible functions, composite function. [1]
Limit and Continuity: Limit of a function, left handed and right handed limits, non existence of limit, theorems on limits (statements only), theorems on continuity (statements only), discontinuity, types of discontinuity. [1]

2. Differentiations:

Derivative of a function, derived function, derivability implying continuity, geometrical interpretation of a derivative, hyperbolic functions, derivatives of hyperbolic and inverse hyperbolic functions, logarithmic differentiation, derivative of implicit functions. [1]

3. Successive Differentiation:

Higher order derivatives, calculation of n th derivatives, some standard results, determination of n th derivative of rational functions, the n th derivatives of the products of the powers of sines and cosines, Leibnitz's theorem: n th derivative of the product of two functions.[1]

4. Mean Value Theorems:

Rolle's Theorem, Lagrange's mean value theorem, meaning of the sign of the derivative, Cauchy's mean value theorem, higher derivatives, Taylor's theorem, Maclaurin's theorem, Maclaurin's power series for a given function. [1]

5. Partial Differentiation:

Function of two variables, limit of a function of two variables, continuity of a function of two variables at a point, limit of a continuous function, partial derivatives, partial derivatives of higher order, homogeneous function, Euler's theorem on homogeneous function, total differentials, differentiation of composite function and implicit function.[1].

6. Prerequisite:

Scalar product of two vectors, sign of the scalar product, length of a vector as a scalar product, angle between two vectors, commutativity, distributivity, right handed and left handed vector triads, vector product, some properties of vector product, scalar triple product, distributive law, some properties of scalar triple product, vector triple product.[2]

7. Differential Operators:

Point Functions: scalar valued point functions, vector valued point functions, limits and continuity, directional derivatives, Cartesian representation of point functions and their directional derivatives, directional derivatives of point functions along co-ordinate axes and along any line, gradient of a scalar point function, character of gradient as a point function, the operator ∇, operator $a.\nabla$, divergence and curl, gradient, divergence and curl of sums and product. [2]

Course Outcome: Differential Equations (Paper – MAT-102)

1. Prerequisite:

Ordinary and partial differential equations, order and degree of Differential equations, Solutions: general, particular, singular.

2. Equations of The First Order and of The First Degree:

Exact differential equations, Linear equations, Equations reducible to the linear form.

3. Linear Equations with Constant Coefficients:

Linear equations, complementary functions, particular integral, complete integral, The linear equations with constant coefficients and second member zero, case of auxiliary equation having equal roots, case of auxiliary equation having imaginary roots, the symbol D, the linear equation with constant coefficients and second member a function of x, the symbolic function $1/f(D)$, methods of finding the particular integral, short methods of finding particular integrals corresponding to the terms e^{ax}, x^m, $\sin ax$, $\cos ax$, $e^{ax}V$ and xV in the second member.

4. Linear Equations with Variable Coefficients:

The homogeneous linear equation, methods of finding solution, the symbolic functions $f(\theta)$ and $1/f(\theta)$, methods of finding the particular integral, integral corresponding to a term of form x^m in the second member, equations reducible to homogeneous linear form.

5. Exact Differential Equations and Equations of Particular Forms:

Exact differential equations, criterion of an exact differential equation, the integration of an exact equation: first integral, equations of the form $\frac{d^n y}{dx^n} = f(x)$, equation of the form $\frac{d^2 y}{dx^2} = f(y)$.

6. Ordinary Differential Equations with More Than Two Variables:

Simultaneous differential equations which are linear, simultaneous equations of the First order.

7. Partial Differential Equations:

Definitions, derivation of a partial differential equation by the elimination of constants,, Derivation of a partial differential equation by the elimination of arbitrary functions.

Course Outcome: Integral Calculus (Paper – MAT-201)

1. Methods of Integration:

Reduction formulae. [1]

2. Integration of Algebraic Rational Functions:

Case of non-repeated linear factors, case of non-repeated linear or repeated linear factors, case of linear or quadratic non repeated factors [1]

3. Integration of Trigonometric Functions:
Integration of $\sin^n x$, $\cos^n x$ and reduction formulae for integration of $\sin^n x$, $\cos^n x$ [1]

4. Definite Integral as The Limit of a Sum:

Introduction, fundamental theorem.[1]

5. Areas of Plane Regions:

Areas of a region bounded by a curve, x-axis and two ordinates.[1]

6. Rectification, Length of Plane Curves:

Introduction, expression for lengths of curves $y = f(x)$, expressions for lengths of arc $x = f(y)$; $x = f(t), y = \phi(t)$; $r = f(\theta)$. [1]

7. Volumes and Surfaces of Revolution:

Introduction, expressions for the volume obtained by revolving about either the axis [1]

8. Integral Transformation:
Introduction, line integrals, circulation, irrotational vector point functions, surface integrals, volume integrals, reduction of volume to surface integral, physical interpretation of Gauss theorem, reduction of surface to line integrals, condition for irrotational vector functional, Green's theorem.[2]

Course Outcome: Geometry (Paper – MAT-202)

1. The Plane:

Equations of the first degree in x, y, z, transformation to the normal form, determination of plane under given conditions, equations of the plane through three given points, systems of planes, two sides of a plane, length of the perpendicular from a point to a plane, bisectors of angles between two planes, joint equation of two planes.

2. Right Line:

Equations of a line, equations of a straight line in terms of its direction cosines and the co-ordinates of a point on it, equations of a line through two points, symmetrical and unsymmetrical forms of the equations of a line, transformation of the equations of a line to the symmetrical form, 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 a 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 perpendicular from a given point to a given line.

3. Sphere:

Definition and equation of the sphere, equation of the sphere through four given points, plane section of a sphere, intersection of two spheres, equation of a circle, sphere through a given circle, intersection of a sphere and a line, equation of a tangent plane.

4. Cones, Cylinders:

The right circular cone, equation of a right circular cone, the right circular cylinder, equation of a right circular cylinder.

5. The Conicoid:

Central conicoids, intersection of a line and a central conicoid, tangent lines and tangent plane at a point, condition that a plane may touch a central conicoid.

Course Outcome: Number Theory (Paper – MAT-301)

1. Divisibility Theory in the Integers:
The Division Algorithm, The greatest common divisor, The Euclidean algorithm, The Diophantine equation $ax + by = c$.

2. Primes and their Distribution:
The Fundamental Theorem of Arithmetic

3. The Theory of Congruences:
Basic Properties of congruences, Linear congruences

4. Fermat's Theorem:
Fermat's Factorization Theorem, The little Theorem, Wilson's Theorem.

5. Number-Theoretic Functions:
The functions τ and σ. The Mobius inversion formula

6. Euler's Generalization of Fermat's Theorem:
Euler's Phi-function, Euler's Theorem, Some properties of Phi function

Course Outcome: Integral Transforms (Paper – MAT-302)

1. Beta and Gamma Functions:
Euler's Integrals - Beta and Gamma functions, Elementary properties of Gamma Function, Transformation of Gamma Function, Another form of Beta Function, Relation between beta and Gamma functions, Other Transformations. [1]

2. Laplace Transform:
Piece-wise or sectional continuity, function of exponential order, Function of class A, The transform concept, Laplace Transform, Notation, Some Standard results. [2]

3. Inverse Laplace Transform:
Definition, Null function, Uniqueness of inverse Laplace transform, partial fractions, Heaviside's expansion formula, the complex inversion formula

4. Applications to Differential Equations:
Differential Equation, Notations (Problems related to Ordinary Differential Equations only) [2]

5. Fourier Transform:
Infinite Fourier sine transform of $F(x)$, Finite Fourier cosine transform of $F(x)$, Infinite Fourier transform of $F(x)$, Relationship between Fourier transform and Laplace transform, Finite Fourier sine transform, Finite Fourier cosine transform, Fourier Integral Theorem [2]

Course Outcome: Mechanics I (Paper – MAT-303)

1. Forces acting on a Particle:
Particle, Rigid body, Force, The force as a vector, Equilibrium, An axiom for equilibrium of two forces, Statics, Resultant of forces, Law of parallelogram of forces, Principle of the transmissibility of force, Deductions, Resultant of forces $m \cdot \overrightarrow{OA}$ and $n \cdot \overrightarrow{OB}$, Components and Resolved parts, the algebraic sum of resolved parts of two forces, To find the magnitude and direction of the resultant of any number of coplanar forces acting at a point, Resultant of parallel forces.

2. Equilibrium of Forces acting on a Particle:
Triangle law of forces, Converse of the triangle law of forces, Polygon of forces, Lami's theorem, Conditions of equilibrium of forces acting on a particle.

3. Forces acting on a Rigid Body:
Introduction, Moment of a force, Sum of vector moments of two like parallel forces, Couples, Conditions of equilibrium of forces acting on a rigid body, Trignometrical Theorems.

4. Centre of Gravity:
Centroid of weighted points, Centre of gravity, Centre of gravity of some uniform bodies.

Course Outcome: Numerical Methods (Paper – MAT-401)

1. Solution of Algebraic and Transcendental Equations:

Introduction, Bisection method, Method of false position, Newton-Raphson method, Genralized Newton's method.

2. Interpolation:

Introduction, Finite differences, Forward differences, Backward differences, Central differences, Symbolic relations and separation of symbols, Differences of a polynomial, Newton's formulae for interpolation, Interpolation with unevenly spaced points, Lagrange's interpolation formula, Hermite's interpolation formula, Divided differences and their properties, Newton's general interpolation formula.

3. Curve Fitting and Approximations:

Introduction, Least-Squares curve fitting procedures, fitting a straight line, nonlinear curve fitting, Approximations of functions, Chebyshev polynomials, Economization of power series.

4. Solution of Linear System of Equations:

Solution of Linear Systems-direct methods, Gaussian elimination method, Method of factorization, Solution of Linear Systems-iterative methods, The Eigenvalue problem, Householder's method, Eigenvalues of a symmetric tridiagonal matrix, The QR method

5. Numerical Solution of Ordinary Differential Equations:

Course Outcome: Partial differential equations (Paper – MAT-402)

1. Prerequisites:

Derivation of a Partial Differential Equation by the elimination of arbitrary constants, Derivation of a Partial Differential Equation by the elimination of arbitrary functions,

2. Partial Differential Equations of Order One (Linear Equations) :

Definition of Partial Differential Equations, Lagrange's Linear Partial Differential Equation, Geometrical interpretation of the Lagrange's Linear Partial Differential Equation $Pp + Qq = R$.

3. Non-linear Partial Differential Equations of Order One:

Complete and Particular Integrals, General Integral, Singular Integral, Special method, Standard form I, Standard form II, Standard form III, Standard form IV, Charpit's method, Non-linear Partial Differential Equations of order one with three or more independent variables, Jacobi's method.

4. Linear Partial Differential Equations:

Definitions, Linear Homogeneous Partial Differential Equations with constant coefficients, Non-Homogeneous Linear Partial Differential Equations, Equations reducible to Linear form with constant coefficients.

5: Partial Differential Equations of Second Order:

Course Outcome: Mechanics II (Paper – MAT-403)

1. Kinematics and Dynamics of a Particle in Two Dimensions:
Introduction, Definitions, Velocity and acceleration in terms of vector derivatives, Tangent and unit vector along the tangent, Rate of change of unit vector moving in a plane, Curvature principal normal, Tangential and normal components of velocity and acceleration, Angular speed and angular velocity, Radial and transverse components of velocity and acceleration, Areal speed and areal velocity.

2. Kinetics of a Particle:
Introduction, Newton's law of motion, Matter, Linear momentum, Angular momentum, An Impulsive force and its impulse, Conservation of linear momentum, Impact of two bodies, Work, Energy, Scalar point function, Vector point function, Field of force, Conservative field of force.

3. Motion of a Projectile and Motion in a Resisting Medium:
Rectilinear Motion, Motion under gravity, Projectile, Motion of projectile, Range on an inclined plane, Parabola of Safety, Projectile to pass through a given point, Motion in a resisting medium, Motion of a body moving under gravity and in a medium whose resistance varies as velocity.

4. Central Orbits:
Definitions, Areal velocity in Central Orbit, Differential equation of central orbit, Apses, Law of Force, Pedal equation of some curves

Course Outcome: Real Analysis I (Paper – MAT-501)

1) Prerequisite:
Sets and elements, Operations on sets.

2) Functions:
Functions, Real-valued functions, Equivalence, Countability, Real numbers, Least upper bounds. [1]

3) Sequences of Real Numbers:
Definition of sequence and subsequence, Limit of a sequence, Convergent sequences, Divergent sequences, Bounded sequences, Monotone sequences, Operations on convergent sequences, Operations on divergent sequences, Limit superior and limit inferior, Cauchy sequences. [1]

4) Series of Real Numbers:
Convergence and divergence, Series with non-negative terms, Alternating series, Conditional convergence and convergence, Test for absolute convergence. [1]

5) Jacobians:
Definitions, Case of function of functions, Jacobian of implicit functions, Necessary and sufficient condition for a Jacobian to vanish. [2]

Course Outcome: Abstract Algebra I (Paper – MAT-502)

1) Prerequisite:
Sets, Functions, Integers.

2) Group Theory:
Definition of a group, Some examples of groups, Some preliminary lemmas Subgroups, A counting Principle, Normal subgroups and quotient groups Homomrphism, Automorphism. [1]

3) Ring Theory:
Definition and examples of rings Some special classes of ring, Ideals and quotient rings More ideals and quotient rings, Polynomial ring. [1]

Course Outcome: Mathematical Statistics I (Paper – MAT-503)

1) Frequency Distribution and Measures of Central Tendency:
Frequency distribution, Continuous frequency distribution, Graphical representation of a frequency distribution, Histograms, Frequency Polygon, Measures of Central Tendency, Arithmetic mean, Properties of arithmetic mean, merits and demerits of Arithmetic mean, Weighted mean, Median, Merits and demerits of Median, Mode Merits and demerits of mode, Geometric mean, Merits and demerits of Geometric mean, Harmonic mean, partitions [1]

2) Measures of Dispersion Skewness and Kurtosis:
Dispersion, Characteristic for an ideal measure of dispersion, Measures of dispersion, Range, Quartile deviation, Mean deviation, Standard deviation and root mean square deviation, Relation between and s, Different formulae for calculating variance, Variance of the combined series, Coefficient of dispersion, Coefficient of variations, Moments, Relation between moments about mean in terms of moments about any point and vice versa, Effect of change of Origin and scale on moments, Pearson's and coefficients, Skewness and kurtosis. [1]

3) Theory of Probability:
Introduction, Definition of various terms, Mathematical or Classical Probability, Statistical Probability, Axiomatic approach to probability, Random experiments, Sample space, Events, Some illustrations, Algebra of events, Probability – Mathematical Notion, Probability function, Theorems on Probability of events, Law of addition of Probability, Multiplication law of probability and conditional probability, Independent events, Pairwise independent events, Conditions for mutual independence of n events. [1]

4) Random Variables and Distribution Functions:
Random Variable, Distribution function, Properties of distribution function, Discrete random variables, Probability mass function, Discrete distribution function, Continuous random variable, Probability density function, Various measures of Central tendency, Continuous distribution function. [1]

Course Outcome: Real Analysis II (Paper – MAT-601)

1) Limits in Metric Spaces:
Metric spaces, Limits in metric spaces. [1]

2) Continuous Functions on Metric Spaces:
Functions continuous on metric spaces, open sets, Closed sets. [1]

3) Connectedness, Completeness and Compactness:
More about open sets, connected sets, bounded sets and totally bounded sets, Complete metric spaces, Compact metric spaces, Continuous functions on compact metric spaces, Uniform continuity. [1]

4) Calculus:
Sets of measure zero, Definition of Riemann Integral, Existence of Riemann Integral, Fundamental Theorem of Calculus. [1]

5) Fourier Series:
Introduction. [2]

Course Outcome: Abstract Algebra II (Paper – MAT-602)

