a: Written (OBJECTIVE TYPE) Examination

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Subject</th>
<th>No.of Questions</th>
<th>Duration (Minutes)</th>
<th>Maximum Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Paper-I: General Studies</td>
<td>150</td>
<td>150</td>
<td>150</td>
</tr>
<tr>
<td>2</td>
<td>Paper-II: Optional Subject (One paper)</td>
<td>150</td>
<td>150</td>
<td>150</td>
</tr>
</tbody>
</table>

b: Oral Test (Interview)

Total Marks: 330

NOTE: The candidates have to choose ONE subject from the following for Paper-II Optional Subject:

<table>
<thead>
<tr>
<th>Code No.</th>
<th>Subject Name</th>
<th>Code No.</th>
<th>Subject Name</th>
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</thead>
<tbody>
<tr>
<td>01</td>
<td>English Literature</td>
<td>15</td>
<td>Sociology</td>
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<tr>
<td>02</td>
<td>Hindi Literature</td>
<td>16</td>
<td>Agriculture</td>
</tr>
<tr>
<td>03</td>
<td>Telugu Literature</td>
<td>17</td>
<td>Animal Husbandry &amp;. Veterinary Science</td>
</tr>
<tr>
<td>04</td>
<td>Urdu Literature</td>
<td>18</td>
<td>Botany</td>
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<tr>
<td>05</td>
<td>Anthropology</td>
<td>19</td>
<td>Chemistry</td>
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<tr>
<td>06</td>
<td>Commerce</td>
<td>20</td>
<td>Geology</td>
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<td>07</td>
<td>Economics</td>
<td>21</td>
<td>Mathematics</td>
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<td>08</td>
<td>Geography</td>
<td>22</td>
<td>Physics</td>
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<td>09</td>
<td>History</td>
<td>23</td>
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<td>10</td>
<td>Law</td>
<td>24</td>
<td>Zoology</td>
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<td>11</td>
<td>Philosophy</td>
<td>25</td>
<td>Civil Engineering</td>
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<tr>
<td>12</td>
<td>Political Science</td>
<td>26</td>
<td>Electrical Engineering</td>
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<tr>
<td>13</td>
<td>Psychology</td>
<td>27</td>
<td>Electronics &amp; Communication Engineering</td>
</tr>
<tr>
<td>14</td>
<td>Public Administration</td>
<td>28</td>
<td>Mechanical Engineering</td>
</tr>
</tbody>
</table>

N.B: 1. The selection to the post will be based on the total marks obtained at the Written examination and Oral test taken together subject to Special Rules and local cadre rules.
2. The candidates will be called based on the merit in the written examination for an interview at the ratio of 1:2 with reference to the no.of vacancies in terms of General Rule 22 and 22-A including local reservation and with due regard to the qualifications prescribed for the post.
3. The candidates belonging to SC/ST/BC/PH may be called for interview by relaxing the minimum qualifying marks at the discretion of the Commission. If the Commission is of the opinion that sufficient no.of candidates from these communities are not likely to come up for interview.
4. Appearance for all the written papers at the written exam and Oral test, if qualified is compulsory and there will be no waiting list as per Rules.

SYLLABUS

GENERAL STUDIES

General Science
Current events of National and International importance.
History of India and Indian National movement. India and World Geography.
Indian Polity and Economy.
General mental Ability.
Questions on General Science will cover General appreciation and understanding of science including matters of everyday observation and experience, as may be expected of a well educated person who has not made a special study of any particular scientific discipline. In current events, knowledge of significant national and international events will be tested. In History of India, emphasis will be on broad general understanding of the subject in its social, economic and political aspects. Questions on the Indian National Movement will relate to the nature and character of the nineteenth century resurgence, growth of nationalism and attainment of Independence. In Geography, emphasis will be on Geography of India. Questions on the Geography of India will relate to physical, social and economic geography of the country, including the main features of Indian agricultural and natural resources. Questions on Indian Polity and Economy will test knowledge of the country's political system and Constitution of India, Panchayati Raj, Social Systems and economic developments in India. On general mental ability, the candidates will be tested on reasoning and analytical abilities.
OPTIONAL SUBJECTS

03. TELUGU LITERATURE

Unit I: Age of Ithihasasas and Puranas - Major poets and their works - Aesthetic approach of different poets and historical background.
Nannaya, Tikkana, Errana, Nannechoda, Palkuriki Somanna, Marana, Kethana, Manchana, Nachana Somana, Ramayana Poets.

Unit II: Age of Kavyas and Katha Kavyas: Major poets during the period and their works Poetic qualities of the poets:
Srinatha, Pothanna, Vallabhamatya, Pillalamarri Pina Veerabhadrana, Nandimallaya and Ghanta Singana, Koravi Goparaju, Anantamatya, Annamayya etc.

Unit III: Age of Prabandhas: Evolution of Prabandhas - Works and poetic talents of the poets during the period.
Srikrishnadevaraya, Ashtaggaja poets and other major poets.

Unit IV: Telugu literature of Southern School: Literary genres like Prabandha, Dvipada, Yakshagana, Geya, Kirthana, Prose works and major poets and writers of these works.

Unit V: Telugu language and literature during nineteenth century, Evolution of Telugu prose contribution of Telugu and Western scholars to Telugu language and literature.


Unit VIII: Poetics and literary criticism: Rasa, Dwani, Alankara, Rithi, Vakrokti, Auchitya – Major trends in Literary criticism and major writers.

Unit IX: Grammar and Alankaras – Major Sanskrit and Telugu Sandhis applicable to Classical and Modern Telugu.
The Alankaras (Artha and Sabda): Upama, Rupaka, Utpreksha, Ananvaya, Dipaka, Parinama, Upameyopama, Sandeha, Bhrantimat, Smruti, Arthantaranyasa, Drustanta – Anuprasa, Yamaka.

Unit X: Structure of Modern Telugu: Classification of the vocabulary – Plural formation, cases, verbs, major divisions of Telugu sentences – simple, complex, compound sentences.
01. ENGLISH LITERATURE

PART – ‘A’

UNIT 1.1: SHAKESPEARE:
A Midsummer Night’s Dream
Measure for Measure
Hamlet
The Tempest

UNIT 1.2: SHAKESPEARE’S CONTEMPORARIES:
The Play of Everyman
Christopher Marlow: Doctor Faustus
Ben Jonson: The Alchemist
John Webster: The Duchess of Malfi
Edmund Spenser: The Faerie Queene, Book 1

UNIT II.1: SEVENTEENTH-CENTURY LITERATURE:
John Milton: Paradise Lost, Books 1, 4 and 9
Milton’s English Sonnets
John Donne: The Sonnets
“The Flea”; “Canonization”; “Valediction Forbidding Mourning”
John Dryden: All for Love

UNIT II.2: RESTORATION LITERATURE:
William Congreve: The Way of the World
John Bunyan: The Pilgrim’s Progress

UNIT III.1: THE EIGHTEENTH-CENTURY NOVEL:
Daniel Defoe: Moll Flanders; Robinson Crusoe
Jonathan Swift: Gulliver’s Travels
Henry Fielding: Joseph Andrews
Oliver Goldsmith: The Vicar of Wakefield
Horace Walpole: The Castle of Otranto

UNIT III.2 EIGHTEENTH-CENTURY POETRY:
Alexander Pope: The Rape of the Lock
Samuel Johnson: “London”
Oliver Goldsmith: The Deserted Village
William Blake: From Songs of Innocence, “Introduction”, “Lamb”, “Nurse’s Song”, “Holy Thursday” and from Songs of Experience; “Tyger”, “Nurse’s Song”, “Holy Thursday”, “Poison Tree”.

