APPENDIX -III
MAIN EXAMINATION
SYLLABI FOR COMPULSORY SUBJECTS

GENERAL STUDIES

PAPER – I

1. History of Modern India and Indian culture
The History of Modern India will cover history of the Country from about the middle of nineteenth century and would also include questions on important personalities who shaped the freedom movement and social reforms. The part relating to Indian culture will cover all aspects of Indian culture from the ancient to modern times.

2. Geography of India
In this part, questions will be on the physical, economic and social geography of India.

3. Indian Polity
This part will include questions on the Constitution of India, Political system, Indian Administrative system and related matters.

4. Current National issues
This part is intended to test the Candidate’s awareness of current national issues.

5. International Affairs & Institutions
This part will include questions on important events in world affairs and on international institutions.

6. Indian Economy
In this part, questions will be on the planning and economic development in India, economic & trade issues, Foreign Trade, the role and functions of I.M.F., World bank, ADB, W.T.O. etc.

7. Developments in the field of Science & Technology, Communication and Space
In this part, questions will test the candidate’s awareness of the developments in the field of Science & Technology, Communication and space and also basic ideas of computers.

8. India and the World
This part is intended to test candidate’s awareness of India’s relationship with the world in various spheres, such as the following:
Role of India in the context of world.
Foreign Affairs, External security and related matters, Nuclear Policy.

9. Games & Sports
Questions will assess the awareness of candidates in respect of games and sports at international and national level. It will also have questions pertaining to different awards and personalities in the context of India.

10. Indian Agriculture
Attempt will be made to assess the general awareness of candidates in respect of crops, white revolution, green revolution, agriculture production and their impact on development of rural economy.


GENERAL STUDIES

PAPER – II

Part - I

General Introduction of Madhya Pradesh

1. Geography
General Introduction of Madhya Pradesh, area, topography and structure, physical and geographic areas and climate.

2. Natural Resources of Madhya Pradesh
Mineral Wealth.
Forest Wealth and Wild Life.
Agriculture and Live stock, Regional distribution of crops, planned development of Agriculture, Green Revolution, Development of Live stock.

3. Water Resources - Development of Irrigation and Irrigation projects.

4. Human Resources
Population, Population Density, Urban and Rural population, Literacy and Labours.

5. Energy Resources
Questions will attempt to assess the general awareness of candidates about the conventional and non-conventional sources of energy and their uses in human life.

6. Industries
Attempt will be made to assess the general awareness of candidates about the types and size of industries and their impact on state economy.
6. Environment

Questions will be related to environment and its protection, pollution, natural climates and their impact on quality of human life.

7. Planning and Evaluation

Attempt will be to assess the general awareness of candidates about different aspect of five year plans till date, various programmes of urban and rural development, economic planning and its evaluation and status of Madhya Pradesh in the context of Country.

8. Administrative Structure of Madhya Pradesh

Questions will be related to general knowledge of candidates about administrative units - Division, District, Tehsil and Development-Blocks; their relationship and administrative structure.

9. Rural and Urban Administrative Structure

Questions will be pertaining to the general knowledge of candidate about organization and administrative structure of Panchayati Raj, Municipality and Municipal corporation.

10. Games and Sports

Attempt will be made to assess the awareness of candidates related to organization, management and facilities for different games and sports. The questions will also be related to different State awards, and personalities and contribution of Government and non Government agencies.

Part – II
Culture, Literature, Music, Dance, Arts and History of Madhya Pradesh

1. Culture

The questions will be related to nature, types their salient features and impact on human life.

2. Literature

(1) Ancient - Kalidas, Bharthari, Bhavabhuti, Vanabhatta.
(2) Medieval - Keshav, Padmakaar, Bhushan.
(4) Folk Literature / Dialects of Madhya Pradesh. Isuri, Singaji.

3. Music & Dance Tradition

(2) Dance tradition - Major styles of folk music, major folk dances.

4. Arts

Questions of general nature will be related to characteristics of Rock painting, folk painting, modern painting school and important painters. It will also have questions related to major folk and other theatres.