1) Vector Spaces and Modules:

Elementary basic concepts, Linear independence and bases, Dual Spaces, Inner product spaces, Modules. [1]

Course Outcome: Mathematical Statistics II (Paper – MAT-603)

1) Mathematical Expectation, Generating Functions:

Mathematical expectation, Expectation of a function of a random variable, Addition theorem of expectation, Multiplication theorem of expectation, Expectation of linear combination of random variables, Covariance, Correlation coefficient, Variance of a linear combination of random variables. [1]

2) Theoretical Discrete Probability Distributions:

Binomial distribution, moments, Recurrence relation for the moments of Binomial distribution, Moment generating function of Binomial distribution, Additive property of Binomial distribution, Cumulants of Binomial distribution, Recurrence relation for cumulants of Binomial distribution, Poission distribution, Moments of Poission distribution, Recurrence relation for moments of Poission distribution, Moment generating function of Poission distribution, cumulants of Poission distribution, Additive property of independent Poission variates, Geometric didtribution, Lack of memory, Moment of geometric distribution, Moment generating function of Geometric distribution. [1]

3) Theoretical Continuous Distributions:

Rectangular or Uniform distribution, Moments of rectangular distribution, Moment generating distribution of rectangular distribution, Normal distribution, Normal distribution as a limiting case of a binomial distribution, Mode of Normal distribution, Median of Normal distribution, moment generating function of Normal distribution, Cumulant generating function of Normal distribution, moments of Normal distribution, Gamma distribution, Moment generating function of Gamma distribution, Cumulant generating function of Gamma distribution, additive property of Gamma distribution, Exponential distribution, Moment generating function of exponential distribution. [1]

4) Correlation and Regression:

Bivariate distribution, Correlation, Scatter diagram, Karl Pearson's coefficient of correlation, limits for correlation coefficient, Assumptions underlying Karl Pearson's correlation, Regression, Lines of regression, regression curves, Properties of regression coefficients, Angle between two lines of regression. [1]

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Department of Microbiology

Programme Outcomes (PO)

On Completion of the course students will be able to

- **PO1:** Acquire knowledge and understanding of the microbiology concepts as applicable to diverse areas such as medical, industrial, environment, genetics, agriculture, food and others.
- **PO2:** Demonstrate key practical skills/competencies in working with microbes for study and use in the laboratory as well as outside, including the use of good microbiological practices.
- **PO3:** Competent enough to use microbiology knowledge and skills to analyze problems involving microbes, articulate these with peers/ team members / other stake holders, and undertake remedial measures / studies etc.
- **PO4:** Develope a broader perspective of the discipline of Microbiology to enable him to identify challenging societal problems and plan his professional career to develop innovative solutions for such problems.
- **PO5:** Acquire knowledge of the diverse places where microbiology is involved.
- **PO6:** Understand of diverse Microbiological processes. Basic skills such as culturing microbes, maintaining microbes, safety issues related to handling of microbes, Good Microbiological practices etc.
- **PO7:** Moderately advanced skills in working with microbes such as pilot scale culturing, downstream processes, diagnostics etc. 5. Generation of new knowledge through small research projects. 6. Ability to participate in team work through small microbiology projects.
- **PO8:** Present and articulate their knowledge of Microbiology. Knowledge of recent developments in the area of Microbiology.
- **PO9:** Analyse of data collected through study and small projects. Able to innovate so as to generate new knowledge.
- **PO10:** Awareness how some microbiology leads may be developed into enterprise. Awareness of requirements for fruition of a microbiology-related enterprise.
- **PO11:** Get services in pharmaceutical and fermentation industries, pathological laboratories, teaching field etc.

Program Specific Outcomes (PSO)

- **PSO1:** Acquire the basic concepts of Taxonomy, Biostatistics, Bioinformatics, Biochemistry, Biophysics, Waste water engineering and Virology.
- **PSO2**: Find the suitability of microorganisms and interlinking its role in industry.
- **PSO3:** Exploring microorganisms in the treatment of waste.
- **PSO4:** Study the instrumentation involved in isolation, identification of microorganisms, biochemistry and molecular biology.
- **PSO5:** Selection of research topic, Collection and compilation of literature, Designing of experiment with objectivity, Compilation and interpretation of results, Presentation of research data in report form.
- **PSO6:** Understand the contributions of various scientist in microbiology and scope of various branches. Understand various kinds of prokaryotic & eukaryotic microbes and their interactions.

- **PSO7:** Explain and describe importance of organic compounds and its chemistry found in living cells. 4. Understand and explain various processes of metabolism of carbohydrates amino acids and vitamins. Explain DNA, RNA and protein structure and their synthesis.
- **PSO8:** Understand the concept of disease development, spread, control and eradication from society.
- **PSO9:** Understand the basic concepts of gene and their regulation of action.
- **PSO10:** Explain and write various industrial fermentations and bioinstrumentation.

Course Outcome (CO)

On Completion of the course students will get knowledge about

Course Outcome: Fundamentals of Microbiology (Paper – I)

- **CO1: 1 Scope & relevance of Microbiology-** i) Definition & concepts ii) Types of microorganism iii) Distribution of microorganisms in nature. **2. Development of Microbiology as a Scientific Discipline -** i) Early observation of microorganisms ii) Spontaneous generation conflict: Contribution of scientists iii) Recognition of the microbial role in diseases. Koch's postulates iv) Recognition of microbial role in fermentations. v) Discovery of microbial effects on organic and inorganic matter. vi) Pure culture concept. vii) Aseptic surgery.
- **CO2: General characteristics of microorganisms.** 1 General principles (Bacteria), i) Taxonomic rank ii) Classification system iii) Numerical taxonomy iv) Major characteristics used in taxonomy. Morphological, Physiological, Immunological, Metabolic, Etiological. Compositions of proteins, composition of nucleic acids, hybridization, nucleic acid sequencing, and identification of organisms based on 16srRNA sequencing, 16S rDNA sequencing v) Bergey's manual of systematic Bacteriology, General characteristics enlisting all parts with major characters & examples. (Vol I to IV)
- **CO3: General characteristics of Microorganisms -** 1 Structure, Reproduction (Lytic & Lysogenic cycle) classification of Viruses.(LHT system) 2. General characters of Fungi (including yeasts), 3. General characters of Actinomycetes 4. General characters of Algae 5. General characteristics of Mycoplasma and Rickettssia. 5 General characteristics of Archaebacteria.
- **CO4: Microscopy- 1.** i) Definitions : Magnification, resolving power, depth of focus, focal length, numerical aperture. ii) Objectives Low , high & oil immersion. iii) Oculars: function, Huygenian, Ramsden, Hyperplane & compensating. iv) Condensers ; Abbe, variable focus cordiod, parabolic & their functions. v) Iris diaphragm. **2 Principles, construction using ray diagram, application and comparative study of :** i) Compound Microscope ii) Electron Microscope – SEM, TEM **3 Principles, ray diagram & applications.** i) Phase contrast microscope. ii) Dark field microscope. iii) Fluorescent microscope. iv) Advanced applications of microscopes.

Course Outcome: Microbiological Techniques & General Microbiology (Paper – II)

- **CO1: Stains and dyes.** i) Definition : stain, dye, chromogen, chromophore, auxochrome, acidic and basic stains, simple and differential staining. (Gram's and Acid fast staining) , natural stains, mordant, decolourizer, counter stains. ii) Physicochemical basis of staining. iii) Fixatives and fixation of smears. iv) Staining of Fungi. v) Principle, application and methodology of Negative, Monochrome and Grams Staining.

- **CO2: Cultivation of microorganisms.** i) Properties of a good culture medium. ii) Definition, concept, use and types of different culture media . Synthetic, non synthetic, natural, selective, differential, enriched , enrichment, assay, minimal, maintenance, and transport media. iv) Role of Buffers in culture media. v) Media used for cultivation of bacteria , fungi, actinomycetes, yeasts, algae and photosynthetic bacteria. (at least two). **Cultivation of anaerobes-** i) Principle and examples. ii) Methods
- **CO3: Microbiological Techniques- 1. Pure culture techniques-** i) Development of pure culture ii) Aseptic techniques, streak, pour and spread plate methods, single cell isolation. iii) Significance **2. Sterilization techniques-** i) Pattern of Microbial death – concepts. ii) Sterilization by physical methods - High temperature, canning and pasteurization. - Low temperature. - Non ionizing and ionizing radiations. - Bacteriological filters. iii) Disinfection by chemical means; Disinfectants and antiseptics: Effectiveness, mode of action & application. Phenolics, alcohols, halogens, heavy metals, quaternary ammonium compounds, aldehydes. iv) Sterilization using gases sulfur dioxide, ethylene oxide, Beta propiolactone.
- **CO4: Structural Organization of microorganisms. A] Fundamental categories of microorganisms.** i) Procaryotic & Eucaryotic cell concepts and differential account **B] Role of microorganisms:** 1.1 In agriculture : As biofertilizers, bioinsecticides, in soil improvement (texture , water holding capacity) as geochemical agents, microbe plant interactions (phyllosphere, rhizosphere, mycorrhizal and nodule formation). Plant diseases : list of common plant diseases with their causative agents. 1.2 In human and animal health : list of common bacterial, rickettsial , fungal and viral diseases.(with causative agents) in human beings, role of normal flora of human body, antibiotics, vaccines and antisera. 1.3 In industries : list of microbial products (and producers) produced on industrial scale, role of contaminants. 1.4 In food processing : list of common fermented food & milk products with their representative organisms. Food spoilage, list of organisms causing changes in texture, colour, aroma, taste & nutritional value of the food products. List of food poisoning & food infection causing microorganisms.

Course Outcome: Practical (Paper – III)

- **CO1**: Microscopy : i) Different parts of a compound microscope. ii) Use and care of compound microscope . iii) Visit to see an electron microscope .
- **CO2**: Construction , operation and utility of laboratory equipments i) Autoclave ii) Hot air oven iii) Incubator iv) pH meter v) High speed centrifuge vi) Colorimeter/ spectrophotometer vii) Anaerobic jar viii) Bacterial Filters ix) Laminar air flow.
- **CO3**: Demonstration of presence of bacteria from – soil/ water/ air/ milk
- **CO4**: Demonstration of yeast, fungi, actinomycetes, algae, protozoa
- **CO5**: Microscopic examination of bacteria: i) Monochrome staining ii) Negative Staining iii) Gram's Staining
- **CO6**: Hanging drop technique to demonstrate bacterial motility
- **CO7**: Micrometry
- **CO8**: Qualitative tests for: i) Carbohydrates – Benedict's test. ii) Protein – Buiret test. iii) Nucleic acid – Diphenylamine(DNA) and orcinol (RNA)tests.

Course Outcome: Cytology and general Microbiology (Paper – IV)

- **CO1:** 1. **Bacterial morphology and ultra structure.** 1.1 Cytology of a typical bacterial cell. i) Morphology – size and arrangement of bacterial cells. ii) Structure ,chemical compositions and functions of : 1. Capsule and slime layer 2. Cell wall : Gram positive and Gram negative bacteria 3. Unit membrane 4. Flagella : Arrangement, mechanism of flagellar movement, Chemotaxis, phototaxis, Magnetotaxis. 5. Pili 6. Ribosomes. 7. Nuclear material, Mesosome 8. Reserved food material: Poly beta hydroxy butyric acid granules, glycogen and polyphosphate granules. 1.2 Bacterial cell division i) Binary fission.
- **CO2: Nutritional Requirements-** i) Concept. ii) Common nutritional requirements – Energy sources, C, N, P, O,S, micronutrients, growth factors, water etc. iii) Classification on the basis of carbon and energy. **Bacterial growth-** i) Concept of Growth ii) Definition iii) Bacterial growth curve iv) Phases of growth v) Mathematics of growth vi) Diauxy vii) Factors influencing bacterial growth (temp, pH, oxygen and nutrients). viii) Synchronous growth ix) Continuous culture x) Measurement of bacterial growth
- **CO3: Microbial Physiology- 1. Endospore** – types, sporulating bacteria, architecture of endospore, sporulation process , germination process. **2. Uptake of nutrients-** i) Passive diffusion ii) Facilitated diffusion iii) Active transport mechanism. iv) Group translocation vi) Uptake of amino acids and metals. **3. Anaerobic respiration :** NO_3 , SO_4 and CO_2 as electron acceptors. **4. Bacterial photosynthesis :** i) Photosynthetic bacteria, ii) Photopigments and associated carriers, iii) Photosynthetic apparatus and its mechanism iv) Cyclic and non cyclic photophosphorylation , v) Calvin cycle, and reductive carboxylic acid cycle for CO_2 fixation. vi) Differences between bacterial and plant photosynthesis.
- **CO4: Advances in Microbiology-** a) Genetic engineering. b) Bioinformatics c) Nano biotechnology d) Bioaugmentation e) Biostatistics f) Enzymes and cell immobilization.

Course Outcome: Basic Biochemistry (Paper – V)

- **CO1: Carbohydrates-** i) Definition and classification. ii) Properties –optical and chemical. iii) Structure of glucose: ring structure, Haworth & fisher's projection, pyranoses , furanoses, isomers, mutarotation. iv) Triose, pentose, hexose, heptoses - examples & structures. v) Derived monosaccharides: glycosides, furano acids, sugar phosphates, uronic acids, sugar alcohol. vi) Disaccharides , glycoside linkage, lactose, maltose, sucrose. vii) Oligosaccharides – Trisaccharides, structure of raffinose. viii) Polysaccharides – Homo and heteropoly saccharides ,structures starch, cellulose, mucopolysacchrides. ix) Biological significance.
- **CO2: Lipids-** i) Classification simple compounds. ii) Chemistry of fatty acids, unsaturated and saturated fatty acids, trigycerides, saponification alkyl ether phospho glycerides , sterols, cholesterol , protaglandins, glycol lipids. iii) Function of lipids.
- **CO3: Proteins-** i) Classification based on properties of solubility & heat. coagulability. Fibrous, globular proteins and functions. ii) Protein structures ; conformation & configuration ,primary structure determination, secondary structure π - helix & β - pleated sheet, tertiary & quaternary structure. iii) Classification of amino acids : based on acid – base properties. iv) Properties of amino acids – solubility, ampholyte, Zwitterions isoelectric pH . v) Peptide bonds – Concepts of biological peptide bond formation, types. vi) Enzymes – Concepts, definition, nature , active site, properties, physico-chemical factors contributing to catalytic efficiency of enzymes

- **CO4: Nucleic acids-** i) Structure of nitrogen bases & base pairing. ii) Structure of nucleosides & nucleotides, ribose, deoxyribose sugars. iii) DNA : properties, forms , structure, function as genetic material. Types of DNA iv) RNA : Structure, function, types (r-RNA, m-RNA, t-RNA) v) Comparative account of DNA & RNA. **PH & buffers.** pH titration curve, P_K value.

Course Outcome: Practical (Paper – VI)

- **CO1:**1) Structural staining – ♦ Bacterial flagella by Patel, Kulkarni and Gaikwad method ♦Capsule staining – Maneval's method. ♦Cell-Wall staining- Chance's method. ♦Spore staining – Schaefer &Fulton's method. ♦Lipid (PHB) granule staining- Burdon's method. ♦Metachromatic granule staining- Albert and Neusser's method.
- **CO2:** Preparation of culture media.- i) Nutrient broth and agar ii) MacConkeys broth and agar.. iii) Sugar media iv) Potato dextrose agar v) Blood agar vi) Photosynthetic bacterial growth medium.
- **CO3:** Sterility checks for Autoclaving.
- **CO4:** Isolation of microorganisms from : i) Air ii) Water iii) Soil iv) Milk
- **CO5:** Isolation of bacteria from mixed cultures (streak plate method).
- **CO6:** Cultivation of Anaerobes
- **CO7:** Effect of physical and chemical agents on growth of bacteria. i) Ph ii) Temperature. iii) Heavy metal ions (oligodynamic action) iv) UV rays. v) Antibiotics.