UNIT III.3 EIGHTEENTH-CENTURY DRAMA:
Henry Fielding: Tom Thumb
John Gay: The Beggar’s Opera
R.B. Sheridan: The Rivals

UNIT IV.1 ROMANTIC POETRY:
S.T. Coleridge: Rime of the Ancient Mariner, “Christabel”, “Dejection, an Ode”
P.B. Shelly: “Ode to the West Wind”
John Keats: “The Grecian Urn” and “The Nightingale”

UNIT IV.2: THE ROMANTIC NOVEL:
Sir Walter Scott: Ivanhoe
Jane Austen: Pride and Prejudice; Persuasion
James Hogg: Confessions
UNIT IV.3: ROMANTIC PROSE:
The Major Essays of Charles Lamb and William Hazlitt; De Quincey's “On knocking at the Gate in Macbeth”, The Preface to The Lyrical Ballads (1800)

PART-B

UNIT V.1: THE VICTORIAN NOVEL:
Charlotte Bronte: Jane Eyre
Emily Bronte: Wuthering Heights
Charles Dickens: Oliver Twist
Thomas Hardy: Jude the Obscure
Joseph Conrad: Heart of Darkness
R.L. Stevenson: Treasure Island

UNIT V.2: VICTORIAN POETRY:
Tennyson: “Mariana”, “The Lady of Shalott”, “Ulysses”, “Crossing the Bar”,
Robert Browning: “My last Duchess”, “Soliloquy of a Spanish Cloister”, “Love among the Ruins”
Matthew Arnold: “Forsaken Merman”, “Dover Beach”, “The Buried Life”
Thomas Hardy: “She Hears the Storm”, “The Ruined Maid”, “Convergence of the Twain”

UNIT VI.1 THE MODERN NOVEL:
James Joyce: Portrait of an Artist as a Young Man
Virginia Wolf: To the Lighthouse
Graham Greene: The Power and the Glory
William Golding: Lord of the Flies

UNIT VI.2 MODERN POETRY:
T.S. Eliot: The Waste Land
W.H. Auden: “W.B. Yeats”, “The Unknown Citizen”
Ted Hughes: Poems from Crow

UNIT VI.3 MODERN DRAMA:
G.B. Shaw: St.Joan
John Osborne: Look Back in Anger
Samuel Beckett: Waiting for Godot
Harold Pinter: Birthday Party

UNIT VII CRITICAL TEXTS:

UNIT VIII FORMS OF LITERATURE:
Epic- Paradise Lost
Sonnet- Shakespeare’s, John Donne’s, Keats’s Sonnets;
Dramatic Monologue-Tennyson’s “Ulysses”, Robert Browning’s “My Last Duchess”;
Novel- all the novels in Units I to VII above;
The Short Story:
The Essay.
02. HINDI LITERATURE

Unit I: General Study of life, works, the personality of the following writers of Hindi Literature:
(a) Kabirdas, Tulsidas, Surdas, Bihari Lal, Meerabai
(b) Premchand, Phaneeswarnath Renu
(c) Jaishankar Prasad, Sumitranandan Pant, Suryakant Tripathi Nirala, Dhumiil, Muktibodh

Unit II: Trends and tendencies in the History of Hindi literature
(a) Veeragathakal, Siddha sahitya, Nath sahitya
(b) Bhaktikal : Nirguna & Saguna Bhakti Sahitya
(c) Ritikal
(d) Adhunik kal : Bharatendu yug, Dwivedhi yug, Chayavadi yug, Nayee Dharaayen

Unit III: Development of modern Genre
(a) Natak
(b) Upanyas
(c) Kahani
(d) Nibhandh

Unit IV: History of Hindi Language
(a) Dilects of Hindi : Khadiboli, Brajbasha and Avadhi
(b) Development of Khadiboli
(c) Hindi-Urdu-Hindusthaani
(d) National Independence movement and Hindi
(e) Constitution, National Language and directions in the constitution for development

Unit V: Modern Hindi grammar:
(a) Hindi sounds
(b) Hindi Lipi
(c) Hindi vocabulary (Nouns and Gender)
(d) General grammar rules
(e) Sandhi in Hindi
(f) Samaasa in Hindi

Unit VI: Alankara, Chanda and Rasa:
(a) Alankaras: Upama, Utprekshaa, Yamak, Shlesh, Anuprasa, Ruupak, Sandeha, Vakrokti, Arthaantaranyasa, Lokokti (definitions & identification)
(b) Rasa: Srigara, Veera, Shanta and their Staayee
(c) Chanda: Doha, Sorataa, Kavita, Rola, Chowpayee (rules & identification)

Unit VII: Criticism (Alochanaa):
The trends and contributions of the following critics of Hindi
(a) Ramachendra Shukla
(b) Nagendra
(c) Ravilas Shama
(d) Namvar Singh

Unit VIII: Indian Poetics
General study of the following Sanskrit Sampradayas
(a) Rasa Sampradaya
(b) Alankar Sampradaya
(c) Dwani Sampradaya only

Unit IX: Identifications Forms of Hindi
Under this Unit the works of the important writers are mentioned and the candidates are required to identify the form of the work as Natak, Upanyas, Ekanki, Kavya etc.

Unit X: Functional aspects of Hindi
General knowledge of the vocabulary and terms used in Hindi in offices. Under this Unit generally used English Words in offices and office correspondence are given and the Hindi equivalents are to be identified.
04. URDU LITERATURE

I. History of Urdu Language:
   a. Hind Aariya, Zabano Ke Advar
   b. Magribi Hindi Aur Uskey Boliyan
   c. Khdi Boli – Urdu Aur Hindi Ka Rishta

II. Important Writers of Deccani Literature:
   1. Mohd. Quli Qutub Shah
   2. Gawasi
   3. Mula Asadullah Wajhi
   4. Nusrati
   5. Walli

III. General study of life works, the personalities of the following writers of Urdu Literature:
   a. Sir Syed Ahmad Khan, Moulana Altaf Hussain Halli, Munshi Premchand, Dr. Syed Mohiuddin Qadri, Zor.
   b. Mir Taqi Mir, Ghalib, Iqbal, Josh

IV. Important School of thought of Urdu Literature:
   a. DABISTAN-E- DELHI
   b. DABISTAN-E-LUCKNOW

V. Literary Trends of Urdu Literature
   1. Aligarh Tahreek
   2. Progressive movement

VI. Important Urdu Genres and Writers:
   a. Ghazal – Qhasida, Mathanavi, Marsia
   b. Mirtaqi Mir, Ghalib
   c. Sauda, Zaoq
   d. Mir Anees, Mirza Dabeer
   e. Mir Hasan, Daya Shankar, Naseem

VII. Development of Modern Urdu Genre:
   a. Novel
   b. Short Story
   c. Drama
   d. Auto Bio-graphy
   e. Essay etc. Major Writer

VIII. Criticism:
   The trends and contributions of following critic of Urdu
   a. Altaf Hussain HALLI
   b. Abdul Rahman Bijnori
   c. Ahtesham Hussain
   d. Aal-e-Ahmad Suroor

IX. Literary contribution of Fort William College.

X. National Independence Movement and URDU.
21. MATHEMATICS

1. **Algebra**: Elements of Set Theory; Algebra of Real and Complex numbers including Demovire’s between Coefficients and Roots, symmetric functions of roots; Elements of Group Theory; Sub-Group, Cyclic groups, Permutation, Groups and their elementary properties. Rings, Integral Domains and Fields and their elementary properties.


3. **Geometry and Vectors**: Analytic Geometry of straight lines and conics in Cartesian and Polar coordinates; Three Dimensional geometry for planes, straight lines, sphere, cone and cylinder. Addition, Subtraction and Products of Vectors and Simple applications to Geometry.


5. **Ordinary Differential Equations**: Order and Degree of a Differential Equation, First order differential Equations, Singular solution, Geometrical interpretation, Second order equations with constant coefficients.

6. **Mechanics**: Concepts of particles-Lamina; Rigid body; Displacement; force, Mass; Weight; Motion, Velocity; Speed; Acceleration; Parallelogram of forces; Parallelogram of velocity, acceleration; resultant; equilibrium of coplanar forces; Moments; Couples; Friction; Centre of mass, Gravity; Laws of motion; Motion of a particle in a straight line; simple Harmonic motion; Motion under conservative forces; Motion under gravity; Projectile; Escape velocity; Motion of artificial satellites.

7. **Elements of Computer Programming**: Binary system, Octal and Hexadecimal systems. Conversion to and from Decimal systems. Codes, Bits, Bytes and Words. Memory of a computer, Arithmetic and Logical operations on numbers. Precision. AND, OR, XOR, NOT and Shift/Rotate operators, Algorithms and Flow charts.
23. STATISTICS

Probability: Random experiment, sample space, event, algebra of events, probability on a discrete sample space, basic theorems of probability and simple examples based theorem, conditional, probability of an event, independent events, Bauer’s theorem and its application, discrete and continuous random variables and their distributions, expectation, moments, moment generating function, joint distribution of two or more random variables, marginal and conditional distributions, independence of random variables, covariance, correlation, coefficient, distribution of a function of random variables. Bernoulli, binomial, geometric, negative binomial, hypergeometric, poisson, multinomial, uniform, beta, exponential, gamma, cauchy, normal, longnormal and bivariate normal distributions, real-life situations where these distributions provide appropriate models, Chebyshev’s inequality, weak law or large numbers and central limit theorem for independent and identically distributed random variables with finite variance and their simple applications.