5. Major Scheduled Tribes

It will assess the general awareness of candidates related to names, characteristics, habitats, major fairs and festivals and cultural structure of major scheduled tribes. It will also have questions related to different programmes of State Government for the upliftment of Scheduled Tribes.

6. Programmes of State Government in the field of Culture

The questions will attempt to assess general knowledge of the candidate related to literasy academics and institutions. The questions will also be related to different Music and Fine Arts Schools and Cultural festivals. There will be questions awards given by the state for the significant contribution in the filed of literature, music and fine arts.

7. Archaeological Heritage

The questions of general knowledge will be related to significance and characteristics of major historical, archaeological and tourist places.

8. Historical perspective of Madhya Pradesh

The questions will be related to creation of M.P. and important dynasties and rules of M.P., It will also have questions related to contribution of M.P. in freedom movement.
gardening; Physiological disorders in vegetables and fruits. Principles and methods of preservation of important fruits and vegetables and processing techniques. Landscape, Floriculture including raising of ornamental plants. Design and layout of gardens.

3. Basic genetics

4. Crop improvement
Center of Crop diversity, mode of reproduction, variability in plants, Germsplasm Male sterility and self incompatibility. Heterosis and inbreeding depression, Breeding methods for crop improvement.

5. Plant protection
Classification and symptoms of plant diseases, Principles of plant disease control including (exclusion, eradication, immunization and protection) Classification of pesticides and formulations. Agents and basic steps of biological control. Integrated diseases and insect pest management. Principle methods of control of stored grain pest and storage pests. Methods of rodent control. Spray equipments, their selection and maintenance. Safety precautionary measures during pesticide usage. Bee keeping (apiculture) and mushroom cultivation. Legal control - plant quarantine and insecticidal act.

6. Basic agro-forestry
Silvi-culture and agro-forestry, Classification of agro-forestry system; Waste land and watershed development through agro-forestry

7. Elements of crop physiology
Absorption and translocation of water and nutrients. Transpiration and water economy. Photosynthesis and respiration. Growth analysis and its importance. Photo-periodism and vernalisation. Growth hormones, senescence and post-harvest physiology (seed dormancy, storage physiology and fruit ripening)

8. Organic farming
Definition of organic Farming, Components and its role in sustainable Agriculture Bio-fertilizers, production and use; Role of neem Products in crop protection. Role of microorganisms in agriculture

9. Dry land farming
Dry land agriculture for sustaining agricultural production. Soil and Water management with special reference to dry land agriculture.

PART - II
There will be two optional sections (A & B) Candidate will have to answer all the questions from the opted section.

SECTION - A
Will be based on production & protection of the following main crops:

<table>
<thead>
<tr>
<th>Field crop groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cereals : Wheat, rice, maize and sorghum</td>
</tr>
<tr>
<td>Pulses Crops : Pigeon pea, chick pea, Urid and Mung</td>
</tr>
<tr>
<td>Oilseeds Crops : Soybean, groundnut, and rapeseed/mustard</td>
</tr>
<tr>
<td>Cash crops : Cotton and sugarcane</td>
</tr>
</tbody>
</table>

SECTION - B
Will be based on production & protection of the following horticultural crops:

<table>
<thead>
<tr>
<th>Horticultural crop groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fruits : Mango, citrus, banana and papaya</td>
</tr>
<tr>
<td>Vegetable crops : Potato, onion, cucurbits, tomato, okra and peas</td>
</tr>
<tr>
<td>Cole crops : Cauliflower and cabbage</td>
</tr>
<tr>
<td>Leafy vegetables : Spinach,</td>
</tr>
<tr>
<td>Flowers : Roses, merry gold, chrysanthemum, aster, gaillardia and gladiolus</td>
</tr>
<tr>
<td>Spices : garlic, chillis, fenugreek, coriander</td>
</tr>
</tbody>
</table>
1. Seed technology
Seed legislation and certification; Classes of seeds; basic principles of Seed production and processing
2. Agricultural biotechnology
Methods and application of plant tissue culture; D.N.A. based marker gene cloning and tools for recombinant DNA technology
3. Agricultural economics and farm management
Agriculture marketing and its problems; Marketing costs, Profit margins and efficiencies. Cooperative marketing in India. EXIM policies and farm commodities for export. Barriers of export in context to WTO. Farm management, types and systems of farming and factors affecting them.
4. Agricultural extension education
Rural society and institutions. Definitions, characteristics and importance of social stratification and culture. Agricultural extension- its importance; Importance and methods of extension training and evaluation. Importance of rural development programmes in India in post-independence period. Communication and diffusion of agricultural innovations. Role of KVKs in dissemination of agricultural technologies. Role and functions of ATMA
5. Agricultural statistics
Measures of central tendency and dispersion. Correlation and regression. Graphs and diagrams
6. Computer application in agriculture
Types and classification of computers. Data operating systems. Library function. Data management.
7. Soil Science and Microbiology
8. Biodiversity and natural resource conservation
Natural resources (Forest and water), their management and conservation. Environmental pollution (air, water, soil and nuclear) and associated hazards to crops. Solid waste management. Utility of plant genetic resources in crop improvement. Germplasm collection and conservation.
9. Food science and food biochemistry
10. Farm management
Farm management planning and budgeting. Role of farming systems in sustainable agriculture. Significance of farm mechanization in agricultural production