Course Outcome: Environmental Microbiology (Paper – VII)

- **CO1: Microbiology of air:** Composition of air. Number and kinds of microorganisms in air (indoor, outdoor). Distribution and sources of air borne microorganisms. Air as a carrier of microorganisms. Droplet, droplet nuclei, Dispersal of Microorganisms in air. Techniques for microbiological analysis of air. Significance of air flora in human health, hospitals, industries. Air sanitation – dust control, UV radiation, bactericidal vapors, filtration, Laminar air flow system (HEPAfilters)
- **CO2: Microbiology of Water and Waste water:** Types of waters, sources of microbes in water. Determining sanitary quality of water indicators of fecal pollution:Fecal and non-fecal coliforms (IMViC& elevated temperature tests). Bacteriological examination of water: Presumptive, confirmed, completed test, SPC, MPN and Membrane filter technique. Water purification methods: Disinfection of potable water supplies. Definition of sewage and chemical composition. Microbiology of sewage treatment: septic tank, evapotranspiration, Imhoff's tank. Muncipal sewage treatment process: Primary, Secondary, (aerobic and anaerobic process), chemical treatment: chlorination. Disposal of treated sewage. (Sludge as fertilizer, irrigation and dilution).
- **CO3: Microbiology of Soil:** Soil as an environment, as a culture medium. Brief account and definition of microbial interactions with examples. Symbiosis, mutualism, commensalism, competition, synergism, satellitism, predation, parasitism with example: Microbe-microbe interactions. II. Plant-microbe interactions (Phyllosphere; legu.plant-Rhizobium). III. Animal-microbe interactions(Rumen; Bioluminescence). Major biogeochemical cycles:Carbon nitrogen, phosphorus, sulphur (cyclic turnover with microbiology). General account of microbes used as biofertilizers, phosphate solubilizers. (Defination, Types, advantages, disadvantages). Rhizosphere: definition, rhizosphere and non rhizospheremicroflora and R: S ratio, significance for fertility.

- **CO4: Environmental Pollution-** Air pollution : sources, causes, health hazards, airborne diseases any 5 (list of causative agents). Water pollution : sources, causes, hea lth hazards, waterborne diseases any 5 (list of causative agents). Waste water pollution : sources, causes, health hazards. Soil : sources, causes, health hazards,

Course Outcome: Immunology (Paper – VIII)

- **CO1: Normal flora and infection-** Normal flora of human body. Defensive mechanism of the host. Nonspecific factors: physiological barriers, natural cellular & humoral factors. Aggressive factors and mechanisms. Infection: Definitions with one example: (primary infection, secondary infection, infection). Sources of infection. Determining factors in infection. Modes of transmission of infectious diseases. Process of infection : entry and spread of infection in host body.
- **CO2: Immune system and Immune responses:** Immune system: organs and cells Involved, functions, types of cells functions of immune system. Production of antibodies: organs & cells involved, monoclonal Antibodies, Regulation of antibody production (genetic control). Factors influencing antibody production: Introduction to stem cells and stem cell therapy.
- **CO3: Immunity:** Definition and classification:Innate / Acquired, Active/Passive, Cellular/Humoral, specific / non - specific humoral factors of immunity: complement, interferon. **Antigen**: Definition, determinant's of antigenicity, a) size, b) chemical, c) nature, d) susceptibility to tissue enzymes, foreignness, specificity of antigens, Types of antigens: species specific antigen, Isoantigen, autoantigen, organ specific antigen, MHC antigen, Heterogenetic (Heterophile)antigen, antigens in relation to bacterial cell. **Antibody:** Immunoglobulins: structure & classes, Types of antibodies:antitoxin, precipitin, agglutinin, bacteriolysin, bacteriocidin, bacteriotropin, complement fixing, neutralizing.
- **CO4: Antigen – Antibody reactions:** General features of Antigen- Antibody reactions. Mechanisms , methods & applications of: Agglutination: Precipitation, Complement fixation, Neutralization, Immunofluorescence, ELISA**.** General methods of prophylaxis. Toxoid & immune sera, Principle involved in preparation. use of adjuvants. Vaccines : types, principles of methods of BCG, TAB, OPV, T.T., DPT, vaccines production, administration of vaccines, Immunization schedule. Hypersensitivity (Four types with one disease in brief).

Course Outcome: Practical (Paper – IX)

- **CO1:** Enumeration of microbes from: Indoor and outdoor environment.
- **CO2:** Bacteriological examination of drinking water: MPN, SPC.
- **CO3:** Qualitative analysis of water : Presumptive, Confirmed, Completed test
- **CO4:** Testing of (water & domestic sewage) for physicochemical parameters like chlorine, phosphate, nitrate and BOD.
- **CO5:** Isolation of*E. coli* and identification by IMViC
- **CO6:** Isolation of coliphages from sewage
- **CO7:** Isolation enteric pathogens from domestic sewage (salmonella and shigella spp)

Course Outcome: Practical (Paper – X)

- **CO1:** Demonstration of media for cultivation of pathogenic bacteria -Mannitol salt agar. Wilson and Blair's medium, Lowenstein- Jenson's medium, Corn- meal agar.
- **CO2:** Staining techniques - Acid fast staining (Demonstration), Blood staining (differential WBC count).
- **CO3:** Hemoglobin examination
- **CO4:** Isolation & study of normal flora of skin/ nose/ throat.
- **CO5:** Agglutination tests: (Slide tests) - Blood grouping, Widal test, RPR test.
- **CO6:** Precipitation test: Demonstration. - Single radial immunodiffusion, Immuno electrophoresis.

Course Outcome: Practical (Paper – XI)

- **CO1: Dairy Microbiology:** Definition of and composition of milk, Sources of microorganisms in milk, Desirable and undesirable changes carried out by microorganism in milk, Types of microorganisms: Biochemical types, temperature characteristic and pathogens (bovine and human origin). Changes in the flora of raw milk stored at room temp. Microbiological examination of milk: SPC, DMC, Reductase and Phosphatase test. Sterilization of milk: Pasteurization
- **CO2: Food Microbiology:** Food as a substrate for microorganisms. Major groups of bacteria, fungi, yeasts important in food microbiology. Sources of contaminat ion of food, factors affecting kind and number of microorganisms in food. Principles of food preservation: Microbiostatic and microbicidal methods : Asepsis, removal of microorganisms, anaerobic conditions, high temp, low temp, drying, chemical preservatives, high osmotic pressure, radiation, smoking. Microbial spoilage of foods. Classification of foods by ease of spoilage, chemical changes caused by microorganisms in food. Types of spoilage of canned and non-canned foods with organisms involved. (Tabular form).

- **CO3: Foodborne diseases and intoxication -** Food borne diseases: Food infections, indicators of food pathogens associated with food. Food intoxication: Staphylococcal, Clostridial, Mycotoxins, Enteropathogenic *E. coli*, Salmonellosis and Shigellosis.
- **Unit 4.Fermented Food and Probiotics**
  - Cheese: Classification and production
  - Butter
  - Idli
  - Criterion for probiotics: Yoghurt and Curd
  - Mushroom as SCP

Course Outcome: Clinical Microbiology (Paper – XII)

- **CO1: Study of Human Diseases caused by bacteria-** Classification, habitat, morphology, staining reactions, cultural characters, biochemical characters, antigenic structure, pathogenesis.Laboratory diagnosis, epidemiology, prophylaxis, chemotherapy w. r. t. *Staphylococcus aureus,* Pneumococcus *(Str. pneumoniae), Mycobacterium tuberculosis.*

- **CO2: Study of Human Diseases caused by Enteric bacteria and spirochete -** Classification, habitat, morphology, staining reactions, cultural characters, biochemical characters, antigenic structure, pathogenesis.Laboratory diagnosis, epidemiology, prophylaxis, chemotherapy w. r. t. *Salmonella typhi, Vibrio cholera, Treponema pallidum.*
- **CO3: Viruses -** HIV: Morphology, types, Life cycle, pathogensis, Laboratory diagnosis, epidemiology Prophylaxis, treatment. Hepatitis virus : Morphology, types, Life cycle, pathogensis, Laboratory diagnosis, epidemiology, Prophylaxis, treatment. Oncogenic viruses: Morphology, types, Life cycle, pathogenesis, Laboratory diagnosis, epidemiology, Prophylaxis, treatment.

- **CO4: Protozoal and fungal diseases-**Protozoa:*Plasmodium spp (morphology, life cycle, clinical signs and symptoms, lab. Diagnosis prophylaxis / prevention and chemotherapy.*Fungi: *Candida albicans (morphology, life cycle, clinical signs and symptoms, lab. Diagnosis prophylaxis / prevention and chemotherapy.*Typhus fever : *(morphology of causative agent life cycle, clinical signs and symptoms, lab. Diagnosis prophylaxis / prevention and chemotherapy.*

Course Outcome: Practical (Paper – XIII)

- **CO1:** Determination of R: S ratio.
- **CO2:** Demonstration of: Ammonification, Nitrification, Denitrification, Nitrate reduction, Sulfate reduction.
- **CO3:** Isolation & study of *Rhozobium*sp from root nodules of leguminous plants.
- **CO4:** Isolation & study of *Azotobacter sp.* from soil.
- **CO5:** Bacteriological analysis of milk: DMC, MBRT
- **CO6:** Isolation of microorganisms from common food items; curd/ bread/ pickles/ spoilt food.
- **CO7:** Visit to waste treatment plants, dairies, food industries, agricultural universities.

Course Outcome: Practical (Paper – XIV)

- **CO1:** Study bacterial pathogens: *Staphylococcus aureus, Salmonella typhi, Vibrio cholerae*
- **CO2:** Isolation & Identification of *Candida albicans*
- **CO3:** Demonstration of haemolysin& coagulase tests.
- **CO4:** Determination of antibiotic resistance of bacteria.
- **CO5:** Detection of specific antigen by ELISA (demonstration – Viral Disease)
- **CO6:** Visits to related labs, hospitals & institutes.

Course Outcome: Microbial Genetics (Paper – XV)

- **CO1: Properties of DNA and Gene expression-** Molecular structure of DNA, DNA as a genetic material: Experimental proof - i Griffith and Avery, MacLeod and McCarty experiment, ii Hershey-Chase and experiments, Molecular properties of DNA - Melting,

Breathing, Bending, flexibility, Novel structures, linking number, major and minor groove. **DNA Replication-** Semi conservative mode of DNA replication: Meselson and Stahl's experiment, Mechanism, steps and process with enzymes involved in replication, Post replication modification- Methylation (dam, dcm, hsd).

- **CO2:** Salient features of Genetic code. Biological expression of a gene: Protein synthesis : Transcription and Translations processes. Regulation of gene expression; Lac operon , Ara operon

- **CO3: Genetic Mutations-** Spontaneous mutation; Definition., causes, replica plating. Induced mutation: Types -Base pair substitution (transition and transversion) -Frameshift mutations (deletion and insertion), Missense mutation, nonsense mutations, silent mutation, Genetic suppression- intragenic and extragenic, Mutagenesis by physical and chemical agents. **Physical mstagenie agents:** U.V. radiations, X rays, **Chemical mutations:** Base modifiers: Nitrous oxide. Base analogue: 5 Bromo uracil, Agents producing distortion in DNA - Proflavin, Intercalating agents: ethidium bromide,

- **CO4: Bacterial Recombinations - Transformation:** Definition, experimental proof, process of transformation. uptake of DNA, competence factor, **Transduction:** Definition, Lederberg and Zinder 'U' tube experiment, Mechanism and process- generalized specialized and abortive transduction. **Conjugation :** Definition, Experimental proof Lederberg and Tatum experiment, Conjugation process, F, Hfr, F´ factors.

Course Outcome: Microbial Metabolism (Paper – XVI)

- **CO1:** *Enzymes:* Definition, properties, specificity, active site, activation of enzymes, Mechanism of action of enzymes (lock and key, Induced fit, ping-pong), Nomenclature and classification of enzymes. Factors affecting catalytic activity of enzymes (pH, temperature $_s$ enzyme concentration, substrate concentration , metal ions, time), Michaelis-Menten equation ; derivation and significance. Types of enzymes extracellular, intracellular. constitutive and inducible,
- **CO2:** Enzyme inhibition: Irreversible, reversible (competitive, uncompetitive, non competitive) and metabolic antagonism; feedback inhibition, Co-enzymes and respective enzymes, (NAD, FAD, Lipoic acid. Vitamin B12, Thiamine pyrophosphate), Elementary knowledge and uses of *isoenzymes.* Commercial uses of enzymes (any five) - (food, leather, textile, environment, pharmaceutics and clinical)
- **CO3:** Metabolism, anabolism. catabolism, free energy, Bioenergetics: chemical links between catabolism and biosynthesis, energy coupling through ATP and through pyridine nucleotides, Central role of ATP-ADP system. Modes of energy yielding metabolism: Definition and features of fermentation, Respiration and photosynthesis. Fermentation of carbohydrates: EMP, HMP, ED, Phospoketolase pathway (pentose, hexose) with structure. Alcoholic, homolactic, mixed acid, butanediol, butyric, acetone-butanol femientations.
- **CO4:** Aerobic respiration: RETC : location functions, components, redox carriers, oxidirtive phosphorylation artificial electron acceptor, bacterial cytochrome systems, TCA cycle, glyoxylate cycle, anaplerotic *sequences.*Catabolism of saturated (16 carbon) and unsaturated fatty adds (16 carbon) by β Oxidation, Degradation of proteins and amino adds: proteolysis, putrefaction, Transformation of amino acids: oxidation, reduction, decarboxylalion, deamination. Nucleic add catabolism: DNA, RNA depolymenzation,

degradation of nitrogenous bases (mention end products without pathway), Biosynthesis of nucleotides: Purine and pyrimidine nucleotides, conversion of ribonucleotides to deoxyribonucleotides.

Course Outcome: Practical (Paper – XVII)

- **CO1:** Isolation of total RNA from yeast. Purification of RNA by phenol extraction method, Concentration of RNA by ethanol precipitation.
- **CO2:** Hyperchromacity study of chromosomal DNA using UV -visible spectrophotometer
- **CO3:** Isolation of spontaneous Lac mutant of *E. coli* by Replica plating.
- **CO4:** Effect of UV radiation (U V, damage) on DNA and photo reactivation in *E coli*
- **CO5:** Study of Transformation in *E coli,* a. Preparation of competent *E coli,* b, Enumeration of transformed cells, c. Determination of plasmid transfer efficiency
- **CO6:** Isolation of coliphage from sewage.
- **CO7:** Study of conjugation in *E coli* (Plate method)

Course Outcome: Practical (Paper – XVIII)

- **CO1:** Preparation of buffers and reagents.
- **CO2:** Study of enzymes: - a-amylase, caseinase, catalasc, desulfurase, gelatinase, lecithinase, oxidase.
- **CO3:** Effect of pH, $temp_r$ substrate concentration on α- amylase activity.
- **CO4:** Demonstration of nitrate reduction
- **CO5:** Demonstration of decarboxylation of amino acid.
- **CO6:** Isolation of photosynthetic bacteria by column method
- **CO7:** Primary screening for: Starch hydrolyzers. Organic acid producers, Antibiotic producers.