Statistical Methods: Concept of a statistical population and a sample, types of data, presentation and summarization of data, measures of central tendency, dispersion, skewness and kurtosis, measures of association and contingency, correlation, rank correlation, intraclass correlation, correlation ratio, simple and multiple linear regression, multiple and partial correlations (involving three variables only), curve-fitting and principle of least squares, concepts of random sample, parameter and statistic, Z, X2, t and F statistics and their properties and applications, distributions of sample range and median (for continuous distributions only), censored sampling (concept and illustrations).


Sampling Theory and Design of Experiments: Complete enumeration vs. sampling, need for sampling, basic concepts in sampling, designing large-scale sample surveys, sampling and non-sampling errors, simple random sampling, properties of a good estimator, estimation of sample size, stratified random sampling, systematic sampling cluster sampling, ratio and regression methods of estimation under simple and stratified random sampling, double sampling for ratio and regression methods of estimation, two-stage sampling with equal-size first-stage units. Analysis of variance with equal number of observations per cell in one, two and three-way classifications, analysis of covariance in one and two-way classifications, completely randomized design, randomized block design, latin square design, missing plot technique, 2^n factorial design, total and partial confounding, 3^2 factorial experiments, split-plot design and balanced incomplete block design.
24. ZOOLOGY

1. Cell structure and function:
   a) Prokaryote and eukaryote
   b) Structure of animal cell, structure and functions of cell organelles.
   c) Cell cycle-mitosis, meiosis.
   d) Structure and contents of nucleus including nuclear membrane, structure of chromosome and gene, chemistry of genetic components.
   e) Mendel's laws of inheritance, linkage and genetic recombination; cytoplasmic inheritance.
   f) Function of gene: replication, transcription and translation; mutations (spontaneous and artificial); Recombinant DNA; principle and application
   g) Sex determination in Drosophila and man; sex linkage in man

2. Systematics:
   a) Classification of non-chordates (upto sub-classes) and chordates (up to orders) giving general features and evolutionary relationship of the following phyla: Protozoa, Porifera, Coelenterata, Platyhelminthes, Nemathelminthes, Annelida, Arthropoda, Mollusca, Echinodermata, Minor Phyla (Bryozoa, Phoronida and Chaetognatha) and Hemichordata.
   c) Classification of chordates (up to orders), giving general features and evolutionary relationship of the following: Protochordata; Agnatha; Gnathostomata-Pisces, Amphibia, Reptilia, Aves and Mammalia.
   d) Comparative functional anatomy of the following based on type animals (Scolioidon, Rana, Calotes, Columba and Orctolagus): integument and its derivatives, endoskeleton, digestive system, respiratory system, circulator system including heart and aortic arches, urinogenital system; brain and sense organs (eye and ear); endocrine glands and other hormone producing structures, (Pituitary, thyroid, parathyroid, adrenal, pancreas, gonads) their function.

3. Vertebrate Physiology and Biochemistry:
   a) Chemical composition of protoplasm; nature and function of enzymes; vitamins, their sources and role; colloids and hydrogen ion concentration; biological oxidation, electron transport and role of ATP, energetics, glycolysis, citric acid cycle; vertebrate hormones; their type, sources and function; pheromones and their role.
   b) Neuron and nerve impulse-conduction and transmission across synapses; neurotransmitters and their role, including acetyl cholinesterase activity.
   c) Homeostasis; osmoregulation; active transport and ion pump.
   d) Composition of carbohydrates, fats, lipids and proteins; steroids.

4. Embryology:
   a) Gametogenesis, fertilization, cleavage; gastrulation in frog and chick
   b) Metamorphosis in frog and retrogressive metamorphosis in ascidian; extra-embryonic membranes in chick and mammal; placentation in mammals; Bio-genetic law.

5. Evolution:
   a) Origin of life; principles, theories and evidences of evolution; species concept.
   b) Zoogeographical realms, insular fauna; geological eras.
   c) Evolution of man; evolutionary status of man.

6. Ecology, Wildlife and Ethology:
   a) Abiotic and biotic factors; concept of ecosystem, food chain and energy flow; adaptation of aquatic, terrestrial and aerial fauna; intra- and inter-specific animal relationships; environmental pollution; Types, sources, causes, control and prevention.
   b) Wildlife of India; endangered species of India; sanctuaries and national parks of India.
   c) Biological rhythms.

7. Economic Zoology:
   a) Beneficial and harmful kinsects including insect vectors of human diseases.
   b) Industrial fish, prawn and molluscs of India.
   c) Non-poisonous and poisonous snakes of India
   d) Venomous animals-centipede, wasp, honey bee
   e) Diseases caused by aberrant chromosomes/genes in man; genetic counselling; DNA as a tool for forensic investigation.
I. Jurisprudence
2. School of Jurisprudence: Analytical, Historical; Philosophical, Sociological & Natural.
3. Administration of Justice: Theories of punishment.
5. A few basic Legal concepts:
   (i) Rights and Duties
   (ii) Legal Personality
   (iii) Ownership and Possession

II. Constitutional Law of India
2. Preamble.
4. Constitutional position and powers of President and Governors
5. Supreme Court and High Courts: Jurisdiction, powers, appointment and transfer of Judges
6. Union Public Service Commission and State Public Service Commissions: Powers and functions
7. Distribution of Legislative and Administrative Powers between the Union and the States
9. Amendment of the Constitution

III. International Law:
1. Nature and definition of International Law
2. Sources: treaty, Custom, General Principles of Law recognized by civilized nations and subsidiary means of determination of law
3. State Recognition and State succession
4. The United Nations, its objective, purpose and principal organs; Constitution, role and jurisdiction of International Court of Justice
5. Protection of Human Rights:
   (i) Provisions in the UN Charter
   (ii) Universal declaration of Human Rights, 1948
   (iii) International Convenant of civil and Political Rights, 1966
   (iv) International convenant on Economic, Social and Cultural Rights, 1966

IV. Torts:
1. Nature and Definition of Tort.
2. Liability based on fault and strict liability
3. Vicarious Liability including State Liability
4. Joint Tort feasors
5. Negligence
6. Defamation
7. Conspiracy
8. Nuisance
9. False imprisonment
10. Malicious Prosecution

V. Criminal Law:
1. General Principles of criminal liability: Mens rea and actus reus
2. Preparation and criminal attempts
3. General Exceptions
4. Joint and constructive liability
5. Abetment
6. Criminal Conspiracy
7. Sedition
8. Murder and culpable homicide
9. Theft, extortion, robbery and decoity
10. Misappropriation and Criminal Breach of Trust

VI. Law of Contract:
1. Definition of contract
2. Basic elements of contract: Offer acceptance, consideration, contractual capacity
3. Factors vitiating consent
4. Void, Voidable, illegal and unenforceable agreements
5. Wagering agreements
6. Contingent contracts
7. Performance of contracts
8. Dissolution of contractual obligations: frustration of contracts
9. Quasi-contracts
10. Remedies for breach of contract
07. ECONOMICS

PART-I

General Economics:
1. Micro- Economics: (a) Production, Agents of Production; Costs and Supply; Isoquants, (b) Consumption and Demand; Elasticity concept, (c) Market Structure and concepts of equilibrium; (d) Determination of prices; (e) Components and Theories of Distribution, (f) Elementary concepts of Welfare economics: Pareto-optimality-Private and social products consumers surplus.

2. Macro- Economics: (a) National Income concepts; (b) Determinants of National income employment (c) Determinants of consumption, savings and investment, (d) Rate of Interest and its determination, (e) Interest and Profit.

3. Money, Banking and Public Finance: (a) Concepts of Money and measures of money supply; velocity of money, (b) Banks and credit creation; Banks and portfolio management, (c) Central Bank and control over money supply, (d) Determination of the price level, (e) Inflation, its causes and remedies, (f) Public, Finance-Budgets-Taxes and non-tax revenues-Types of Budget deficits.

4. International Economics:
   (1) Theories of International Trade-comparative costs – Hecksher-Ohlin-Gains from Trade-Terms of Trade.
   (2) Free Trade and Protection
   (3) Balance of payments accounts and adjustment
   (4) Exchange rate under the exchange markets
IMF and the World Bank and their associates.
Floating rates-GATT and WTO:

5. Growth and Development: (1) Meaning and measurement of growth; Growth, distribution and Welfare; (2) Characteristics of under-development; (3) Stages of Development; (4) Sources of growth-capital, Human capital, population, productivity, Trade and aid, non-economic factors; growth Strategies, (5) Planning in a mixed economy-Indicative planning-Planning and growth.