ANIMAL HUSBANDARY AND VETERINARY SCIENCE  (CODE NO. 02)

1. Animal Nutrition
Metabolism of carbohydrates, proteins and fats. Requirements for maintenance, growth and production of milk, meat, work, eggs and wool.
Mineral and trace elements. Metabolism, source and role of minerals and trace elements, their requirements for growth and production, deficiency syndromes.
Vitamins, their sources, requirements, role in metabolism and deficiency syndromes.
Feeding standards and measures of feed energy. Limitations of different feeding systems. Feeding practices in livestock in normal and drought conditions.
Feed additives in the ration of livestock and poultry; antibiotics and hormonal compounds and other growth stimulators their uses and abuse.
Preservation of feed.
Feeding infants and growing. Importance of colostrums.
Feeding and care of expectant and nursing mothers.
2. Genetics and Animal Breeding
Application of computer for statistical analysis in animal farms and veterinary hospitals and epidemiology.

3. Semen quality, preservation and artificial insemination


Biochemistry of semen, Care, sterilization and storage of equipments used for artificial insemination.

Selection, care, training and maintenance of breeding bull for A.I.

4. Livestock production and Management


Wild and zoo animal management

Management of pack animal

Management of laboratory animals & fish production.

5. Milk Technology


Defects in processing, packing, storing, distribution and marketing of milk and milk products and their remedial measures.

Nutritive properties of pasteurized, standardized, toned, double toned, sterilized, homogenized, reconstituted, recombined and flavoured milk.

Preparation of cultured milks. Cultures and their management. Vitamin D, acidified and other special milks. Legal standards and sanitation requirements for clean and safe milk and for the milk plant equipments.

Methods of preparation of butter, ghee, khoa, lassi, curd, ice cream and cheese.

6. Hygiene

Veterinary Hygiene with respect to water, air and habitation.

Duties and role of Veterinarians in a slaughter house to provide meat that is produced under ideal hygienic conditions.

By-products from slaughter houses and their economic utilization.

Methods of collection, preservation and processing of hormonal glands for medicinal use.

Sanitation of animal houses. Source of air pollution in animal houses and its effect on animal health and production.

7. Extension

Extension Education: evolution of extension education in India: classification of extension, teaching methods, audiovisual aids, their classification. Role of animals in the economy, health, socio-psychology of rural, semi urban and urban society (role of farm stock, companion animals, sports animals etc.)

Different methods adopted to educate farmers under rural conditions. Utilization of fallen animals for profit extension education, etc.

Design trysen: Different possibilities and method to provide self employment to educated youth under rural condition.

Cross breeding as a method of upgrading the local cattle.

ANIMAL HUSBANDARY AND VETERINARY SCIENCE (Code No. 02)

PAPER-II

1. Anatomy


Systemic embryology- stage wise study of embryo/ fetus of chicks, cattle, buffalo, sheep, goat and cat.

2. Physiology


Physiological relations and their regulations: mechanism of adaptation, environmental factors and regulatory mechanisms involved in animal behavior. Methods of controlling climatic stress.