Course Outcome: Recombinant DNA Technology (Paper – XIX)

- **CO1:** Recombinant DNA technology: definition, objectives of genetic engineering, tools used for cloning, steps in gene cloning, DNA manipulating enzymes; i) restriction endonucleases (types, nomenclature, recognition sequences, cleavage patterns with examples), ii) DNA ligase iii) alkaline phosphtase, iv) polynucleotide kinase v) reverse transcriptase.
- **CO2:** Vectors: properties of good vector, cloning and expression vectors, (pBR322, pUC18), Bacteriophage vectors (improved λ vector), cosmids, YAC. Properties of good host (cloning organisms). Uptake of DNA (Calcium chloride treatment electroporation, protoplast fusion, liposome). Selection of recombinant clones by blue *script/* white script screening.
- **CO3:** Genoraic library (construction and identification of desired clone). Probes (preparation & labelling), its uses, PCR, Nucleic acid and protein blotting techniques; Southern blotting, Western blotting, Northern blotting. Colony hybridization, *DNA* sequencing (Sanger method / dideoxy method)
- **CO4:** Gene therapy (Somatic cell and germ line), Applications of genetic engineering, Agriculture-(Golden *Rice* and Bt cotton), Human and animal health (Interferon and HBV

vaccine), Industries (Strain improvement and recombinant proteins: Insulin), Environment (Super bug and Bioremediation using GEMS), Ethical issues of genetic engineering.

Course Outcome: Industrial Microbiology (Paper – XX)

- **CO1:** Introduction to Industrial Microbiology, Historical events. Lay out of a fermentation Industry: Different units and departments and functions (stock, production and fermentation, QC and Q.A. and R & D, Packaging Importance of sterility maintenance and checking. IP, and WHO standards of sterility, Design of a fermentor, Types, (Single, multiple), Scale up **of** fermentation.
- **CO2:** Primary and Secondary screening methods, Preservation of industrially important Microbe (Serial subculture, overlaying mineral oil. soil stocks, lyophilisation, liquid nitrogen preservation), Strain improvement methods for increase in yield of product, Development of inoculum (Steps). Development of fermentation medium (Raw materials, nutrients, media formulation,, pretreatment, sterilization, buffers, antifoam agents, cell lysates, precursors), Phage contamination and control
- **CO3:** Industrial fermentations : Antibiotic – penicillin, Vitamin B12, L-Lysine (Direct method)
- **CO4:** Microbial production of Ethyl Alcohol, Citric acid, Amylase enzyme, Baker's Yeast, Biofertilizers (Azo, Rhizo, PSB) and Biopesticide production

Course Outcome: Practical (Paper – XXI and XXII)

Practical papers XXI

1. Restriction digestion of lambda DNA
2. Isolation of *E. coli* chromosomal DNA.
3. Separation of *E coli* DNA by agarose gel electrophoresis.
4. Confirmation and estimation of DNA by diphenylamine
5. Ligation chain reaction
6. i) Study of DNA uptake in *E coli* using $CaCl_2$ treatment
   ii) Selection of recombinant clones on suitable medium.
7. Measurement of B–galactosidase activity of *E coli* / Yeast using ONPG
8. Demonstration of polymerase chain reaction (PCR)

Practical paper – XXII

1. Production, detection and estimation of ethanol using *S cerevisiae.*
2. Production and estimation citric acid by *Aspergillus spp*
3. Production of alpha-amylase by *Aspergillus / Bacillus spp.*
4. Identification of fermentation product by paper chromatography and thin layer chromatography – Lysine and Citric acid.
5. Separation of proteins by using agarose gel electrophoresis.
6. Microbiological Assay of penicillin.
7. Study tour and report submission

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FACULTY OF COMMERCE (B. Com.)

Programme Outcomes (PO)

On Completion of the course students will be able to

- **PO1:** Demonstrate knowledge of major theories and models in key areas of organizational behaviour.
- **PO2:** Analysis Organisational problems and generate realistic solutions based on current academic research in organisational behaviour.
- **PO3:** Apply basic mathematical and statistical skills necessary for analysis of a range of problems in economics actuarial studies, Accounting, Marketing, Management and Finance.
- **PO4: Environment Awareness:** Understand the issues and problems of environmental context and develop environmental awareness in the mind.
- **PO5: Consumer Movement:** Make people aware about consumer movement, rights & duties, laws relating to consumers.
- **PO6: Sound knowledge of various laws :** Impart the knowledge of basic concepts, terms & provisions of company law, Mercantile law, Income Tax and other laws affecting business, trade and commerce.
- **PO7:** Develop management skills, Entrepreneurial ability, Numerical ability, Well familiar with business regulatory framework, knowledge of important business laws, financial accounting and basic principles of economics.
- **PO8:** Possess the knowledge and skills necessary to maintain a safe and healthy lifestyle.
- **PO9:** Understand and appreciate the physical, biological and technological world and make responsible and informed decisions in relation to their world.
- **PO10:** Understand and apply a variety of analytical and creative techniques to solve problems, Understand, interpret and apply concepts related to numerical and spatial patterns, Structures and relationships.
- **PO11:** Be productive, creative and confident in the use of technology and understand the impact Of technology on society.
- **PO12:** Develop a system of personal values based on their understanding of moral, ethical and Spiritual matters.

Program Specific Outcomes for Commerce (PSO)

On Completion of the course students will be able to

- **PSO1:** Understand application of mathematical & Statistical concepts and techniques in solving business problems.
- **PSO2:** Develop the insights regarding organizational skills, functioning of modern appliances, e-format records in modern office.

- **PSO3:** Stimulate the student's interest by showing the relevance and use of various economic theories.
- **PSO4:** Develop the capability of students for knowing banking concepts and operations.
- **PSO5:** Analyze the basic concept in marketing and prepare to face the relevant changes in the field of marketing.
- **PSO6:** Know the basic concepts, terms and provisions of mercantile & business laws.
- **PSO7:** Acquire the knowledge about accounting procedures, methods & techniques.
- **PSO8:** Develop business communication skills. Develop cost consciousness and analytical bent of mind.
- **PSO9: B**uild a strong foundation of knowledge of commerce in different areas. Develop the skills of various techniques used in commerce. Develop an attitude for working efficiently and effectively in a business environment.
- **PSO10: D**evelop an attitude of strong morale in stuff competition. Promote students about entrepreneurial development.
- **PSO11: I**ntegrate knowledge, skill and attitude of commerce that will sustain for business environment to learn creativity among the students.
- **PSO12: E**nable a student to be capable of making decision at personal, professional and entrepreneurial level.
- **PSO13: D**evelop a strong platform of commerce activities. Develop the knowledge of statistical tools used in business analysis.
- **PSO14: D**evelop a thorough understanding of Accounts and financial functions of an organization, Quality leadership in financial area, Collate and integrate systems of Accounts and finance.
- **PSO15: E**ncourage the students to undertake higher studies and research in commerce and allied disciplines communicate and share their ideas with industry effectively and efficiently.
- **PSO16:** Become the ability to work at individual as well as team level in accounting area.
- **PSO17**: Become proficient in using information technology and accounting tools in decision making process.
- **PSO18**: Develop quality consultant in taxation area. Encourage the students to undertake higher studies and research in taxation with new policy.
- **PSO19**: Be able to calculate and understand GST, CST and IGST.
- **PSO20**: Become the ability to find various levels of taxation in income and to suggest tax payer effectively and efficiently.
- **PSO21**: Become proficiency in using information technology and accounting tools in taxation process.
- **PSO22:** Apply conceptual business foundation to solve practical decision making problems, both individually and as part of teams using techniques such as case study, project and assignment.
- **PSO23:** Recognize and address ethical issues and values and apply them in organizational settings. Knowledge of social awareness (contemporary issues). Develop good leaders in management area.

- **PSO24:** Get an ability to function effectively on multi-disciplinary teams (team work), ability to communicate effectively, both in writing and orally.

• Course Outcome (CO)

On Completion of the course students will get knowledge about

Course Outcome: Financial Accounting – I

B.Com. First Year (First Semester)
Financial Accounting-I

Theory-80
Practical/Sessional -20

Objectives: The course aims at acquainting the students with the emerging issues in business, Trade and commerce regarding recording, maintaining and presenting the accounting and financial facts.

Unit I: **Book-Keeping and Accountancy: -** **(Theory)**
Meaning, Definitions, Concepts, Objectives, Need, Scope, Classification, and Rules of Accounts, Accounting Cycle, Journal, Ledger, Balancing of Account.

Unit II: **Depreciation: -** **(Numerical)**
Annuity and Sinking fund Method

Unit III: **Final Account of Sole Trader: -** **(Numerical)**
Meaning and Importance, Preparation of Manufacturing Account, Trading Account, Profit and Loss Account and balance sheet, Adjustment.

Unit IV: **Hire purchase System & Installment Method:-**
(Theory on Hire Purchase & Numerical on Installment Method)
Meaning, Calculations of Interest, Accounting for hire purchase transactions by Asset purchase method based on full cash price, Journal Entries, Ledger Accounts and Discloser in Balance sheet for hire and vendor.

Unit V: **Royalty Accounts: -** **(Numerical)**
Royalty, Minimum Rent, Short Workings, Recoupment of Short Working, Lapse of Short Working. Journal Entries and Ledger Accounts in the Books of Landlord and Lessee.

Course Outcome: Business mathematics and Statistics – I

B.Com. F.Y. (First Semester)

Business Mathematics and Statistics-I

Theory-80

Practical/ Sessional -20

Objectives: The Objective of this paper is to impart knowledge to students in order to improve their Logical Reasoning, Ability and Interpretation, Application of various statistical and Mathematical Tools and Techniques in making logical and scientific decisions in Business Operations.

Unit I: **Introduction to Statistics: -** **(Theory)**

Meaning, Definition, Importance and Limitations of Statistics, Primary and Secondary Data, Methods of collecting primary data, sources of secondary data. Difference between Primary and Secondary data. Ways of collection of data: a) Complete enumeration b) Sample Method, seriation and Tabulation of statistical data.

Unit II: **Measures of Central Tendency: -** **(Numerical)**

Introduction, definition, types of averages Mean, Median, and Mode: Computation of above Measures in Discrete series, continuous series, and cumulative Frequency. Distribution. (Less than and More than). Merits and Demerits of Mean, Median and Mode.

Unit III: **Measures of Dispersion & Skewness: -** **(Numerical)**

Introduction, Definition, Objectives of Measuring Dispersion. Mean Deviation and its coefficient. Standard deviation, its coefficient with its Co- variance.

Skewness -Introduction, Definition, Objectives of Skewness, Measures of Skewness: Karl Pearson's Co-efficient of skewness.

Unit IV: **Determinants: -** **(Numerical)**

Definition, Cramer's Rule Determinant of second order, Determinant of Third Order. Properties of Determinants. Computation of Area of Triangle with the help of determinant. SARRU'S Rule for evaluating the determinant.

Unit V: **Matrices: -** **(Numerical)**

Meaning, Definition and types of Matrices. Operations of Matrices: Addition and subs traction; properties of addition and subtractions.

Course Outcome: Business and Industrial Economics

B.Com. F.Y. (First Semester)
Business and Industrial Economics

Theory-80
Practical/ Sessional -20

Objectives: This course is meant to acquaint the students with the principles of Business economics as are applicable in business.

Unit I: **Introduction to Business Economics:-**
Meaning, Definition, Nature, Characteristics, Significance and Scope of Business Economics, Objectives of Business Firm.

Unit II: **Theory of Consumer Behaviour:-**
The indifference curve approach, meaning, definition, assumptions and properties of indifference curve, consumers equilibrium.

Unit III: **Elasticity of Demand:-**
Concept, measurement and determinants of elasticity of demand, Price elasticity, income elasticity and cross elasticity, Average Revenue, marginal Revenue, importance of Elasticity of demand, Demand forecasting Methods.

Unit IV: **Market Structures:-**
Market Structures and Business decisions, objectives of a business firm, Perfect Competition: Meaning, concept and features, Monopoly Meaning, concept and features. Securities Exchange Board of India (SEBI), Foreign Exchange Management Act (FEMA)

Unit V: **Factor Pricing:-**
Marginal productivity theory and demand for factors, nature of supply of factor inputs, determination of wage rate under perfect competition and monopoly, interest concept, theories of interest.

Course Outcome:

B.Com. F.Y. (First Semester)

Computer Application in Business-I

Theory - 50

Practical/ Sessional - 50

Objectives:	To provide computer skills and knowledge for commerce students and to enhance the Students understand of usefulness of information technology tools for business operations.
Unit I:	**Computer Codes and Languages:** Source Code, Machine/Binary Code, Mnemonic Opcode, Byte/Object Code, BCD, EBCDIC, ASCII, Language Translator-Interpreter & Compiler, High Level, Low Level, Assembly language, Different Number Systems, Binary, Octal, Hexadecimal, Decimal, Conversion from one base to another base.
Unit II:	**Word Processing:-** Introduction to word Processing, Word processing concepts, Use of Templates, Working with word document: Editing text, Find and replace text, Formatting, spell check, Autocorrect, Auto text; Bullets and numbering, Tabs, Paragraph Formatting, Indent, Page Formatting, Header and footer, Tables: Inserting, filling and formatting a table; Inserting Pictures and Video; Mail Merge: including linking with Database; Printing documents Creating Business Documents using the above facilities.
Unit III:	**Preparing Presentations:-** Basics of presentations: Slides, Fonts, Drawing, Editing; Inserting: Tables, Images, texts, Symbols, Media; Design; Transition; Animation; and Slideshow. Creating Business Presentations using above facilities.
Unit IV:	**Spreadsheet and its Business Applications:** Spreadsheet concepts, Managing worksheets; Formatting, Entering data, Editing, and Printing a worksheet; Handling operators in formula, Project involving multiple spreadsheets, Organizing Charts and graphs Generally used Spreadsheet functions: Mathematical, Statistical, Financial, Logical, Date and Time, Lookup and reference, Database, and Text functions.
Unit V:	**Creating Business Spreadsheet:** Creating spreadsheet in the area of: Loan and Lease statement; Ratio Analysis; Payroll statements; Capital Budgeting; Depreciation Accounting; Graphical representation of data; Frequency distribution and its statistical parameters; Correlation and Regression.

Course Outcome:

B.Com. F.Y. (First Semester)
(Elective Paper)
Entrepreneurship Development - I

Theory-80
Practical/Sessional -20

Unit I: **Entrepreneur:**
Concept of Entrepreneur Definition, Characteristics, Functions, Entrepreneurs and Intrapreneur. Role of an Entrepreneur in Economic Development.

Unit II: **Entrepreneurship:**
Concept, Meaning, Definition, Characteristics, Importance of Entrepreneurship, Challenges, Issues & Barriers of Entrepreneurship.

Unit III: **The Dynamic New Trends of Entrepreneurship:**
Startup Accelerators, Student Sandbox and Business Labs, Crowd Funding, Venture Capital, Co-Working Spaces, Boot Camps, Online Entrepreneurship Degree.

Unit IV: **Evolution of Entrepreneurship in 21st Century:**
Essential of 21st Century Entrepreneurship, Importance of Entrepreneurship in 21st Century. Start-up Schemes, Start-up India, Stand up India, Pradhan Mantri Kaushal Vikas Yojana, Skill India.

Unit V **Project Identification:**
Meaning, Definition, Classification, Project Life, Project Formulation & Feasibility, Information Centers in India.

Course Outcome:

B.Com. F.Y. (First Semester)
(Elective Paper)
Office Management

Theory-80
Practical/Sessional -20

Objective: The purpose of this course is to familiarize the students with the activities in a modern office. Smooth functioning of any organization depends upon the way various activities are organized, facilities provided to the staff working in the office, the working environment and the tools and equipment used in office.

Unit I: **Office and Office Management:-**

Meaning of office- Primary and Administrative Management Functions, Importance of Office, Duties of the Office Manager, Qualities and Essential Qualifications.

Filing and Indexing: Meaning and importance, essentials of good filing, centralized vs. decentralized filing, system of classification, methods of filing and filing equipment, weeding of old records, meaning and need for indexing, various types of indexing.

Unit II: **Mail and Mailing Procedures:-**

Meaning and importance of mail. Centralization of mail handling work, its advantages. Mailing through post, couriers, email, appending files with email. Inward and outward mail- receiving, sorting, opening, recording, making distributing folding of letters sent, dispatching, courier services, central receipt and dispatch.