PART-II

Indian Economics:
1. Main features; Geographic size-Endowment of natural resources, Population; size composition quality and growth trend-Occupational distribution-Effects of British Rule with reference to Drain theory and Laissez Faire policy.
3. Growth in income and employment since Independence-Rate, Pattern, Sectoral trends-Distributional Changes-Regional diparities.
4. Economic Planning in India: Major controversies on planning in India-Alternative strategies-goals and achievements, shortfalls of different plans-planning and the Market
5. Broad Fiscal, monetary, industrial trade and agricultural policies-objectives, rationale, constraints and effects.
25. CIVIL ENGINEERING

PART-A


PART-B


**Transportation Engineering**: Highway alignment, choice of layout and capacity of highways, location survey, geometric design of highways-various elements, curves, grade separation and segregation of traffic, inter-section design, highway materials and testing subgrade and pavement components, type of pavements, road drainage, elements of airport engineering. Railway engineering-elements of permanent track-rails, sleepers, ballast and rail fastenings, tractive resistance, elements of geometric design-gradients and grade compensation on curves, cant transition curves and vertical curves, stresses in railway tracks, points and crossing, signaling and inter-locking, maintenance of railway track. Culverts and small bridges.

PART-C

**Fluid Mechanics**: fluid properties, fluid statics, forces on plane and curved surfaces, stability of floating and submerged bodies. Kinematics: Velocity, streamlines, continuity equation, accelerations irrotational and rotational flow, velocity potential and stream functions, flownet, separation. Dynamics: Euler's equation along streamline, control volume equation, continuity, momentum, energy and moment of momentum equation from control volume equation, applications to pipe flow, moving vanes, moment of momentum, Dimensional analysis. Boundary layer on a flat plate, drag and lift on bodies. Laminar and Turbulent Flows. Laminar and turbulent flow through pipes, friction factor variation, pipe networks, water hammer and surge tanks.
Open Channel Flow: Energy and momentum correction factors, uniform and non-uniform flows, specific energy and specific force, critical depth, Friction factors and roughness co-efficients, flow in transitions, free overfall, weirs, hydraulic jump, surges, gradually varied flow equations, surface profiles, moving hydraulic jump.

PART-D

Environmental Engineering:

Water Supply: Estimation of surface and subsurface water resources, predicting demand for water, impurities of water and their significance, physical, chemical and bacteriological analysis, water borne diseases, standards for potable water.

Intake of water: Pumping and gravity schemes, water treatment; principles of coagulation, flocculation and sedimentation; slow-, rapid-, pressure-, filters; chlorination, softening, removal of taste, odour and salinity.

Water storage and distribution: storage and balancing reservoir types, location and capacity. Distribution systems: layout, hydraulics of pipe lines, pipe fittings, valves including check and pressure reducing valves, meters, analysis of distribution systems, leak detection, maintenance of distribution systems, pumping stations and their operations.

Sewerage systems: Domestic and industrial wastes, storm sewage-separate and combined systems, flow through sewers, design of sewers, sewer appurtenances, manholes, inlets, junctions, siphon. Plumbing in Public buildings.

Sewerage characterization: BOD, COD, solids, dissolved oxygen, nitrogen and TOC. Standards of disposal in normal water course and on land.

Sewage treatment: Working principles, units, chambers, sedimentation tank, trickling filters, oxidation ponds, activated sludge process, septic tank, disposal of sludge, recycling of waste water.


Elements of Engineering Economics, methods of appraisal, present worth, annual cost, benefit-cost, incremental analysis. Economy of scale and size. Choosing between alternatives including levels of investments. Project profitability.
28. MECHANICAL ENGINEERING

STATICS: Simple applications of equilibrium equations.
DYNAMICS: Simple applications of equations of motion, work, energy and power.
THEORY OF MACHINES: Simple examples of kinematic chains and their inversions.
Different types of gears, bearings, governors, flywheels and their functions.
Static and dynamic balancing of rigid rotors.
Simple vibration analysis of bars and shafts.
Linear automatic control systems.
MECHANICS OF SOLIDS: Stress, strain and Hooke's Law. Shear and bending moments in beams.
Simple bending and torsion of beams, springs and thin walled cylinders. Elementary concepts of
elastic stability, mechanical properties and material testing.
MANUFACTURING SCIENCE: Mechanics of metal cutting, tool life, economics of machining, cutting
tool materials. Basic types of machine tool and their processes. Automatic machine tools, transfer
lines. Metal forming processes and machines-shearing, drawing, spinning, rolling, forging, extrusion.
Types of casting and welding methods. Power metallurgy and processing of plastics.
MANUFACTURING MANAGEMENT: Methods and time study, motion economy and work space
design, operation and flow process charts. Cost estimation, break-even analysis. Location and
layout of plants, material handling. Capital budgeting, job shop and mass production, scheduling,
dispatching, Routing, Inventory.
THERMODYNAMICS: Basic concepts, definitions and laws heat, work and temperature, Zeroth law,
temperature scales, behaviour of pure substances, equations of state, first law and its corollaries,
second law and its corollaries. Analysis of air standard power cycles, cannot, otto, diesel, brayton
cycles. Vapour power cycles, Rankine reheat and regenerative cycles, Refrigeration cycles-Bell
Coleman, Vapour absorption and Vapour compression cycle analysis, open and closed cycle gas
turbine with inter-cooling, reheating.
ENERGY CONVERSION: Flow of steam through nozzles, critical pressure ratio, shock formation and
its effect. Steam generators, mountings and accessories. Impulse and reaction turbines elements
and layout of thermal power plants.
Hydraulic turbines and pumps, specific speed, layout of hydraulic power plants.
Introduction to nuclear reactors and power plants, handling of nuclear waste.
REFRIGERATION AND AIR CONDITIONING: Refrigeration equipment and operation and
maintenance, refrigerants, principles of air conditioning, psychrometric chart, comfort zones,
humidification and dehumidification.
FLUID MECHANICS: Hydrostatics, continuity equation, Bernoulli’s theorem, flow through pipes,
discharge measurement, laminar and turbulent flow, boundary layer concept.
26. ELECTRICAL ENGINEERING

Electrical Circuits – Theory and Applications: Circuit components, network graphs, KCL, KVL; circuit analysis methods; nodal analysis, mesh analysis; basic network theorems and applications; transient analysis; RL, RC and RLC circuits; sinusoidal steady state analysis; resonant circuits and applications; coupled circuits and applications; balanced 3-phase circuits. Two port networks, driving point and transfer functions; poles and zeros of network functions.

Signals & Systems: Representation of continuous-time and discrete-time signals & system’s; LTI systems; convolution; impulse response; time-domain analysis of LTI systems based on convolution and differential/difference equations. Fourier transform, Laplace transform, Z-transform, Transfer function. Sampling and recovery of signals.

Control Systems: Elements of control systems; block-diagram representations; open-loop & closed-loop systems; principles and applications of feed-back. LTI systems: time domain and transform domain analysis. Stability: Routh Hurwitz criterion, root-loci, Nyquist’s criterion. Bode-plots, Design of lead-lag compensators; Proportional, PI, PID controllers.

E.M. Theory: Electro-static and magneto-static fields; Maxwell’s equations; e.m. waves and wave equations; wave propagation and antennas; transmission lines; micro-wave resonators, cavities and wave guides.


Digital Electronics: Boolean algebra; minimisation of Boolean function; logic gates, digital IC families (DTL, TTL, ECL, MOS, CMOS). Combination circuits: arithmetic circuits, code converters, multiplexers and decoder’s. Sequential circuits: latches and flip-flops, counters and shift-registers. Comparators, timers, multi-vibrators. Sample and hold circuits; ADCs and DACs. Semiconductor memories.


Computers and Microprocessors: Computer organization; number representation and arithmetic, functional organization; machine instructions, addressing modes, ALU hardware and micro programmed control, memory organization. Elements of microprocessors; 8-bit microprocessors-architecture, instruction set, assembly level programming, memory, I/O interfacing, micro controllers and applications.

Measurement and Instrumentation: Error analysis; measurement of current voltage, power, energy, power-factor, resistance, inductance, capacitance and frequency; bridge measurements. Electronic measuring instruments; multimeter, CRO, digital volt meter, frequency counter, Q-meter, spectrum analyser, distortion-meter. Transducers; thermocouple, thermistor, LVDT, strain-guages, piezo-electric crystal. Use of transducers in measurement of non-electrical quantities. Data-acquisition systems.