Physiology of circulation, respiration excretions, digestions and reproduction.


3. Pharmacology

Pharmacology of drugs acting on gastrointestinal, cardio-vascular, urinary, respiratory, nervous, genital systems and endocrines. Therapeutic agents against bacteria, protozoa fungi, parasites and
insects, including their mechanism of action. Common toxic compounds and plants their effects and
treatment.
Use of anticancer agent in animals, pharmacological and therapeutic efficacy of indigenous drugs
4. Diseases
Common livestock and poultry diseases caused by bacteria, fungi protozoa, viruses and parasites
pertaining to their causal agents, epidemiology, symptoms diagnostic methods, treatment and
prevention. Important zoonotic diseases . Toxicity caused by agrochemicals and environmental
toxicity. Methods of collection and dispatch of material for laboratory diagnosis.
Principles of immunity and immunization:
Principles of epidemiology, public health aspects of food products of animal origin (meat. egg. milk
and fish) their inspection and marketing.
5. Surgery
Anesthesia in animals.
Common surgical affections of different systems of the body. Diseases of locomotion system with
special reference to soundness, health identification, principles of radiology.
Electrotherapy in veterinary practice.
Familiarisation with fluoroscopic examination and ultrasonography
6. Jurisprudence
Jurisprudence in veterinary practice. Common offences towards animals. Common adulteration
practices regarding milk and milk products and meat and their detection.
Laws relating to offences affecting public health.
Laws relating to adulteration of drugs
Evidence procedure in court
Legal duties of veterinarian
Code of conduct and ethics for veterinarian.

ZOOLOGY ( CODE NO. 03 )
PAPER - I
PART - I
Structure, general organization and Biology of nonchordata and chordata, ecology ethology,
economic zoology and Laboratory methods.
1. Non-chordata and chordata
   (1) Classification and relationship of various phyla upto sub-classes.
   (2) Protozoa - Structure, locomotion, nutrition, reproduction; and life history of Paramaecium,
      Monocystis, Plasmodium, Trypnosoma and Amoeba.
   (3) Porifera - Stucture, histology, Skeleton, canal system and reproduction in sycon
   (4) Coelenterata - Polymorphism, defensive structures and their mechanism; coral reefs and
      their formation; metagenesis; general features and life history of Obelia and Aurelia.
   (5) Platyhelminthes - Parasitic adaptation; general features and life history of Fasciola and
      Taenia and their relation to man.
   (6) Nemathelminthes - General features, life history and parasitic adaptation of Ascaris;
      Nemathelminths in relation to man.
   (7) Annelida - Coelom and metamerism; general features and life history of Neanthes, Pheretima
      and Hirudinaria.
   (8) Arthropoda - External features, organ systems and life histry of prawn, scorpion and
      cockroach. Mouth parts in insects (cockroach, mosquito, housefly, honey bee and butterfly);
      metamorphosis in insects and its hormonal regulation; social organization in insects
      (termites and honey bees).
   (9) Mollusca - Feeding, respiration, locomotion, general features and life history of Unio & Pila.
      Torsion and detorsion in gastropods.
   (10) Echinodermata - General features, Feeding, respiration, water vascular system and
      locomotion of Asterias.
   (11) Protochordata - Origin of chordates; general features and life history of Herdamania and
      Branchiostoma.
   (13) Amphibia - Parental care, neoteny & paedogenesis.
   (14) Reptilia - Poisonous and non poisonous snakes of M.P. - Biting mechanism of snakes.
   (15) Aves - Flight adaptation and migration.
   (16) Mammalia - Structural peculiarities and phylogenetic relation of profotheria and methatheria.
       Comparative functional anatomy of following systems of vertebrates-integument and its
derivatives, endoskeleton (limbs and girdles only), digestive system, respiratory system,
circulatory system (heart and aortic arches only) urino-genital system, brain and sense
       organs (eye and ear only).

PART - II
1. Ecology
   (1) Biosphere - Biogeochemical cycles, green-houses effect, ozone layer and its impact;
       ecological succession.
2. Ethology
(1) Behaviour - Learning, instinct, habituation, conditioning, imprinting.
(2) Role of hormones in drive; role of pheromones in alarm spreading; social behaviour in insects and primates; courtship (Drosophila, 3-spine stickleback and birds)
Biological clock and circadian rhythms.