Forms and Stationery: Office Forms- introduction, meaning, importance of forms, advantages of using forms, disadvantages of using forms, type of forms, factors affecting forms design, principles of form design, form control. Stationery- introduction, types of stationery used in offices, importance of managing stationery, selection of stationery, essential requirements for a good system of dealing with stationery, purchasing principles, purchase procedure, standardization of stationery.

Unit III: **Modern Office Equipment:-**

Introduction, Meaning and Importance of Office Automation, Objectives of Office Mechanization, advantages & disadvantages, factors determining office mechanization. Kinds of office machines.

Budget: Budget- Annual, Revised and Estimated. Recurring and non- recurring heads of expenditure, **Audit:** Audit process- Vouching, Verification and Valuation (in brief). Consumables/ Stock register and Asset register. Procedure for disposal of records and assets.

Unit IV:	**Banking facilities:** Types of accounts. Passbook and Cheque book. Other forms used in Banks. ATM and money transfer. NEFT/RTGS, Net Banking, BHIM Apps. **Abbreviations/Terms used in Offices**: Explanation of abbreviations/terms used in offices in day-today work.

Course Outcome:

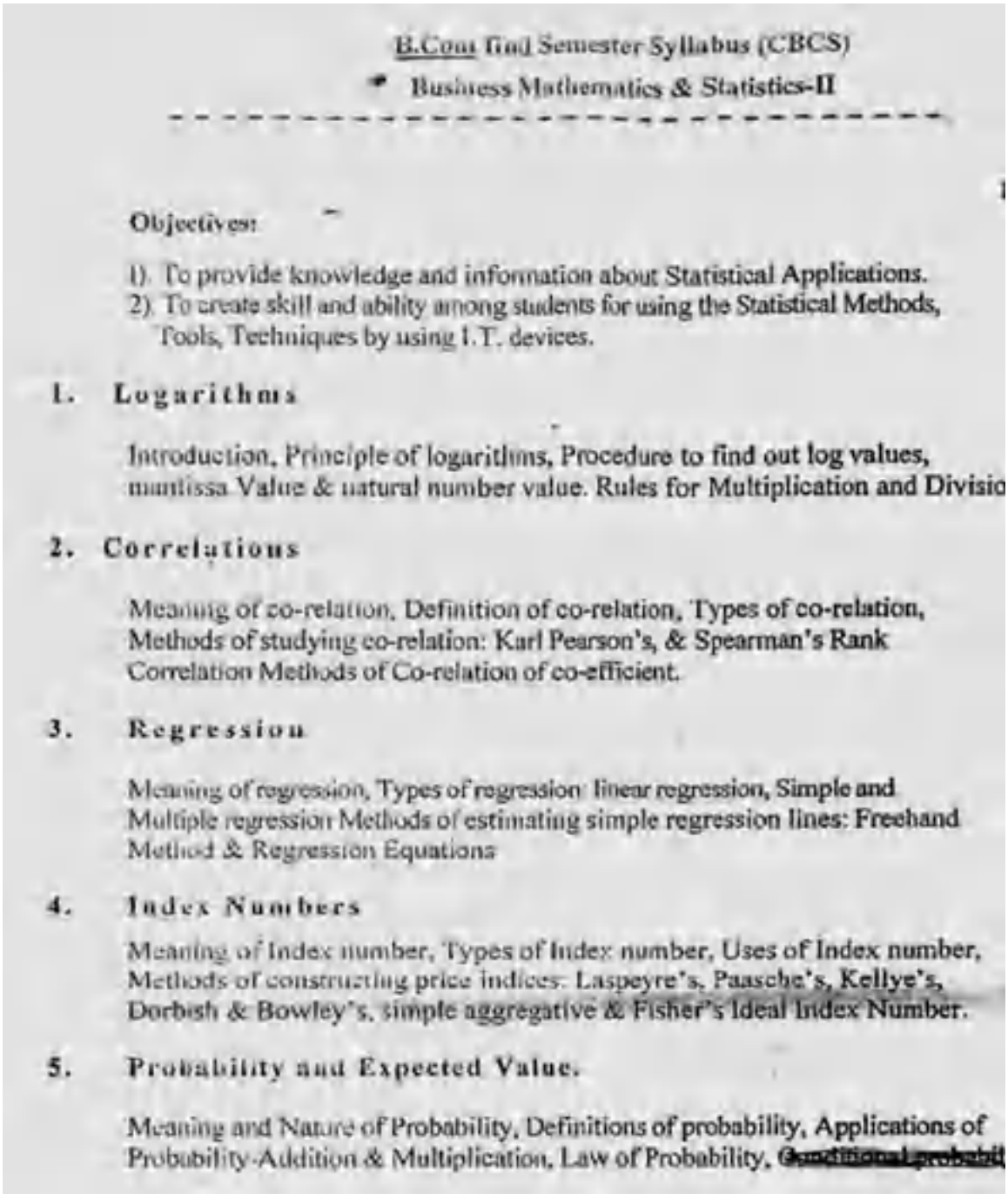
B.Com IInd Semester Syllabus (CBCS)
Financial Accounting-II

Theory: 80
Practical: 20

Objective: The purpose of this course is to develop the skill among the students about Preparing an organization's accounts.

Unit-I	**Accounting Principles and Accounting Standards (Theory)** AS-1, AS-2, AS-9, AS-10, AS-17
Unit-II	**Final Accounts of Non-trading Concerns (Numerical)** Meaning of Non-trading concerns, features, Capital and Revenue Receipts and Expenditures, difference between Receipts and Payments Account, Income and Expenditure Account, Preparation of Final Accounts.
Unit-III	**Branch Accounts (Numerical)** Meaning of branch and branch account, objectives of branch account, Classification of branches, Accounting for Dependent Branches-Methods of accounting for branch accounting: **Debtors System**-Meaning, cost price method and invoice price method, accounting entries in the books of head office and ledger accounts. **Stock and Debtors System**-meaning, accounting entries in the books of head office and ledger accounts
Unit- IV	**Departmental Accounts (Numerical)** Meaning, Objectives, Advantages of Department Accounts, Accounting Procedure- Unitary method and Tabular or Columnar Method, Allocation of Expenses and Incomes, Inter-departmental Transfers, Preparation of Departmental Trading, Profit and Loss Account and Balance Sheet.
Unit-V	**Consignment Accounting (Numerical)** Meaning of Consignment Account, Distinction between consignment and sale, Valuation of inventories, goods invoiced above cost, normal loss, abnormal loss, Accounting entries in the books of the consignor and consignee, Ledger accounts- consignment account, Goods sent on consignment account, inventories on consignment account, inventory reserve account consignee's account, consignor's account.

Course Outcome:



B.Com IInd Semester Syllabus (CBCS)

Business Mathematics & Statistics-II

Objectives:

1). To provide knowledge and information about Statistical Applications.
2). To create skill and ability among students for using the Statistical Methods, Tools, Techniques by using I.T. devices.

1. **Logarithms**

Introduction, Principle of logarithms, Procedure to find out log values, mantissa Value & natural number value. Rules for Multiplication and Divisio

2. **Correlations**

Meaning of co-relation, Definition of co-relation, Types of co-relation, Methods of studying co-relation: Karl Pearson's, & Spearman's Rank Correlation Methods of Co-relation of co-efficient.

3. **Regression**

Meaning of regression, Types of regression: linear regression, Simple and Multiple regression Methods of estimating simple regression lines: Freehand Method & Regression Equations

4. **Index Numbers**

Meaning of Index number, Types of Index number, Uses of Index number, Methods of constructing price indices: Laspeyre's, Paasche's, Kellye's, Dorbish & Bowley's, simple aggregative & Fisher's Ideal Index Number.

5. **Probability and Expected Value.**

Meaning and Nature of Probability, Definitions of probability, Applications of Probability-Addition & Multiplication, Law of Probability, Conditional probabil

Course Outcome:

B.Com IInd Semester Syllabus (CBCS)

Business Organisation And Management

Theory: 80
Practical: 20

Objective: The course aims to provide basic knowledge to the students about the organisation and management of a business enterprise.

Contents

Unit 1: Foundation of Indian Business **Lectures: 12**

Manufacturing and Service Sectors; Small and Medium Enterprises; Problems and Government policy. India's experience of liberalization and globalization. Technological innovations and skill development. 'Make in India' Movement. Social responsibility and ethics

Emerging opportunities in business; Franchising, Outsourcing, and E-commerce.

Unit 2: Business Enterprises **Lectures: 12**

Forms of Business Organization: Sole Proprietorship, Joint Hindu Family Firm, Partnership firm, Joint Stock Company, Cooperative society; Limited Liability Partnership; Choice of Form of Organization. Government - Business Interface; Rationale and Forms of Public Enterprises. International Business. Multinational Corporations.

Unit 3: Management and Organization **Lectures: 12**

The Process of Management: Planning; Decision-making; Strategy Formulation.

Organizing: Basic Considerations; Departmentation – Functional, Project, Matrix and Network; Delegation and Decentralization of Authority; Groups and Teams.

Unit 4: Leadership, Motivation and Control **Lectures: 12**

Leadership: Concept and Styles; Trait and Situational Theory of Leadership.

Motivation: Concept and Importance; Maslow Need Hierarchy Theory; Herzberg Two Factors Theory. Control: Concept and Process.

Unit V: Functional Areas of Management **Lectures: 12**

Marketing Management: Marketing Concept; Marketing Mix; Product Life Cycle; Pricing Policies and Practices Financial Management: Concept and Objectives; Sources of Funds – Equity Shares, Debentures, Venture Capital and Lease Finance. Securities Market, Role of SEBI. Human Resource Management: Concept and Functions; Basic Dynamics of Employer – Employee Relations.

Course Outcome:

B.Com Second Semester Syllabus
Business Communication and IT Application

Unit I: Communication
Meaning & Definition of Communication, Importance of Communication, types of Communication – (Verbal, Non Verbal), Barriers to Communication

Unit II : Business Correspondence :
Letter Writing, Presentation, Inviting quotations, Sending quotations, placing orders, Inviting tenders, Sales letters, claim and adjustment letters and social correspondence, Memorandum, Inter-office memo, Notice Agenda, Job application letter, preparing the Resume

Unit III : Internet technology

Introduction to computer networks : Introduction- need, advantages, disadvantages, types of networks, types of transmission media, Internetworking devices-bridges, routers, gateways, IP addressing: why IP address, basic format of IP address- IPV4, IPV6, Protocols - HTTP, HTTPS, FTP, DNS, Email

Unit IV: Electronic Communication
Meaning and Definition of Electronic Communication, Advantages & Disadvantages of Electronic Communication, Types of Electronic Communication, Web Pages, Email, Forums, Text & Instant Messaging, Social Networking, Video Chat etc., Monitoring of Electronic Communication, Developing a Policy

Unit V: Email, Social Networking and Oral Presentation.
Definition and Origin of E-mail, Message Format, Types of Email, Spam, Spoofing, Bombing. Social Networking Sites- Facebook, You Tube, Instagram, Twitter, Linkedin, Google+ etc. Oral Presentation : Presentation Plan, PPT, Visual Aids, Sales Presentation and Training Presentation.

Course Outcome:

B.Com II Semester Syllabus (CBCS)

Entrepreneurship Development-II

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Objectives :

1). To provide knowledge and information about Entrepreneurship Development.
2). To provide knowledge and create ability for setting up an enterprise within given Environment.

1. **Entrepreneurship**
   -Evolution of the concept
   -Characteristics
   -Growth in India
   -Role of Entrepreneurship in Economic Development
2. **Emerging Trends in Entrepreneurship Development.**
   -Women Entrepreneurship: Concept, Functions, Problems, Growth.
   -Rural Entrepreneurship: Meaning, Nature, Need & Importance, Problems
   -Traditional Pattern of Entrepreneurship in India
3. **Entrepreneurship Development Programme**
   -Need for EDP
   -Objectives of EDP
   -Contents of EDP
   -Phases of EDP
   -Evaluation of EDP
4. **Project Identification & Resource Management**
   -Meaning of Project
   -Project Identification
   -Project Selection
   -Resources of (Finance, Material, Market, Man power, Power, Land & Building)
   -Preparation of Project
5. **Project Preparation**
   -Introduction about Project
   -Background about Project (Product/Service)
   -Brief information about Product, Marketing, Resources generation etc.
   -Requirements of Project: Required Resources, Budget, Plant, Machinery & Other related things (Based on fixed and working capital approach)
   -Processing, Duration required and expected outcome
   -Marketing, Services etc.

Course Outcome:

B.Com IInd Semester Syllabus (CBCS)

Office Management-II

Theory: 80
Practical: 20

Objectives :

1). To provide knowledge and information about Office Management Practices.
2). To create skill and ability to operate office activities effectively(By using automation systems).

1.	**Modern Office and its Functions** -Introduction : Office -Meaning of Office -Work and activities of Office -Office functions and its Importance -Changing nature of Office activities -Current scenario and Practice	05
2.	**Office Systems and Procedures** -The concept of system, Meaning, Nature and definition -System analysis, Nature, Practice and Stages -Meaning of flow of work, Role of Manager in system and Procedural work	10
3.	**Office Services** -Meaning and Nature of office services, -Centralized Vs Decentralized Office Services, -Departmental work or categorization of work in office (Modern services and practices to be expected)	15
4.	**Record Management and Reporting** -Meaning and Nature of record, Record managing Practices, Filing, Indexing, Manual preparation, Record retentions, Safety Security and Disbursement Reporting: Meaning of reporting, Report Preparation, Report writing, Contents writing and Report submission/Presentation.	15
5.	**EDP Environment for Effective Office Management** -Need and requirement of EDP Environment, Availability of EDP based modern tools, techniques, devices, hardware, software and Human wares. -Knowledge about Computer, Hardware, Software and its application in day to day office work. -Knowledge about File creation, Folder Creation, Uploading, Downloading, Attachment, Merging, Conversion etc.	15

Course Outcome:

B.Com III[rd] Semester Syllabus (CBCS)
Corporate Accounting –I

Theory = 8(
Sessional = 1

Unit-I : **Issue and forfeiture of shares, Re-issue of forfeited shares**
Meaning of shares, Issue of shares-at par, at premium, at discount **(Theory),** Collection of share money Collection at lump sum **(Theory)** Collection in Installment Issue of share in consideration of assets etc. Procedure of Issue of shares, Prospectus, Application, Allotment, Pro-rata Allotment of shares, Forfeiture of shares, Reissue of shares, Profit on Re-issue, Journal Entries for Issue of shares, Balance sheet
(Numerical Problems)

Unit-II : **Redemption of Debentures**
Types of Debentures, Methods of Redemption- Redemption in Installment, Redemption in lamp sum, Redemption by conversion, Redemption by purchase in open market, Sinking Fund. – **(Theory)**
Finance for Redemption out of profit, out of fresh Issue Redemption in lump sum
Issue at "Par" Redeemable at "Par"
Issue at "Discount" Redeemable at "Par"
Issue at "Premium" Redeemable at "Par"**(Numerical Problems)**
Issue at "Par" Redeemable at "Premium"
Issue at "Discount" Redeemable at "premium" Sinking fund method
(Numerical)

Unit-III: **Redemption of Preference shares**
Types of Preference shares **(Theory)**
Redemption out of fresh Issue of shares
Redemption out of profits
Journal Entries for Redemption and Balance sheet after Redemption:
(Numerical)

Unit-IV: **Final Accounts of Joint stock company**, Statement Form **(Numerical)**

Unit-V: **Profit Prior to Incorporation (Theory and Numerical)**

Course Outcome:

Cost Accounting – I

Theory – 80 Marks
Sessional – 20 Marks

Unit – I	**Cost Accounting :** Meaning, Definition, Limitation, of financial Accounting, Development of Cost Accounting, Function, Objectives, Advantages, Disadvantages and limitations of cost accounting, Difference between Financial and Cost Accounting. **(Theory)**
Unit – II	**Elements of Cost :** Concept of Cost, Cost Units, Cost Centers, Cost Objects, Cost Drivers, Types of Cost, Classification of Cost – By Nature or Elements, By Function, By Variability, or Behaviour, By Controllability, By Normality, By Cost for Managerial Decision Making. **(Theory)**
Unit – III	**Material :** Concept, Objectives, Need, Essentials of Material Control, Purchase procedures, Function of purchase, department classification, and coding of material, fixation of levels of material, Economic Order Quantity, Material Handling Costs, Bin Cards, Stores Routines, Issue of Material, Issue Procedures, Methods of Pricing, Material Issue FIFO, LIFO, Simple Average, Weighted Average Method. **(Theory & Numerical)**
Unit – IV	**Labour :** Meaning, Definition, Recent Trends in Time Booking, Labour Control, Methods of Wage Payment, Time and Piece Rate, Incentives Scheme – Taylor's Differential Piece Rate System, Halsey Plan, Rowan Plan **(Theory & Numerical)**
Unit – V	**Overheads :** Definition, Direct and Indirect Costs, Importance of Overheads, Allocation, Apportionment and Absorption of Overhead, Methods of Distribution, Primary – Secondary distribution, repeated method, Machine Hour Rate, Under and Over absorption of overheads **(Numerical)**

Course Outcome:

I.T. Application in Business – I

Theory = 5(
Practical U/A = 5(

Unit – I	**C-LANGUAGE :** Introduction: Types of Languages – History of C language – Basic Structure – Creating – Compiling - Linking and Executing the C Program - Pre-processors in "C". Token- Constants- Keywords & Identifiers– Variables- Data types- declaration and assignment of variables – defining symbolic constants
Unit – II	**OPERATORS, EXPRESSIONS AND DECISION MAKING :** Introduction to Operator, Type of Operator, Arithmetic, Relational and Logical Operators, Assignment, Increment and Decrement of Operators – Conditional, bitwise and Special Operator, arithmetic expression and its evaluation – hierarchy of arithmetic operations – evaluations.
Unit – III	**CONTROL BRANCHING AND DECISION-MAKING IN C** - Decision Making in C, Introduction, if Statement, if-else Statement, Nested if Statement, if else if Ladder, switch case, GOTO statement.
Unit – IV	**LOOP** - Loop Introduction in C, while loop, do while Loop, for Loop with variations, Nested Loops, Loop interruption statement - break and continue.
Unit – V	**ARRAYS AND STRINGS:** - Arrays : Introduction - Defining an array - Initializing an array - One dimensional array – Two dimensional array - Dynamic array, Strings: Introduction - Declaring and initializing string variables - Reading and Writing strings - String handling functions.

Course Outcome: GST Account – I

Unit I **Introduction, Overview and Evolution of GST:**

1.1 Indirect tax structure in India; Difference between Direct & Indirect Taxes;
1.2 Introduction to Goods and Service Tax (GST) - Key Concepts
1.3 Important definitions, Meaning of terms used in GST, GST Council
1.4 Taxes under GST, Cess

Unit – II **Registration under GST:**

2.1 Threshold for Registration
2.2 Regular Tax Payer; Composition Tax Payer; Casual Taxable Person; Non-Resident Taxable Person
2.3 Persons not liable for registration.
2.4 Compulsory registration in certain cases.
2.5 Procedure for registration.
2.6 Unique Identification Number
2.7 Registration Number Format

Unit – III **Supply under GST and Valuation of Supply:**

3.1 Supply, Place of Supply, Intrastate & Interstate Supply,
3.2 Levy and Collection of IGST, CGST, SGST/UTGST
3.3 Time and Valuation of Supply

Unit – IV **Input Tax Credit and Tax Payments under GST:**

4.1 Input tax credit process
4.2 Negative List for Input tax credit
4.3 Input Tax Credit Utilization and Input Tax Credit Reversal
5.5 Payment of Tax, Interest and Penalties.

Unit – V **Documents, Accounts & Records, Returns under GST:**

5.1 Tax Invoice, Credit & Debit Notes.
5.2 Accounts and other records to be maintained.
5.3 Types of GST returns, particulars to be furnished, their due dates, late filing, late fee.
5.4 Annual Return and Audit under GST.

Unit – VI **Others:**

6.1 Overview of Schedule Entries and Tariffs under GST
6.2 E-Way Bill Procedure.
6.3 Accounting Entries (Journal entries, Ledger Posting) of GST Transactions.

Course Outcome: Banking

Unit – I	**AN OVERVIEW of BANKING INDUSTRY :** Definition of Banks. Evolution of Banking system in India. Banking reforms from 1991-2000. Bank crises in India. Critical evaluation of Banking Industry in India.
Unit – II	**COMMERCIAL BANKING :** Meaning and Definition of commercial Bank, Functions of Commercial Bank, Services offered by Commercial Bank. Retail Banking- Meaning, Features, Significance of Retail Banking and overview of its Products. Corporate Banking – Meaning, Features, significance of Corporate Banking and Overview of Its products. Nationalization, Privatization of Banks, Merger of Banks.
Unit – III	**RESERVE BANK of INDIA :** Objectives, Organization, Functions, Instruments of Credit control. Monetary policy of Reserve Bank of India and Role in Economic Development of the Country.
Unit – IV	**MODERN BANKING IN INDIA :** Meaning and importance of E Banking, Electronic payment System. Teller Machines- Branch Teller Machines (BTM) and Automated Teller Machines (ATM) Tele Banking, Internet Banking, Debit and Credit cards, Real Time Gross Settlement (RTGS) and National Electronic Funds Transfer System (NEFT), Electronic payment System.
Unit – V	**FINANCIAL INCLUSION :** Need and Extent, Features and Procedures of Pradhan Mantri Jan Dhan Yojana and PM Mudra Yojana, Features, Procedures and Significance of Stand Up India Scheme for Green Field.

Course Outcome: Marketing management

Unit – I	**Introduction to Marketing** : Definition, nature, scope and importance of marketing, traditional and modern concept of marketing, classification of markets, functions of marketing, Evolution of marketing.
Unit – II	**Strategic and Ethical Marketing :** Marketing strategy - definition & features, steps in strategic marketing planning process, SWOT analysis, Meaning and definition, scope, ethics in marketing, challenges facing marketers
Unit – III	**Marketing Mix and Channels of Distribution :** meaning and importance of marketing mix, elements of marketing mix – product mix, price mix, place and promotion mix. study of channels of distribution-and various, channels of distribution—factors to be considered in the selection of channels of distribution.
Unit – IV	**Marketing Management and Marketing Environment :** definition need & importance of marketing management, functions of marketing management, marketing environment - meaning of marketing environment, nature & scope of environment, micro & macro environment, emerging marketing opportunities in India, international marketing environment
Unit – V	**Agriculture Marketing :** Meaning, definition and scope, difference between agricultural product marketing and manufactured product marketing, factors affecting demand of agro products, importance of agriculture marketing

Course Outcome: Financial management

Unit – I	**INTRODUCTION** : Meaning of Business Finance, Definition, Nature and Scope of Financial Management, Importance & Objectives of Financial Management, Finance Function – Approaches & Aims, Function of Finance Manager.
Unit – II	**COST OF CAPITAL AND CAPITAL STRUCTURE :** Meaning, Concept, Significance of Cost of Capital,, Determination of Cost of Capital – Equity, Preference & Debentures, Retained earnings, Capitalization. Meaning of Capital Structure, Patterns of Capital Structure, Importance, Factors determining Capital Structure, Optimal Capital Structure, Theories of Capital Structure (Net Income, Net Operating Income, MM Hypothesis, Traditional Approach)
Unit – III	**LEVERAGES :** Meaning of leverage, Types of leverages-Financial, Operating and Combined leverage, Significance and limitations of Financial leverage, Distinction between Financial and Operating leverage.
Unit – IV	**WORKING CAPITAL MANAGEMENT :** Concept of Working Capital Management, Significance of working capital, Excess v/s Inadequate Working Capital, Factor determining working capital Needs, Operating Cycle, Working Capital Management – Cash, Inventory, & Receivable Management, Estimation of Working Capital requirement
Unit – V	**DIVIDEND POLICY & DECISION MAKING :** Introduction, Significance, Factors of Determinants of Dividend Policy, Forms of Dividends, Types of Dividend Policies.

Course Outcome: Indian Economy

Unit – I	**Introduction to Indian Economy :** Concept and Characteristics of Indian Economy, Types of Economies, Importance of Agriculture, Industry and Service Sector in Indian Economy, Need and Impact of Economic Reforms in India since 1991, Characteristics of India's Population, Present status of India in HDI rank, Need and Significance of Infrastructure, Impact of Demonetization & GST on Indian Economy.
Unit – II	**National Income :** Meaning and features of National Income, Concepts and Methods of measurement, Difficulties and Trends in National Income, Green GDP, India's place in world economy.
Unit – III	**Poverty and Unemployment :** ***Poverty:*** Concept and meaning, Poverty line, Absolute and Relative Poverty, Causes, Effects and Measurement of poverty, measures to eradicate Poverty. ***Unemployment:*** Concept, Types, Causes, Effects and government measures to reduce unemployment, Skill Development Schemes in India, Make in India.
Unit – IV	**Planning in India :** Meaning, Characteristics and Objectives of planning, Targets and Achievements of Five Year Plans.,12th Five Year Plan: Objectives, Achievements & Evaluation, NITI Aayog Nature Objectives and Functions.
Unit – V	**Budget :** Meaning, Features and Types of Budget, Structure of Budget- Revenue and Capital Budget, Concepts of Deficit, Gender Budget, FRBM Act 2003 with amendments, Recent Trends in Budget.

Course Outcome:

B.Com IVth Semester Syllabus (CBCS)
Corporate Accounting –II

Total Marks
Theory
Sessional

Unit-I :	**Amalgamation of Joint Stock Company** Purchase consideration, closing entries in the books of dissolving company, Acquisition entries and Opening Balance Sheet of New Company after Amalgamation
Unit-II :	**Absorption of Joint Stock Company** Purchase consideration, Ledger accounts in the books of Absorbed (Dissolved) company, Acquisition entries in the books of Absorbing Company, Balance Sheet after Absorption
Unit-III:	**Reconstruction of Joint Stock Company** Internal Reconstruction only
Unit-IV:	**Accounts of Holding Company (with one subsidiary)** Pre - Post Acquisition Profit, Reserve, Pre-Post Acquisition Loss, Inter-Company Debentures and Debts, Unrealized Profit, Consolidated Balance Sheet
Unit-V:	**Liquidation of Joint Stock Company** Solvent and Insolvent Company, Remuneration of Liquidator- Fixed, on Asset Realized, Preferential Creditors, Unsecured Creditors etc

Course Outcome:

B.Com IV[th] Semester Syllabus (CBCS)

Cost Accounting – II

Total Marks	10
Theory	80
Sessional	20

Unit – I	**Single or Output Costing:** Meaning, Definition, Features, Objectives, Element of Cost, Distribution of Overhead, Preparation of Cost Sheet, Tender and Quotation. **(Theory)**
Unit – II	**Contract Costing :** Meaning, Concept of Contract Costing, Preparation of Contract Account, Complete and Incomplete Contracts, Work in Progress, Profit on Contract **(Numerical)**
Unit – III	**Operating Costing or Service Costing:** Meaning of Operating Costing, Types of Operating Costing, Preparation of Electricity and Transport Cost Sheet. **(Numerical)**
Unit – IV	**Process Costing :** Meaning of Process Costing, Concept of Process Costing, Normal and Abnormal Gain, Loss, Equivalent Production, Preparation of Process Costing, Joint and By-product **(Theory/ Numerical)**
Unit – V	**Reconciliation :** Meaning, Objectives and Advantages of reconciliation, Reconciliation of Cost accounting records with Financial record. Procedure of Reconciliation, Methods of Reconciliation, **(Theory)**
	Sessional Work : 20 Marks 1. One Test : 05 Marks 2. One Tutorial : 05 Marks 3. Seminar and GD : 10 Marks

Course Outcome:

B.Com IVth Semester Syllabus (CBCS)
I.T. Application in Business – II

Total Marks	**100**
Theory	**50**
Practical	**50**

		Lectures
Unit – I	**Introduction to E-commerce** : E-Commerce- An Overview, Electronic Commerce Framework, Evolution of E-commerce: History of Electronic Commerce, Advantages and Disadvantage of E-commerce, Roadmap of e-commerce in India, E-Business : Definition, E-Business Models, Elements of E-business Models	12
Unit – II	**E-Marketplaces** Definition & Structure of E-Marketplace, Types of E-Marketplace, Types of Auctions and its Characteristics, Benefits ,Limitations and impact of Auctions, E-Commerce in the wireless environment.	09
Unit – III	**E-Business Applications and E-Payment Systems** :Integration & E-Business Suits, ERP-Overview of Software Solutions, ERP Implementation, Methodology and Framework, CRM, E-Payment, Categories and users of smart cards, Different Digital Payment methods	12
Unit – IV	**E-Business Impact on Different Fields and Industries :** E-Business Impacts : E-Tourism, Online Employment and Job Market, online Real Estate, Online Publishing & E-Books, Online Banking, Online Delivery of Digital Products, Entertainment and Media **E- Government** : Definition of E-Government, implementation, E-Government Services, Challenges & Opportunities, Benefits of E-Government	12
Practical 1. Students Shall Prepare a report on growth of E-Commerce in India from an authenticate source 2. Students shall list out Top B2B websites. 3. Students shall list out Top B2C websites. 4. Students shall list out E-Commerce websites whose advertisement is Aired on TV. 5. Students Should study the various payment methods & gateways available on E-commerce websites. 6. Preparing a model purchase order on Amazon.com/Flipkart.com 7. Model Railway ticket booking on IRCTC 8. Filing Online applications for various scholarships and concessions 9. Online application for Banking purpose like Bank Account, Loan, Fund transfer, Insurance Policy etc 10. Online Application for job using www.Nokari.com or any other job portal 11. Online Movie ticket Booking usingwww.Bookmyshow.com or any other booking portal		15

Course Outcome:

B.Com IVth Semester Syllabus (CBCS)
Goods and Services Tax (GST) – II

Total Marks 1
Theory 8
Sessional 2

Unit – I	**Documents, Accounts & Records, Returns under GST:** 1.1 Tax Invoice, Credit & Debit Notes. 1.2 Accounts and other records to be maintained. 1.3 Types of GST returns, 1.4 Particulars to be furnished in the Returns, their due dates, late filing, late fee. 1.5 Annual Return and Audit under GST.
Unit – II	**Composition Scheme under GST:** 2.1 Provision of Composition Scheme, Eligibility criterion for opting the scheme. 2.2 Comparative analysis and Decision making under Regular and Composition scheme. 2.3 Withdrawal from Composition Scheme
Unit – III	**Reverse Charge Mechanism under GST:** 3.1 Provision of Reverse Charge Mechanism (RCM). 3.2 Services covered under RCM. 3.3 Difference between RCM and Tax on URD. 3.4 Provisions of Self Invoicing and ITC under RCM.
Unit – IV	**Others:** 4.1 Overview of Schedule Entries and Tariffs under GST 4.2 E-Way Bill Procedure. 4.3 GST for E-Commerce Operators. 4.4 GST for Import, Export and SEZ Transactions. 4.5 Accounting Entries (Journal entries, Ledger Posting) of all GST Transactions. 4.6 Overview of Assessment, Demand, Recoveries and Penalties under GST.