Energy Conversion: Single-phase transformer; equivalent circuit, phasor-diagram, tests, regulation and efficiency; three-phase transformer; auto transformer. Principles of energy conversion-d.c. generators and motors: Performers characteristics, starting and speed control armature reaction and commutation; three-phase induction motor; performance characteristics, starting and speed control. Single-phase induction motor. Synchronous generators; performance characteristics, regulation, parallel operation. Synchronous motors; starting characteristics, applications; synchronous condensor, FHP motors, permanent magnet and stepper motors, brushless d.c. motors, single-phase motors.
**Power Systems:** Electric power generation; thermal, hydro, nuclear. Transmission line parameters; steady-state performance of overhead transmission lines and cables. Distribution systems; insulators, bundle conductors, corona and radio interference effects; per-unit quantities; bus admittance and impedance matrices; load flow; voltage control and power factor correction. Economic operation. Principles of over current, differential and distance protection; solid state relays, circuit breakers, concept of system stability, HVDC transmission.

**Power Electronics and Electric Drives:** Semiconductor power devices; diode, transistor, thyristor, triac, GTO and MOSFET, static characteristics, principles of operation; triggering circuits; phase controlled rectifiers; bridge converters-fully controlled and half controlled; principles of thristor chopper and inverter. Basic concept of speed control of DC and AC motor drives.

**Elements of IC Fabrication Technology:** Overview of IC Technology. Unit steps used in IC fabrication; wafer cleaning, photo-lithography, wet and dry etching, oxidation, diffusion, ion-implantation, CVD and LPCVD techniques for deposition of poly-silicon, silicon, silicon-nitride and silicon dioxide; metallisation and passivation.
27. ELECTRONICS AND COMMUNICATION ENGINEERING

**Solid State Physics:** Quantum theory of free electrons, classical wave equation, Schrodinger's wave equation, Fermi distribution function, Band theory of solids, Electron in a periodic field of a crystal (Kronig-Penny model), Diffusion, Drift Mechanism, Continuity equation, Hall effect. Basic Principles of Super Conductivity.


**Networks:** Network definitions, Network topology, Mesh and Node circuit analysis, Steady state sinusoidal analysis, Network theorems, Response of RL, RC and RLC networks to various types of excitation, series and parallel resonance, Two port networks, Laplace transforms.


**Digital Electronics:** Clipping, Clamping circuits. Boolean algebra, Minimisation of Boolean functions, logic gates, digital IC families, arithmetic circuits, code converters, multiplexers and decoders. Latches and flip-flops, counters and shift registers, comparators, timers, ADC and DACs. Microprocessor (8085) architecture, programming, memory and I/O interfacing.

**Control Systems:** Open loop and closed loop (feedback) systems, LTI systems-transfer function, impulse response, poles, zeros – their significance, stability analysis, Root loci, Routh-Hurwitz criterion, Bode and Nyquist plots.

**Electronic Instrumentation:** Types of errors, Power supplies, CRO, Special purpose CROs, DVM, DMM, digital frequency meters, function generators, standard AM/FM signal generators, pattern generators, Transducers.
19. CHEMISTRY

SECTION-A: (INORGANIC CHEMISTRY):

1.1 Atomic structure: Schrödinger wave equation, significance of and quantum numbers and their significance, radial and angular probability, shapes of orbitals, relative energies of atomic orbitals as a function of atomic number. Electronic configurations of elements; Aufbau principle, Hund’s multiplicity rule, Pauli exclusion principle.

1.2 Chemical periodicity: Periodic classification of elements, salient characteristics of s,p,d and f block elements. Periodic trends of atomic radii, ionic radii, ionization potential, electron affinity and electro-negativity in the periodic table.

1.3 Chemical bonding: Types of bonding, overlap of atomic orbitals, sigma and pi-bonds, hydrogen and metallic bonds. Shapes of molecules bond order, bond length, V.S.E.P.R. theory and bond angles. The concept of hybridization and shapes of molecules and ions.

1.4 Oxidation states and oxidation number: Oxidation and reduction, oxidation numbers, common redox reactions, ionic equations. Balancing of equations for oxidation and reduction reactions.

1.5 Acids and bases: Bronsted and Lewis theories of acids and bases. Hard and soft acids and bases. HSAB principle, relative strengths of acids and bases and the effect of substituents and solvents on their strength.

1.6 Chemistry of elements:
   i) Hydrogen: Its unique position in the periodic table, isotopes, ortho and para hydrogen, industrial production, heavy water.
   ii) Chemistry of ‘s’ and ‘p’ block elements: Electronic configuration, general characteristics properties, inert pair effect, allotropy and catenation. Special emphasis on solutions of alkali and alkaline earth metals in liquid ammonia. Preparation, properties and structures of boric acid, borates, boron nitrides, borohydride (diboran), carboranes, oxides and oxyacids of nitrogen, phosphorous, sulphur and chlorine; interhalogen compounds, polyhalide ions, pseudohalogenes, fluorocarbons and basic properties of halogens. Chemical reactivity of noble gases, preparation, structure and bonding of noble gas compounds.
   iii) Chemistry of ‘d’ block elements: Transition metals including lanthanides, general characteristic properties, oxidation states, magnetic behaviour, colour. First row transition metals and general properties of their compounds (oxides, halides and sulphides); lanthanide contraction.

1.7 Extraction of metals: Principles of extraction of metals as illustrated by sodium, magnesium, aluminum, iron, nickel, copper, silver and gold.

1.8 Nuclear Chemistry: Nuclear reactions; mass defect and binding energy, nuclear fission and fusion. Nuclear reactors; radioisotopes and their applications.

1.9 Coordination compounds: Nomenclature, isomerism and theories of coordination compounds and their role in nature and medicine.

1.10 Pollution and its control: Air pollution, types of air pollution, control of air and water pollution, radioactive pollution.

SECTION-B: (ORGANIC CHEMISTRY):

2.1 Bonding and shapes of organic molecules: Electronegativity, electron displacements-inductive, mesomeric and hyperconjugative effects; bond polarity and bond polarizability, dipole moments of organic molecules; hydrogen bond; effects of solvent and structure on dissociation constants of acids and bases; bond formation, fission of covalent bonds; homolysis and heterolysis; reaction intermediates-carbocations, carbanions, free radicals and carbenes; generation geometry and stability; nucleophiles and electrophiles.

2.2 Chemistry of aliphatic compounds: Nomenclature alkanes-synthesis, reactions (free radical halogenation) – reactivity and selectivity, sulphonation-detergents; cycloalkanes-Baeyer’s strain theory; alkanes and alkynes-synthesis, electrophilic addition; reactions, Markownikov’s rule, peroxide effects, 1-3-dipolar addition; nucleophilic addition to electron-deficient alkenes; polymerization; relative acidity; synthesis and reactions of alkyl halides, alkanois, alkynals, alkanoanols, alkanoic acids, esters, amides, nitriles, amines, acid anhydrides, -unsaturated ketones, ethers and nitro compounds.
2.3 **Stereochemistry of carbon compounds**: Elements of symmetry, chiral and achiral compounds. Fischer projection formulae; optical isomerism of lactic and tartaric acids, enantiomerism and diastereoisomerism; configuration (relative and absolute); conformations of alkanes up to four carbons, cyclohexane and dimethylcyclo-hexanes their potential energy \( D,L \) and \( R,S \) notations of compounds containing chiral centers; projection formulae-Fischer, Newman and sawhorse of compounds containing two adjacent chiral centers; meso and dl-isomers, erythro and threo isomers; racemization and resolution; examples of homotopic, enantiotopic and diastereotopic atoms and groups in organic compounds, geometrical isomers; \( E \) and \( Z \) notations. Stere-chemistry of SN1, SN2,E1 and E2 reactions.

2.4 **Organometallic compounds**: Preparation and synthetic uses of Grignard reagents, alkyl lithium compounds.

2.5 **Active methylene compounds**: Diethyl malonate, ethyl acetoacetate. ethyl cyanoacetate-applications in organic synthesis; tautomerism (keto-enol).

2.6 **Chemistry of aromatic compounds**: Aromaticity; Huckel’s rule; electrophilic aromatic substitution-nitration, sulphonation, halogenation (nuclear and side chain), Friedel-Crafts alkylation and acylation, substituents effect; chemistry and reactivity of aromatic halides, phenols, nitro, diazo, dia-zonium and sulphonic acid derivatives, benzyne reactions.

2.7 **Chemistry of biomolecules**: (i) **Carbohydrates**: Classification, reactions, structure of glucose, D,L-configuration, osazone formation; fructose and sucrose; step-up step-down of aldoses and ketoses; and their interconversion, (ii) **Amino acids**: Essential amino acids; zwitterions, isoelectric point, polypeptides; proteins; methods of synthesis of \(-\)amino acids. (iii) Elementary idea of oils, fats, soaps and detergents.

2.8 Basic principles and applications of UV, visible, IR and NMR spectroscopy of simple organic molecules.

**SECTION-C: (PHYSICAL CHEMISTRY):**

3.1 **Gaseous state**: Deviation of real gases from the equation of state for an ideal gas, Vander Waals and Viril equation of state, critical phenomena, principle of corresponding states, equation for reduced state. Liquification of gases, distribution of molecular speed, collisions between molecules in a gas; mean free path, specific heat of gases.

3.2 **Thermodynamics**: (i) **First Law and its applications**: Thermodynamic systems, states and processes work, heat and internal energy, zeroth law of thermodynamics, various types of work done on a system in reversible and irreversible processes. Calorimetry and thermo-chemistry, enthalpy and enthalpy changes in various physical and chemical processes, Joule-Thomson effect, inversion temperature. Heat capacities and temperature dependence of enthalpy and energy changes. (ii) **Second Law and its applications**: Spontaneity of a process, entropy and entropy changes in various processes, free energy functions, criteria for equilibrium, relation between equilibrium constant and thermodynamic quantities.

3.3 **Phase rule and its applications**: Equilibrium between liquid, solid and vapours of a pure substance, Clausius-Clapeyron equation and its applications. Number of components, phases and degrees of freedom; phase rule and its applications; simple systems with one (water and sulphur) and two components (lead-silver, salt hydrates). Distribution law, its modifications, limitations and applications.

3.4 **Solutions**: Solubility and its temperature dependence, partially miscible liquids, upper and lower critical solution temperatures, vapour pressures of liquids over their mixtures, Raoult's and Henry’s law, fractional and steam distillations.

3.5 **Colligative Properties**: Dilute solutions and colligative properties, determination of molecular weights, using colligative properties.

3.6 **Electro-chemistry**: Ions in solutions, ionic equilibria, dissociation constants of acids and bases, hydrolysis, pH and buffers, theory of indicators and acid-base titrations. Conductivity of ionic solutions, its variation with concentration, Ostwald’s dilution law, Kohrausch law and its application. Transport number and its determination. Faraday’s laws of electrolysis, galvanic cells and measurements of their e.m.f., cell reactions, standard cell, standard reduction potential Nernst equation, relation between thermodynamic quantities and cell e.m.f., fuel cells, potentiometric titrations.
3.7 **Chemical kinetics:** Rate of chemical reaction and its dependence on concentrations of the reactants, rate constant and order of reaction and their experimental determination; differential and integral rate equations for first and second order reaction, half-life periods; temperature dependence of rate constant and Arrhenius parameters; elementary ideas regarding collision and transition state theory.

3.8 **Photochemistry:** Absorption of light, laws of photochemistry, quantum yield, the excited state and its decay by radiative, non-radiative and chemical pathways; simple photochemical reactions.

3.9 **Catalysis:** Homogeneous and heterogeneous catalysis and their characteristics, mechanism of heterogeneous catalysis; enzyme catalysed reactions (Michaelis-Menten mechanism)

3.10 **Colloids:** The colloidal state, preparation and purification of colloids and their characteristics properties; lyophilic and lyophobic colloids and coagulation; protection of colloids; gels, emulsions, surfactants and micelles.
20. GEOLOGY

Part - I

a) **General Geology:** Solar System. The Earth: its origin, age and internal constitution. Volcanoes-types, distribution geological effects and products. Earth-quakes-intensity, magnitude, distribution, causes and effects. Elementary ideas about isostasy, geosynclines, mountain building, continental drift, sea floor spreading and plate tectonics.


Part – II

a) **Crystallography:** Elements of crystal structure. Laws of crystallography, Symmetry elements of normal classes of seven crystal systems. Properties and interaction of light and crystalline matter. Petrological microscope and accessories. Construction and use of Nicole prism. Pleochroism, double refraction, extinction angle, birefringence and twinning in crystals, isotropic, uniaxial and biaxial minerals.

b) **Mineralogy:** Physical, chemical and optical properties of the following common rock forming minerals: quartz, feldspar, mica, pyroxene, amphibole, olivine, garnet, chlorite, carbonates, aluminosilicates. Structure of silicates and crystal chemistry of minerals. Gemstones.

c) **Economic Geology:** Ore, ore mineral and gangue. Classification of ore deposits. Important processes of their formation. Occurrence, origin and distribution in India of the ores of aluminium, chromium, copper, gold, lead, zinc, iron, manganese and radioactive elements. Deposits of minerals use as abrasives, refractories and in ceramics, deposits of coal and petroleum. Elements of prospective of mineral deposits.

Part – III

a) **Igneous Petrology:** Origin of magma and formation of igneous rocks. Bowen’s reaction principle. Crystallisation of binary systems. Classification of igneous rocks. Textures and structures of igneous rocks. Composition, origin and mode of occurrence of granite, syenite diorite, mafic and ultramafic groups, anorthosites and alkaline rocks.


c) **Metamorphic Petrology:** Types and factors of metamorphism. Zones, grades and facies of metamorphism. Regional and contact metamorphism. Textures and structures of metamorphic rocks. Metamorphism of arglillaceous, arenaceous, calcareous and basic rocks. Metasomatism.

Part – IV


b) **Stratigraphy and Geology of India:** Fundamental laws of stratigraphy. Stratigraphic classification lithostratigraphic, biostratigraphic and chronostratigraphic. Geological time scale. Physiographic divisions and outline of stratigraphy of India. Brief study of Dharwar, Vindhyan and Gondwana Supergroups and Siwalik Group with reference to their major subdivisions, lithology, fossils, aerial distribution and economic importance.
11. PHILOSOPHY

SECTION-A:
PROBLEMS OF PHILOSOPHY:

1. Substance and Atributes: Aristole, Descartes, Locke, Berkeley’s criticism, Nyaya-Viasesika, Buddhist criticism of Pudgala.
2. God, Soul and the World: Thomas Acquinas, St. Augustine, Spinoza, Descartes, Nyaya-Vaisesika, Sankara, Ramanuja.
3. Universals: Realism and Nominalism (Plato, Aristotle, Berkeley’s criticism of abstract ideas, Nyay-Vaisesika, Buddhism).
5. Truth and Error: Correspondence theory, Coherence theory, Pragmatic theory; Khyativada (Anyathakhyati, Akhyati, Anivacaniyakhyati)

SECTION-B:
Logic:

1. Truth and Validity
2. Classification of sentences: Traditional and Modern
3. Syllogism: Figures and Moods; Rules of Syllogism (General and special) validation by Venn Diagrammes; Formal Fallacies
4. Sentential Calculus: Symbolisation; Truth-Functions and their interdefinability, Truth tables; Formal proof.

SECTION-C:
Ethics:

1. Statement of fact and statement of value
2. Right and Good; Teleology and Deontology
3. Psychological Hedonism
4. Utilitarianism (Bentham; J.S. Mill)
5. Kantian Ethics
6. Problem of the freedom of will
7. Moral judgements: Descriptivism, Prescriptivism, Emotivism
8. Niskamakarma: Sthitaprajna
9. Jaina Ethics
10. Four Noble Truths and Eight fold path in Buddhism
09. HISTORY

Section – A
1. Prehistoric cultures in India.
3. Geographical distribution and characteristics of pastoral and farming communities outside the Indus region, from the Neolithic to early iron phases.
4. Vedic society. The Vedic texts; change from Rigvedic to later Vedic phases. Religion; Upanishadic thought; Political and social organization; evolution of monarchy and varna system.
5. State formation and urbanization, from the mahajanapadas to the Nandas. Jainism and Buddhism. Factors for the spread of Buddhism.
6. The Mauryan Empire. Chandragupta; Megasthenes. Ashoka and his inscriptions; his dhamma, administration, culture and art. The Arthasastra.

Section - B

Section – C
18. Economic impact of the British Raj: Drain of Wealth (Tribute); land revenue settlements (zamindari, ryotwari, mahalwari); De-industr ialisation; Railways and commercialization of agriculture; Growth of landless labour.
22. Gandhi and his thought; Gandhian techniques of mas mobilization-Khilafat and Non-Cooperation Movement. Civil Disobedience and Quit India Movement; Other strands in the National Movement-Revolutionaries, the Left, Subhas Chandra Bose and the Indian National Army.
23. You can continue listing events as per the structure of the textbook.
18. BOTANY


3. Tissue Systems: Origin, development, structure and function of primary and secondary tissue.


05. ANTHROPOLOGY

1. Meaning and scope of Anthropology, Branches of Anthropology – Social – Cultural Anthropology, Physical Biological anthropology, Linguistic anthropology, Archaeological anthropology, Contribution of these branches to the 'holistic' study of Man. Anthropology’s relation with other social sciences, humanities and natural sciences.