Course Outcome:

B.Com IVth Semester Syllabus (CBCS)
Insurance (Elective)

Total Marks
Theory
Sessional

Unit – I	**Introduction to Insurance** Insurance: History, Meaning, Definitions, Features, Functions, Scope, Types, Principles, Importance, Contract of insurance, Insurable Risk and its Types
Unit – II	**Life Insurance** Life Insurance: History, Meaning Definitions, Principles, Importance, Types, Procedure of taking life insurance policy, Policy conditions and claims, life Insurance Corporation of India.
Unit – III	**General Insurance** General Insurance: History & Types (Marine, Fire, Motor, Health, Accident, Crop, Group Insurance, etc.)
Unit – IV	**Insurance Agency** Agent, Agent's qualification, procedure for becoming an Agent, Methods of Agent's Remuneration, Functions and Responsibilities of Agent, Ethical behaviors of Agent, Renewal and Cancellation of license.
Unit – V	**Recent Trends in Insurance Sector** Functional areas of IT in insurance sector (Marketing, Consumer Awareness, Customer Service, Finance, HRM, R&D, MIS Regulatory Control), Benefits and Factors affecting of e-insurance, IT and life Insurance Corporation of India: Online Insurance, Channels of online Insurance Premium Payments, Benefits of online insurance purchase, Procedure of purchase Online Insurance Policy, Unit linked Insurance Plan (ULIP)
	Practical's: 1 Collecting and identifying the features of various products of insurance (Life and General) (05 marks) 2 Evaluating a insorance policy by approaching any insurance office. (05 marks) 3 Report of one guest lecture of insurance agent (05 marks) 4 Evaluating various websites of insurance companies (05 marks)

Course Outcome:

B.Com IV[th] Semester Syllabus (CBCS)

Human Resource Management (Elective)

Total Marks	**100**
Theory	**80**
Sessional	**20**

Unit – 1	**Introduction to Human Resource Management :** Definition, Features, Objectives, & Importance of HRM, Qualities of good HR Manager, Changing Roles of Human Resource Manager, Issues in HRM – Workforce, Diversity, VRS, Downsizing, Work-life balance
Unit – II	**Human Resource Planning and Procurement :** HR Planning - Concept, Objectives, Importance, Process, Limitations, Human Resource Information System. Job Analysis – Job Description, Job Specification, - Concept and Purpose Recruitment – Definition, Internal & External Sources of recruitment. Selection – Concept, Process of Selection. Placement – Induction and Retention.
Unit – III	**Training and Development :** Meaning and Objectives of Training , Benefits of Training to Organization and Employees, Needs and Importance of Executive Development, Training & Development Methods – Apprenticeship, Understudy, Job Rotation, Vestibule Training, Case Study, Role Playing, Coaching & Mentoring, Management Development Games, Training Process Outsourcing.
Unit – IV	**Performance Appraisal :** Definition of Performance Appraisal, Objectives, Uses, Process of Performance Appraisal , Methods of Performance Appraisal.
Unit – V	**Discipline and Grievance :** Nature and Objectives of Discipline, Causes of Indiscipline, Principles and Procedure for disciplinary action, Red Hot – Stove Rule. **Grievance :** Meaning, Causes, Grievance Handling Mechanism.
	Practical - 20 Marks **(To be Conducted by the Department in each College as per Convenience)**

Course Outcome:

B.Com IV[th] Semester Syllabus (CBCS)

Import and Export Procedure & Practice (Elective)

Total Marks 1(
Theory 8(
Sessional 2(

Unit – I	**Documentation Framework :** Export Import Controls and Policy, Types of Documents: Export contract: Processing of an Export order.
Unit – II	**Export Financing Methods and Terms of Payments :** Negotiations of Export Bills, Methods of Payment in International Trade, Documentary Credit and Collection, UCP 500/501; Pre-Post Shipment Export Credits, Bank Guarantees, Foreign Exchange Regulations and Procedures.
Unit – III	**Cargo Credit and Exchange Risks:** Marine Insurance Need, Types and Procedure, ECGC schemes for risk coverage, and procedure for filing claims. **Quality Control and Pre-shipment Inspection Schemes :** Process and Procedures, Excise and Customs, Clearance – Regulations Procedures and Documentation.
Unit – IV	**Planning and Methods of Procurement for Exports :** Procedure for procurement through Import, Import Financing, Customs Clearance of Import Cargo, Managing risks involved in importing – Transit Risk, Credit Risk and Exchange Risk.
Unit – V	**Export Incentives :** Overview of export incentives-ECGC, Duty drawbacks, Duty exemption schemes, Tax Incentives, Procedures and Documentation. **Trading Houses :** Export and Trading Houses Schemes – Criteria, Procedures and Documentation, Policy and Procedures for EOU/FTZ/EPZ/SEZ units.
	Sessional - 20 Marks **(To be Conducted by the Department in each College as per Convenience)**

Course Outcome:

B.Com. IVth Semester Syllabus (CBCS)
Business Environment (Elective)

Totat Marks	**100**
Theory	**80**
Sessional	**20**

Unit – 1	**Business Environment :** Concept of Business Environment, Nature, Scope, Features, Needs and Importanee of Business Environment, Indian Business Environment.
Unit – II	**Problem of Growth :** Problems of Population, Poverty, Unemployment, Regional Imbalances, Agrieultural backwardness, Black Money, Inflation.
Unit – III	**Government Policies :** Industrial Policy 1948, 1956, 1977, 1980, 1991, 2019. Monetary Policy – Meaning and Definition, Objectives, Instrumeuts and Limitations of Monetary Policy, Export and Import Policy.
Unit – IV	**Economic Treods :** National Income, Saving and Investment, Price Trends in India, Income, Money Market, Foreign Trade and Balance of Payments.
Unit – V	**International Business Environment :** Foreign Capitai – Types, Needs, Importance, FDI , Foreign Capitai in India, IMF – International Monetary(IMF), World Trade Organization(WTO), World Bank.
	Practical - 20 Marks **(To be Conducted by the Department in each College as per Convenience)**

Course Outcome:

B.com Third Year
V Semester
Advanced Financial Accounting-I

Max Marks-50

Objective:–

The objective of this course is to equip the students with the ability to analyze, interprete and use Financial accounts in Business enterprises.

Unit-I- Social Accounting

Introduction, objectives and social performance and its indicators, application of Keynesian formula of saving and investment, social cost benefits and its measurement, Social Income statement and social Balance Sheet, Analysis of social cost and social benefits in India-

(Theory)- 08 Periods

Unit-II- Departmental Accounts

Introduction, objectives and advantages of Departmental Accounting, Methods of Departmental accounts. Allocation of Departmental Expenses, Provision for unrealized Profit, Problems related to Allocation of Expenses, Computation of Departmental Cost, Interdepartmental Transfer.

10 Periods
(Numerical Problems)

Unit-III- Investment Accounts

Introduction, Objectives of Investment Accounts, Fixed Income, Bearing Securities, variable income bearing securities, Purchase and Sales of investment on date of payment interest, Purchase and sales of investment before the date of payment of interest cum interest, fix interest, dividend purchase cum interest ex. Interest Dividend Sale some adjustment on equity shares investment Accounts.

15 Periods
(Numerical Problems)

Unit-IV- Bank Final Accounts- Vertical Format only

Introduction- Financial statement & Discloser, Form of Profit and Loss Account, form of Revised Balance Sheet as per scheduled stated Form A and Form B, special Adjustments and Provisions.

15 Periods
(Numerical Problems)

Unit-V- Accounts of Insurance Companies

Introduction- Preparation of Final Accounts- Fire, Marine & Accident Insurance, Forms of Revenue Accounts, Form of Profit &Loss A/C, Profit &Loss Appropriation Account, Form of general Balance sheet.

Course Outcome:

B.Com. Third Year
V Semester
Management Accounting-I

Max Marks-50

Objective:–

The objective of this course is to equip the students with the ability to analyze and interprete accounting information in managerial decision making. The Student is expected to have a good working knowledge of the subject. This course provide the student an understanding of the application of management accounting techniques.

Unit – I Management Accounting (Theory only)

i. Meaning, Definition, Scope of Management Accounting.
ii. Tools and Techniques of Management Accounting.
iii. Difference between Management Accounting and Financial Accounting.
iv. Advantages and Limitation of Management Accounting.

Unit – II Financial Statement Analysis (Theory only)

i. Meaning, Definition, Scope of Financial Statement.
ii. Meaning of Financial Statement Analysis.
iii. Tools of Financial Statement Analysis (Comparative Statement, Common Size Statement, Trend Analysis).

Unit – III Ratio Analysis (Numeric only)

i. Classification of Ratio.
ii. Calculation of Ratio, - G/P Ratio, N/P Ratio, Return on Capital Employed Ratio, Inventory Turnover Ratio, Debtors Turnover Ratio, Creditors Turnover Ratio, Current Ratio, Liquid Ratio, Proprietary Ratio.

Unit – IV Funds Flow Statement (Numeric only)

i. Funds From Operation (Only in Statement Form)
ii. Statement Showing Changes in Working Capital.
iii. Funds Flow Statement (Only in Statement Form)
iv. Preparation of Necessary ledger Accounts to Find out hidden information.

Unit – V Cash Flow Statement (Numeric only)

Cash Flow Statement As per Revised Accounting Standard – 3 only.

Course Outcome:

B.Com Third Year
V Semester
Cost Accounting-I

Max Marks- 50

1

Objective:-This course exposes the students to the basic concepts and the tools used in cost accounting.

Unit-I **Cost Accounting:** Meaning and definition, limitations of financial accounting, Development of Cost Accounting, Functions, Objective, Advantages and Limitations of Cost Accounting, Difference between Financial and cost Accounting, Elements of Cost, Classification of Costs. (Theory Only)

Unit-II Material: Concepts and objective of material control, Need and essentials of Material Control, Purchase procedure, Functions of purchase department Classification and Coding of Materials, Fixation of levels of material, Economic order quantity. (Theory only)

Unit-III Storage and Handling of Material : Organization and layout of stores, material handling costs, Bincards, Stores routine, issue of materials, issue procedure, methods of pricing material issues, Fifo, Lifo, simple average, weighted average Method. (Theory and Numerical)

Unit-IV **Labour:** Meaning and definition, Methods of time keeping and time booking, labour control, methods of wage payment, time and piece rate, incentive schemes-Taylor's differential piece rate system, Halsey plan, Rowan plan. [Numerical Problem]

Unit-V **Overheads:** Definition of Overhead, Direct and Indirect Cost, Importance of Overhead, Allocation, Apportionment and Absorption of Overheads, Methods of distribution-Primary, Secondary distribution repeated methods [Numerical Problem]

Course Outcome:

B.Com. Third Year
V Semester
Indirect Taxes & Direct Taxes-I

Max Marks- 50

Objective:- This course exposes the students to the basic tax concepts, procedure and Legislation pertaining to Indirect Tax.

Unit I : Indirect Taxes:
Definition, Characteristics, Advantages, Disadvantages, Types Special features of indirect tax, Contribution to Government revenues; Instrument of planning development and fiscal performance, An overview of Goods and Service Tax (GST).

Unit II : Central Excise: Introduction, Meaning, Nature and Scope, Central Excise Duty Act-1944, Important Terms and Definitions, Registration, Goods, Excisable Goods, Manufacture, and Manufacturer, Basis of chargeability of duties of central excise, classification and valuation of excisable goods, Adjudication, Appeals Settlement Commission, penalties, payment, recovery and refunds of duties.

Unit III: Customs Laws: Basic Concepts of Customs Law; Types of Custom Duties., Anti-Dumping Duty, Safeguard Duty; Valuation; Customs Procedures, Import and Export Procedures, Baggage, Exemptions, Penalties and Offences, Export Promotion Schemes, Special Economic Zones (SEZ).

Unit IV: Service Tax: (Law Relating to Service Tax as Contained in the Finance Act, 1994 as amended from time to time). Introduction, Nature of Service Tax, Service Provider and Service Receiver, Registration, Records to be maintained, Classification of Taxable Services, Payment of Services Tax, Returns, etc.

Unit V : Maharashtra Value Added Tax (M-VAT): Introduction, Meaning and features. Important definitions under M-VAT- Registration, Business, Dealer, Declared Goods, goods, Manufacturer, Person, Purchase price, Sale price, Tax Free Goods, Leavy of Tax, Returns and Assessment, Audit, Penalty and interests, Purchases and Sales Registers, Tax invoice, Exemptions, Set off, Compositions schemes, Tax liabilities, Rates of Taxes, Sales Tax Authorities and Tribunals.

Course Outcome:

B. Com. Third Year
V Semester
New Auditing Trends - I

Max Mark-50

Objectives:-

The Study of various components of this course will enable the students to know about the Auditing Procedure

Unit I. Auditing-

Meaning, Objectives, Scope, General Principles, Types of Errors and Frauds, Audit Programme, Audit Note book

Unit II:- Internal Check System:-

Internal Control - Meaning, Objectives and significance. Internal check and auditor.

Unit III. Vouching-

Meaning, Needs & Importance, Vouching of Cash & Credit transaction, Verification and Valuation of Assets & Liabilities.

Unit IV. Audit of Limited Companies-

Company Auditor- Appointment of Auditor, Power, Duties and Liabilities of Auditor, Remuneration of Auditor, and Removal of Auditor.

Audit Reports- Meaning and Definition of Report, Types of Reports -Standard report and Qualified Report.

Unit V:- Audit of Computerized System-

Auditing in an EDP environment, Planning and audit in a computer Environment, General EDP Control, EDP Application Control, System Development, Data Transfer, Audit practice in relation to computerized systems - Computer Assisted Audit Techniques (CAAT)

Course Outcome:

B.Com Third Year
V Semester
Banking & Insurance-I

Maximum Mark -50

Objectives:

1. To familiarize students with banking and practice of banking.
2. To equip the students with the knowledge of modern banking.
3. To develop employability of students in banking, financial and other economic sectors.

Unit- I Banking in India

i. Meaning and definition of Bank, Banking and Banking Company.
ii. Commercial Banks: Introduction, Structure of Commercial Banks in India, functions, credit creation by commercial Banks, Principle of liquidity and profitability.
iii. Co-operative Banks: Introduction, Structure, organization and management, progress and problems.
iv. Regional Rural Banks: Introduction, objectives, organization and management, progress and problems.

Unit – II Central Bank

The Reserve Bank of India: Introduction, organization and management General functions, regulation of money and credit supply, credit control measures.

Unit- III Banker and Customer

The relationship between a Banker and a customer, general relationship – special relationship, statutory obligation to honour cheques- Bankers lien. Duty to maintain secrecy of customers account, right to claim incidiential charges, right to charge compound interest Banking Ombudsman.

Unit- IV Account of Customers:

i. General precautions for opening accounts, KYC (Know Your Customer), Types of deposit accounts, Fixed deposit receipt, nomination, TDS.
ii. Special types of customers, minor, married women, Drunkards, Lunatic; Partnership, Joint stock companies unincorporated bodies. Executor and administrators. Trusts accounts, Joint accounts.
iii. Principles of sound lending, secured and unsecured advances, Forms of advances.
iv. Modes of charging security : Lien, Pledge, Mortgage, Assignment, Hypothecation.

Unit- V Electronic Banking (E-Banking):

Introduction, Traditional banking v/s E-Banking, electronic delivery channels (ATMs, Smart cards, telebanking, internet banking,) E-banking transaction, Truncated cheques and electronic cheques, MCqb product, Advantages of E-Banking, constraints in E-Banking, security measures, RTGS & NEFT.

Course Outcome:

B.COM Third Year

V Semester

Small Business Paradigm and Supply Chain Management-I

Max Mark -50

Objective: To equip the students with prospects and problems faced by small business units. To orient the students with environment of small business in India.

Unit-I - Small Business in Indian Environment:

Definition of Small Business Enterprises (SBE) - Characteristics and Advantages of SBEs, Economic, Social, Political, Cultural and legal environment governing small scales. MSMED Act, 2006: Need, Objectives, Important Provisions

Unit – II- Industrial Policies and Strategies Relating to Small Scale Sector:

Small scale sector in Industrial policies- Various IPRs since 1991

Incentives & Subsidies for SBE- Need, advantages, Fiscal incentives, Taxation benefits, subsidies, reimbursements (Given by central & State Government).