2. Physical anthropology: Meaning and scope. Relationship of Physical anthropology with other branches of anthropology and also Biological sciences, Anatomy, Physiology, Human Biology and Genetics.


10. Paleolithic cultures. Lower, Middle and Upper Paleolithic cultures – their tool technology, typology and cultural traits and associated human fossils.

Mesolithic Cultures: Salient features.

11. Neolithic Cultures – emergence and characteristic features in India. Megaliths, definition; Megalithic cultures and their salient features.

12. Sites of Paleolithic, Mesolithic and Neolithic cultures in India and their features. Megalithic cultures and their salient features in India.


16. Kinship. Definition and significance of kinship in simple societies; primary, secondary and tertiary relatives; kinship terms – terms of reference and terms of address classificatory and descriptive kinship terms; Analysis of kinship terminology kinship uses.

Rules of Descent – Patrilineal, matrilineal and double; Rules of inheritance and succession. Structure and functions of descent groups in tribal societies – Clan, Phratry, Moiety, Dual organisation.

Nature of political organisation in tribal societies, Social control, Law and justice. Role of oaths and ordeals in tribal societies. Panchayati Raj in tribal societies.

Indian society – Characteristic features – Racial, ethnic, religious and linguistic elements in Indian population – Unity and diversity in Indian society. Indian village, its features and Jaimani system; concept of caste and dominant caste. Concepts of Sanskritisation. Westernisation, great and Little Traditions.

Constitutional provisions and safeguards for Scheduled Tribes in India. Tribal development programmes. Role of NGOs in tribal development.

Emergence and development of anthropology in India. Applied Anthropology – Meaning, Scope, Development anthropology; Role of anthropology in tribal welfare administration; Role and relevance of anthropology in agricultural development; Health and Family Welfare in India and education.
15. SOCIOLOGY

Unit-I: Basic Concepts:
Society, community, association, institution. Culture-culture change, diffusion, Cultural-tag, Cultural relativism, ethnocentrism, acculturation
Social Groups-primary, secondary and reference groups.
Social structure, social system, social action.
Status and role, role conflict, role set.
Norms and values-conformity and deviance
Law and customs.
Socio-cultural processes: socialisation, assimilation, integration, cooperation, competition, conflict, accommodation, social distance, relative deprivation.

Unit-II: Marriage, Family and Kinship.
Marriage: types and norms, marriage as contract and as a sacrament.
Family: types, functions and changes.
Kinships: terms and usages, rules of residence, descent, inheritance.

Unit-III: Social Stratification:
Forms and functions; Caste and Class. Jajmani system, purity and pollution, dominant caste, sanaskritisation.

Unit-IV: Types of Society:
Tribal, agrarian, industrial and post-industrial.

Unit-V: Economy and Society:
Man, nature and social production, economic systems of simple and complex societies, non-economic determinants of economic behaviour, market (free) economy and controlled (planned) economy.

Unit-VI: Industrial and Urban Society:
Rural-Urban Continuum, urban growth and urbanisation-town, city and metropolis; basic features of industrial society; impact of automation on society; industrialisation and environment.

Unit-VII: Social Demography:
Population size, growth, composition and distribution in India; components of population growth-births, deaths and migration; causes and consequences of population growth; population and social development; population policy.

Unit-VIII: Political Processes:
Power, authority and legitimacy; political socialisation; political modernisation, pressure groups; caste and politics.

Unit-IX: Weaker Section and Minorities:
Social justice-equal opportunity and special opportunity; protective discrimination; constitutional safeguards.

Unit-X: Social change:
Theories of change; factors of change; science, technology and change. Social movements- Peasant Movement, Women’s Movement, Back-ward Caste Movement, Dalit Movement.
14. PUBLIC ADMINISTRATION


2. **Basic concepts and principles**: Organisation, hierarchy, Unity of command, Span of control, Authority and Responsibility, Co-ordination, Centralization and Decentralization, Delegation, Supervision, Line and Staff.

3. **Theories of Administration**: Scientific Management (Tylor and the Scientific Management Movement), Classical Theory (Fayol, Urwick, Gulick and others) Bureaucratic theory (Weber and his critics). Ideas of Mary Parker Follett and CI B arnard; Human Relations School (Elton Mayo and others). Behavioral approach, Systems approach.

4. **Administrative Behaviour**: Decision making with special reference to H Simon, communication and control, leadership theories. Theories of motivation (Maslow and Herzberg)

5. **Accountability and Control**: The concepts of Accountability and control; Legislative, executive and judicial control. Citizen and Administration; Role of civil society, people’s participation and right to information.

6. **Administrative Systems**: Comparative Administrative features of USA, Great Britain, and Japan.

7. **Personnel Administration**: Role of Civil Service in developing societies; position classification, Recruitment, Training, Promotion, Pay and Service conditions. Relations with the Political Executive; Administrative Ethics.

8. **Financial Administration**: Budget; Concepts and forms. Formulation and execution of budget, deficit financing public debt, Accounts and Audit.

9. **Union Government and Administration in India. British legacy**: Constitutional context of Indian Administration; The President, Prime Minister and the Council of Ministers; Central Secretariat; Cabinet Secretariat, Prime Minister’s Office, Planning Commission; Finance Commission; Election Commission; Comptroller and Auditor-General of India. Public enterprises; Patterns, role performance and impact of liberalization.

10. **Civil Services in India**: Recruitment to All India and Central Services. Union Public Service Commission; Training of Civil Servants. Generalists and Specialists. Minister-Civil Servant relationship.

11. **State and District Administration**: Governor, Chief Minister, Secretariat, Chief Secretary, Directorates, District Collector; changing role.

12. **Local Government**: Panchayati Raj and Urban local Government; Main features, structures, finances and problem areas. 73rd and 74th Constitutional Amendments.
12. POLITICAL SCIENCE

SECTION – A

1. Political Science: Nature & scope of the discipline, relationship with allied disciplines like History, Economics, Philosophy, Sociology, Psychology.
2. Meaning of Politics: Approaches to the study of Politics.
12. Nationalism and Internationalism:
   a) Major theories of International relations: Realist Marxist, Systems & Decision making & Game theory.

SECTION – B

INDIAN GOVERNMENT AND POLITICS

1. Approaches to the study of Governments: Comparative historical, legal institutional, political economy and political sociology, approaches.
2. Classification of Political Systems: Democratic and Authoritarian, characteristics of Political systems in the third world.
3. Typologies of Constitutions; Basic features of these constitutions & governments: Including U.K., USA., France, Germany, China and South Africa.
4. Constitutional development: In India during British Rule-A historical perspective.
6. Nature of Indian Federalism: Centre-state relations, legislative, administrative, financial and political; politics of regional move and National Integration.
7. Fundamental Rights: Constitutional provisions and political dynamics. Judicial interpretations and socio political realities; Fundamental Duties.
8. The Union Executive: President, Prime Minister and the Council of Ministers, Constitutional provisions & frame-work and political trends.
9. Parliament: Powers and functions of the Lok Sabha & Rajya Sabha; Parliamentary Committees; Functioning of the Parliamentary system in India.
10. The Judiciary: The Supreme Court, Judicial Review Judicial Activism, Public Interest Litigation; Judicial Reforms.
11. The State Executive: Governor, Chief Minister and the Council of Ministers; Constitutional Provisions and Political trends.
12. Indian Party System: Evolution and Contemporary trends; Coalition government at the Centre and States, pressure groups in Indian Politics.
13. The interaction of Government & Scientific & Technology business: Previous and now their inter relationship and changing roles in Society, Elites, Role of Pressure groups class and voluntary associations in society.
15. Bureaucracy and Development: Post-colonial India; its changing role in the context of liberalization bureaucratic Accountability.
16. Challenges to Indian Democracy:
   a) communalism Regionalism violence, ‘criminalisation’ and corruption.
   b) regional disparities, environmental degradation, illiteracy, Mass Poverty, Population, growth, caste oppressions and socio economic in equalities among backward classes.
PART-I:
Accounting and Auditing: Nature, Scope and Objectives of Accounting-Accounting as an Information System Users of Accounting Information.
Generally Accepted Principles of Accounting-The Accounting Equation-Accrual Concept-other concepts and conventions, Distinction between capital and revenue expenditure. Accounting Standards and their application-Accounting standards relating to fixed assets, depreciation, inventory, recognition of revenue
Auditing: Nature, objectives and basic principles of auditing.- Techniques of auditing-physical verification, examination of documents and vouching, direct confirmation, analytical review.
Planning an audit, audit programmes, working papers, audit process.
Evaluation of internal controls.
Test checking and sampling.
Broad outlines of company audit.
Audit of non-corporate enterprises.
Internal and management audit.

PART-II:
Business Organisation: Distinctive features of different forms of business organisation.

SOLE PROPRIETOR
Partnerships-characteristics, Registration, Partnership deed, Rights and duties, Retirement, Dissolution.
Joint Stock Company-Concept, characteristics, types.
Cooperative and State ownership forms of organizations.
Types of securities and methods of their issue.
Economic functions of the capital market, stock exchanges, Mutual Funds. Control and regulation of capital market.
Business combination; control of Monopolies. Problems of modernisation of industrial enterprises.
Social responsibility of business. Foreign Trade-Procedure and financing of import and export trade.
Incentives for export promotion. Financing of foreign trade.
Insurance-Principles and practice of Life, Fire, Marine and General Insurance.

MANAGEMENT
Management functions-Planning-strategies, Organising-levels of authority Staffing, Line function and staff function, Leadership, Communication, Motivation, Directing-Principles, Strategies.
Coordination-Concept, types, methods.
Control-principles, performance standards, corrective action. Salary and wage administration-job evaluation.
Management by Objectives and management by Exception.
Management of change; Crisis Management. Office Management-scope and principles, systems and routines; handling of records-modern aids of Office management; office equipment and machines; Automation and Personal computers.
Impact of Organisation and Methods (O&M)
Company Law: Joint stock companies-incorporation; documents and formalities-Doctrine of indoor management and constructive notice.
Duties and powers of the board of directors of a company.
Accounts and audit of companies: Company Secretary-role and functions-qualifications for appointment.


6. **Electronics.**: Diodes in half-waves and full-wave rectification, qualitative ideas of semiconductors p type and n type semiconductors, junction diode, Zener diode, transistors, binary numbers, Logic gates and truth tables, Elements of microprocessors and computers.
Section – A
PHYSICAL GEOGRAPHY

i) Geomorphology: Origin of the earth; Geological Time Scale; Interior of the earth; Types and characteristics of rocks; Folding and Faulting; Volcanoes; Earth quakes; Weathering; Landforms caused by fluvial, Aeolian and glacial actions.

ii) Climatology: Structure and composition of atmosphere; Temperature; Pressure belts and Wind systems; Clouds and rainfall types; Cyclones and anti-cyclones; Major climatic types.

iii) Oceanography: Ocean relief; Temperature; Salinity; Ocean deposits; Ocean currents, El Nino and La Nino; Waves and tides.

iv) Biogeography: Origin and types of soils; Major biomes of the world; Ecosystem and food chain; Environmental degradation and conservation.

Section – B
HUMAN GEOGRAPHY

i) Man and Environment Relationship: Growth and development of Human Geography; Concepts of Determinism and Possibilism.

ii) Population: Races of mankind and tribes; growth and distribution of world population; migration; population problems of developed and developing countries.

iii) Economic Activities: Food gathering and hunting; Pastoral herding; fishing and forestry; Types of agriculture-shifting, subsistence, commercial and plantation; Mining, power; Manufacturing – locational factors of textile, iron and steel, sugar and fertilizer industries; Tertiary activities-trade, transport, communication and services.

iv) Settlements: Origin, types and patterns of rural settlements; Processes of urbanisation; morphology and functional classification of towns; million-cities and mega-cities.

Section – C
GEOGRAPHY OF THE WORLD

i) Major Natural Regions: Characteristics, economic base and human adaptation.

ii) Regional Geography of Developed Countries: Canada, U.S.A., Western Europe, Russia, Japan, Australia and New Zealand.

iii) Regional Geography of Developing Countries: S.E. Asia, S.W. Asia, China, Southern Africa and Brazil.

iv) Regional Geography of South Asia.

Section – D
GEOGRAPHY OF INDIA

i) Physical Setting: Landforms, drainage, climate, soils and natural vegetation.

ii) Economic Base: Minerals & energy resources, aquatic resources, forest resources; irrigation, agriculture and industries; trade and commerce.

iii) Population: Growth, distribution and density; demographic characteristics.

iv) Environmental problems, developmental issues and regional planning.

Section – E
GEOGRAPHICAL THOUGHT

i) Ancient Period: Contributions of Indians, Greeks, Romans and Arabs.

ii) Pre-Modern Period: Contribution of Verenius, Kant, Humboldt and Ritter.

iii) Modern Period: Dichotomy of determinism and possibilism; contributions of Ratzel, sempie, Huntington and La Blache.

iv) Recent Period: Quantitive Revolution; Radicalism, Behaviouralism and Humanism.

Section – F
TECHNIQUES OF GEOGRAPHICAL ANALYSIS

i) Maps: Scale and types, uses.

ii) Diagrams: Types and uses.

iii) Projections: Types, characteristics and uses.

iv) Remote sensing and geographical information system (GIS): Aerial photographs and imagery, GIS.
1. **Introduction to Psychology**: Concept and definition of psychology – Nature and Scope – Branches of psychology – Application of psychology to society and social problems.


6. **Perception**: Preceptual process. Perceptual organisation. Perceptual form, colour, depth and time. Perceptual readiness and constancy. Role of motivation, social and cultural factors in Perception. Application of knowledge of Perception to skill development (e.g. for certain jobs like that of driving, airline pilots etc.)


8. **Memory**: Physiological basis of memory. Memory and forgetting. Measurement of memory (Recall, Recognition, Relearning). Short term and long term memory. Theories of forgetting (Decay and interference theories and Repressive forgetting) Application of Mnemonic devices etc., to improving memory.


12. **Personality**: Concepts and Definition of personality. Study of personality (Trait, type and eclectic approaches) Development of personality (Freud, Erikson, Biological and socio-cultural determinants). Measurement of Personality (Projective tests, pencil-paper tests). Application of personality profiles in fitting a person to a job.


15. **Application of Psychology**: Health and mental health (yoga, meditation and relaxation therapies). Education (programmed learning; self instructional learning and learning styles). Community (self help through group cohesiveness and leadership). Industry (Assessment centre approach in selection, recruitment and training). Environment (man-nature interaction, personal space concept, pollution reduction information technology (Application to commercial, educational and health areas).
16. AGRICULTURE

Agriculture, its importance in National economy. Factors determining agro-ecological zones and geographic distribution of crop plants. Importance of crop plants, cultural practices for cereal, pulses, oilseed, fibre, sugar, tuber and fodder crops and scientific basis for these crop-rotations, multiple and relay cropping, intercropping and mixed cropping.


Principles of economics as applied to agriculture. Farm planning and optimum resource-use efficiency and maximizing income and employment. Farm systems and their spatial distribution, their significant roles in regional economic development.
17. ANIMAL HUSBANDRY AND VETERINARY SCIENCE

ANIMAL HUSBANDRY


5. Animal Production: (a) Artificial insemination, fertility and sterility. Reproductive physiology, semen characteristics and preservation. Sterility its causes and remedies. (b) Meat eggs and wool production. Methods of slaughter of meat animals, meat inspection, judgment, carcass characteristics, adulteration and its detection processing and preservation; Meat products, quality control and nutritive value, By-products. Physiology of egg production, nutritive value, grading of eggs preservation and marketing. Types of wool, grading and marketing.

6. Veterinary Science: (i) Major contagious diseases affecting cattle, buffaloes, horses, sheep and goats, pigs, poultry, rabbits and pet animals—Etiology, symptoms, pathogenicity, diagnosis, treatment and control of major bacterial, viral, rickettsial and parasitic infections. (ii) Description, symptoms, diagnosis and treatment of the following:
   a) Production diseases of milk animals, pig and poultry.
   b) Deficiency diseases of domestic livestock and birds
   c) Poisonings due to infected/contaminated foods and feeds, chemicals and drugs.


8. (a) Poisons used for killing animals euthanasia.
   (b) Drugs used for increasing production/performance efficiency and their adverse effects.
   (c) Drugs used to tranquilize wild animals as well as animals in captivity.
   (d) Quarantine measures in India and abroad. Act, Rules and Regulations.