Promotion & Development Policies for SBEs: Reservation Policy, Purchase preference policy, Price preference policy, Technical assistance, Financial assistance, Technology Business incubators

Unit - III Institutional Support to SBEs

Ministry of Micro, Small & Medium Enterprises: Objectives and Role. (www.msme.org.in)

Financial Institutions: SIDBI, NABARD, Commercial Banks, Regional Rural Banks, Cooperative Banks: Brief Review

Support Institutions: NSIC, SIDO, DIC, NIESBUD, Online shopping portal for SBEs (www.msmeshopping.com)

Unit - IV Problems and Sickness in the small scale sector:

Special problems in the management of small business in various functional areas like finance, marketing, production and personnel. Concept of Sickness, causes, remedies

Unit - V Exports in Small Business

Meaning of Export, Benefits, Factors affecting exports, Institutions Assisting Export Promotion of small business in India; Export Promotion Councils, Global Perspective of Small Business in selected Countries.

Course Outcome:

B.Com. Third Year
V Semester
Cooperative Management & Retail Management - I

Max Marks – 50

Objective:-

The Objective of the course is to expose the Students to the managerial aspects of co-operative organizations and the changing market structure with globalization of the Indian economy.

Unit – I - Co-operative Movement in India.

Co-operative Management Nature and functions- Feature and Historical development.

Unit-II:- Co-operative Law:

Evolution of co-operative legislation in India- recent developments in co-operative legislation. The constitution (97^{th}) amendment Act 2011- Provision relating to registration amendment, management, audit and liquidation of co-operative societies.

Unit- III Co-operative Movement

Placement and the role of board of directors in co-operative Management, the state and the co-operative movement. Nature and functions of professionalized management for co-operations role of leadership in co-operative management.

Unit-IV:- Co-operative Administration:

A global respective ecology of co-operative administration, the co-operative sector and economic development. Co-ordination between trading co-operatives & public sector trading agencies, problems & aspects.

Unit-V:- International Institutional Supporting Co-operative Development:

International co-operative alliance International Labour Organization, food and agriculture organization.

Course Outcome:

B.Com. Third Year
Semester V
Rural Development & Agricultural Marketing - I

Maximum - 50 Marks

Objectives:

The objective of this course is to understand the concept of rural development in India. It enables to study the present status and development of the rural area through various schemes.

Unit -I Rural Development

i. Rural - Meaning and Definition
ii. Pre-dominance of rural economy in India
ii. Causes of Rural Backwardness
iii. Rural Development - Meaning, Definition and significance of Rural development

Unit-II Rural Segmentation- Labor, Farmer, Artisans.

i. Rural Population in India
ii. Agricultural Labors in India
iii. Small Farmers and Rural Artisans in India

Unit - III Rural Poverty and Rural Unemployment

i. Meaning and definition of Poverty
ii. Causes of rural poverty
iii. Remedies of eradication of rural poverty
iv. Problems of Rural Unemployment
v. Measures to overcome poverty& Unemployment

Unit -IV Rural Finance

1. Problem of Rural indebtedness
2. Need for rural Credit
iii. Rural credit mechanism (Institutional & Non institutional)
iv. Role of District Co-operative Bank in rural credit
iv. Role of Commercial banks in rural credit
v. Role of NABARD in Rural Development.

Unit - V Rural Development Programs in India

i. Rural Development Program - Meaning , Strategy
ii. Rural Development and Panchayat Raj System - its concept and structure.
iii. Mahatma Gandhi National Rural Employment Guarantee Act" (or, MGNREGA).
iv. Indicators of Rural Development - Agricultural, Infrastructural, Human and Economic

Course Outcome:

B.Com Third Year
V Semester
Information and Communication Technology -I

Max Marks 50

Objective:

The main objective of the subject in to familiarize the students with the programming in C environment.

Unit -I: C Language - Introduction to C, History, Character set Tokens of C - tokens-constant keywords and identifiers - variables- data types- declaration and assignment of variables- defining symbolic constants.

Unit-II-Operators and Expressions: Types of Operators- Arithmetic, Relational and Logical Operators Assignment, increment and decrement of operators - conditional bitwise and special operators - arithmetic expression and its evaluation - hierarchy of arithmetic operations - evaluations, precedence and associatively - mathematical functions.

Unit-III- Control Branching and Decision-Making in C - If statement Switch statement- GOTO statement – The? : Operators.

Unit-IV- Loops - WHILE DO, and FOR statements with variations, Nested Loops, Loop interruption statement- break and continue.

Unit-V- Arrays in C Single Two - dimensional and Multi-dimensional arrays. Handling of Character Set: Declaration & Initialization of string variables - reading from and writing to screen -Arithmetic operations - String handling functions.

Course Outcome:

B.Com. III Year
VI Semester
Advanced Financial Accounting-II

Max Mark-50

Unit -I –Stock Market

Introduction to sock Market. Meaning, Functions & Procedure of Listing of Securities and D-Mat Accounts.

(Theory only)- 05 Periods

Unit –II – Accounts of Electricity Company

Introduction, Features of Double Account system, Advantages and Disadvantages of Double Account System, Preparation of accounts- Revenue Account, Net Account, Capital Account and General Balance Sheet with special effect of Adjustment.

(Numerical Problems) 15 Periods

Unit –III – Insolvency Accounts.

Introduction, Insolvency Act, Insolvency of an individual, Preparation of Accounts as per Act, Statement of Affairs and Deficiency Accounts, Important Adjustments.

(Numerical Problems) 15 Periods

Unit –IV – Accounts for Local Government

Introduction, Powers and duties of Grampanchayat and funds, vesting of public property of Grampanchayat, Norms and Rules regarding application of cash and accrual basis system, problem of present Accounting system, Reception and Payment Account.

Municipal Accounting – Introduction, fundamental, characteristics, Books of Account, Income and expenditure and Balance Sheet.

(Numerical Problems) 15 Periods

Unit –V – Farm Accounting (Dairy and Poultry only)

Introduction, Objectives of Farms Accounting, Methods of Farm Accounting, various concepts of Agro cost, Preparation of accounts, farm accounts, Balance Sheet with special Adjustments.

Course Outcome:

B.Com. III Year

VI Semester

Management Accounting - II

Max Marks-50

OBJECTIVES

The objective of the course is to equip the students with the ability to analysis interpret and use accounting information in managerial decision making. The student is expected to have a good working knowledge of the subject. This course provides the students an understanding of the application of Management accounting techniques.

Unit - I Budget & Budgetary Control: (Theory)

1. Meaning, Definition, and Classification of Budget
2. Meaning and Objectives of Budgetary Control
3. Advantages and Limitations of Budgetary Control

Unit - II Cash Budget: (Numeric)

i. Preparation of Cash Budget under Receipt & Payment Method

Unit - III Functional Budgets: (Numeric)

i. Preparation of Production and Purchase Budget
ii. Preparation of Sales Budget
iii. Preparation of Master Budget

Unit - IV Capital Budgeting: (Numeric)

1. Meaning and Types of Capital Budgeting
2. Pay Back Period Method
3. Discounted Cash Flow Method - Net Present Value Method

Unit - V - Responsibility Accounting: (Theory)

1. Definition, Meaning, Basic Principles, Basic Process in implementation,
2. Responsibility Reporting, Centers of Control - Cost Centre, Revenue Centre- Responsibility Centre - Profit Centre- Investment Centre.
3. Benefits of Responsibility Accounting.

Course Outcome:

B.Com. III Year
VI Semester
Cost Accounting – II

M:

Unit-I Single or Output Costing: Elements of cost, Preparation of Cost Sheet, Tender and Quotations.

Unit-II Contract Costing: Complete and Incomplete Contracts, work in Progress Profit on Contract.

Unit-III Operating Cost Sheet: Electricity & Transport

Unit-IV Process Costing:

Unit-V Reconciliation: Reconciliation of Cost and Financial Accounts

Course Outcome:

B.Com. III Year

VI Semester

Indirect Taxes & Direct Taxes- II

Max Marks-50

Unit I : Income Tax Act 1961:

Introduction to Income Tax Act 1961., Basic Concepts, Assessee, Person, Income, Classification of Income, Agricultural Income, Casual Income, Assessment, Previous year, Assessment Year, Heads of Income, Gross Total Income, Total Income, Incomes exempt from Income tax, Deductions in computation of Total Income, Filing of Return, Advance payment of Tax, Tax deduction at Source, Refund of tax.

Unit II : Income from Salary (Numerical):

Meaning: definition of Salary, Computation of Income from Salary - Allowances, Perquisite, Gross Salary, Deductions from gross salary, Net Salary.

Unit III: Income from Business and Profession (Numerical)

Business, Profession, Deemed income from business or profession, Computation of income from business and profession, Deductions.

Unit IV: Income from House Property (Theory):

Basis of charge, Annual Value, Determination of Annual Value, Computation of Income from House Property, Deductions U/s 24.

Unit V: (A) Income from Capital Gain (Theory):

Basis of Charge (Section 45), Meaning of Capital Assets, Types of Capital Gain - Short term and Long term Capital Gain, Cost of inflation index, Computation of Capital Gain, Exemptions in respect of Capital gain(U/s 54).

(B) Income from Other Sources (Theory):

Income taxable under the head Income from other Sources u/s 56. Deductions from income from other sources u/s 57.

Course Outcome:

B. Com. III

Semester VI

New Auditing Trends - II

Total Marks 50.

Objectives:-

The Study of various components of this course will enable the students to about the concepts of New Auditing Trends.

Unit I:- Cost & Management Audit-

A) **Cost Audit:-** Meaning, Definition, Nature, Objectives, of Cost Audit. Advantages of cost audit.

Cost auditor - Qualification and Appointment, Rights and power of cost Auditor.

Cost audit programme, Cost audit report.

B) **Management Audit:-** Meaning & Defination, Objectives of Management Audit, Need for Management Audit, Work & Duties of Management Audit.

Unit II:- Human Resource Audit:-

Meaning, Definition, Scope and Importance of Human Resource Audit

Advantages and Disadvantages of Human Resources Audit.

Unit III:- Investigation:-

Meaning, Definition, Objectives and Characteristics of Investigation.

Difference Between Audit and Investigation, Types of Investigation.

Unit IV:- Trends in Cooperative Audit

Special Features in respect of Audit of Co-operative Sugar Industries.

Unit V:- Tax Audit-

Meaning of Tax Audit, Auditor's Role under Income Tax Act, Compulsory Tax Audit, Certification for Claiming Exemptions, Selective Tax Audit, Tax Consultancy and Representation.

Course Outcome:

B.Com. III Year
VI Semester
Banking & Insurance – II

Max Marks-50

Objective:- This Course enables the students to know Fundamentals of Insurance.

Course Input:-

Unit- I : Introduction of Insurance:

Meaning, Basic principal and Significance of insurance, insurance contracts, Elementary Knowledge of Life Insurance Corporation Act, 1956, IRDA 2000.Privitisation of Insurance Business in India, Impact of Liberalization on insurance Business.

Unit- II : Insurance Agent: Definition of an Agent, Qualification and Disqualifications, Duties and Function of an Insurance Agent ; Agents compensation. Insurance intermediaries.

Procedure for Becoming an Agent : Pre-requisite for obtaining a license; renewal, cancellation of license; code of conduct for Insurance Agent.

Unit- III : Life Insurance : Meaning, Features, Importance, Type and Principal of Life Insurance. Selection of Lives and Risk.

Unit- IV: Procedure of Talking of Life Insurance Policy: Proposal FORM , Medical Examination, Age Proof, Agent's Report, Moral Hazard Report, Underwriting; Insurance Premium, Mode of Payment. Procedure regarding settlement of policy claim: life Insurance policy Conditions and Various Clauses and privileges.

Unit- V :General Insurance : Principles and functions of General Insurance, Types of General Insurance (viz- Marine, fire Accident, Health and crop insurance, Lone Insurance, Third Party, Vehicle Insurance,) Risk and Underwriting.

Course Outcome:

B.Com. III Year
VI Semester
Small Business Paradigm & Supply Chain Management – II

Unit I : Understanding the Supply Chain
- i. What is a Supply Chain?
- ii. The Objective of a Supply Chain
- iii. The Important of Supply Chain Decisions
- iv. Decision Phase in a Supply Chain
- v. Process View of a Supply Chain
- vi. Example of Supply Chain

Unit II : Supply Chain Performance: Achieving Strategic Fit and Scope
- i. Competitive and Supply Chain Strategies
- ii. Achieving Strategic Fit
- iii. Expanding Strategic Scope

Unit III: Supply Chain Drivers and Metrics
- i. Drivers of Supply Chain Performance
- ii. Framework for Structure Drivers
- iii. Facilities
- iv. Inventory
- v. Transportation
- vi. Information
- vii. Sourcing
- viii. Pricing
- ix. Obstacles to Achieving Fit

Unit IV : Demand Forecasting in a Supply Chain
- i. The Role of Forecasting in a Supply Chain
- ii. Characteristics of Forecasts
- iii. Components of Forecasts and Forecasting Methods
- iv. Basic Approach to Demand Forecasting
- v. Time-Series Forecasting Methods
- vi. Measures of Forecast Error
- vii. Forecasting Demand at Tahoe Salt
- viii. The Role of IT in Forecasting
- ix. Risk Management in Forecasting

Unit V : Transportation in a Supply Chain
- i. Role of Transportation in a Supply Chain
- ii. Models of Transportation and Their Performance Characteristics
- iii. Transportation Infrastructure and Policies
- iv. Design Options for a Transportation Network
- v. Trade-Offs in Transportation Design
- vi. Tailored Transportation
- vii. The Role of IT in Transportation
- viii. Risk Management in Transportation

Course Outcome:

B.Com. III Year
VI Semester
Rural Development & Agricultural Marketing- II

Max Marks-50

Unit I : Agriculture Marketing – Importance, Merits, demerits and Measures to improve it.

Unit II : Functions of Agricultural Marketing – Agricultural Marketing System, Problems of Agricultural Marketing and Measures to solve them.

Unit III : Regulated and Co-operative market

- Characteristics of Regulated market
- Advantages of Regulated market
- Merits & demerits of co-operative market
- National Agricultural Co-operative marketing federation.

Unit IV : Agricultural produce – Problems of agricultural produce, characteristics of agricultural goods, wholesale agricultural Markets-Local-terminal jobbing & secondary markets, recent trends in marketing of consumer, Industrial & agricultural goods.

Unit V : Agricultural price policy – Nature of Demand & supply of Agricultural product, price instability – objectives of Agricultural price policy.

Course Outcome:

B.Com. III Year

VI Semester

Information and Communication Technology-II

Max Marks-50

Objective: To familiarize the students with all the latest new age system prevalent in business domain.

Unit-I - E-banking

Electronic banking, internet banking in India, Inter- bank transaction, electronic Payments, benefits, Payment getaways, requirement and process, ATM Automated clearing house Transfers, Credit Cards Features Debit Cards types benefits and drawbacks, smart card application and categories, electronic clearing system & its benefits, facilities through e-banking. NFT SWIFT, RTGS, Net Banking

Unit-II - Security in e-banking

Security precautions, Technology, Secure Socket Layer, SSL working, Firewalls, Digital signature, ATM Security, Tips & Steps for Debit Cards lost, electronic Payment Safeguards.

Unit-III - Enterprise Resource Planning (ERP)

Introduction, Evolution, Features, Advantages, of ERP, Modules ERP Products- SAP, BAAN, AVLON, MFG/PRO.

Unit-IV- Business Process Outsourcing (BPO)

Introduction Advantages Challenges, BPO in India, Call Centre and its dynamics varieties of Call Centres.