3. Economic Zoology
(1) Apiculture, sericulture, lac culture, carp culture, pearl culture, prawn culture.
(2) Major infectious and communicable diseases (small pox, plague, malaria, tuberculosis, cholera and AIDS) their vectors, pathogens and prevention.
Insects and diseases in relation to man.

4. Laboratory techniques
(1) Study of pH meter
(2) Chromatography-(paper and thin layer)
(3) Microtomy
(4) Preparation of fixatives, stains and reagents
(5) Museum keeping & preservation
(6) Skeleton preparation and taxidermy.

ZOOLOGY (CODE NO. 03)
PAPER - II
Cell Biology, genetics, evolution, systematics, biochemistry, physiology and embryology

PART - I
1. Cell Biology
(1) Structure and function of cell and its organelles(nucleus, plasma membrane, mitochondria, Golgi bodies, endoplasmic reticulum, ribosomes and Lysosomes), cell division (mitosis and meiosis), cell cycle.
(2) Watson-Crick model of DNA, replication of DNA,
(3) Protein synthesis.
(4) Cell fusion.
2. Genetics and biotechnology
(1) Genetic code.
(2) Sex chromosomes and sex determination in Drosophilla, and man.
(3) Mendel's laws of inheritance, recombination, linkage, and crossing over, multiple alleles, inheritance of blood groups.
(4) Mutations and mutagenesis : radiation and chemical.
(5) Cloning technology, plasmids and cosmids as vectors, transgenics, transposons, DNA sequence cloning and whole animal cloning (Principles and methodology).
(6) Regulation and gene expression in pro-and eu-karyotes.
(7) Congenital diseases in man.
(7) DNA finger-printing.

3. Evolution and systematics
(1) Origin of life
(2) Lamarck and his works.
(3) Darwin and his works.
(4) Sources and nature of organic variation.
(5) Natural selection.
(6) Isolation.
(7) Concept of species and sub-species, principles of classification, zoological nomenclature and international code , cladistics.
(8) Fossils,
(9) Geological eras.
(10) Distribution of animals, zoogeographical realms of the world.

PART - II
1. Biochemistry
(1) Structure and role of carbohydrates, fats, lipids, proteins, aminoacids, nucleic acids.
(2) Glycolysis and Krebs cycle, oxidation and reduction, oxidative phosphorylation; energy conservation and release, ATP, cyclic AMP-its structure and role.
(3) Hormone and their function.
(4) Enzymes: types and mechanisms of action and co-enzymes.
(5) Immunoglobulin and immunity.
2. Physiology (with reference to mammals)
   (1) Composition and constituents of blood; its coagulation, factors and mechanism of coagulation; thermo regulation. Blood group and Rh factor in man.
   (2) Oxygen and carbon dioxide transport; haemoglobin : constituents and its role in regulation, of gaseous transport.
   (3) Nutritive requirements; role of salivary glands, liver, pancreas and intestinal glands in digestion and absorption.
   (4) Excretory products; nephron and regulation of urine formation; osmoregulation.
   (5) Types of muscles, mechanism of contraction of skeletal muscles.
   (6) Neuron, nerve impulse-its conduction and synaptic transmission; neurotransmitters.
   (7) Vision, hearing and olfaction in man.
   (8) Mechanism of hormone action.
   (9) Physiology of reproduction, role of hormones in reproduction.

3. Embryology
   (1) Gametogenesis, fertilization, types of eggs, cleavage, development up to gastrulation in Branchiostoma, frog and chick, Metamorphosis in frog, formation and fate of extra embryonic membranes in chick and mammals. Types and functions of placenta in mammals;
   (2) Paedogenesis and neoteny.
   (3) Growth, regeneration and aging.
   (4) In vitro fertilization; embryo transfer, cloning.

BOTANY (CODE NO. 04)
PAPER - I
MICROBIOLOGY, PATHOLOGY, PLANT GROUPS, MORPHOLOGY
ANATOMY TAXONOMY AND EMBRYOLOGY OF ANGIOSPERMS

1. Microbiology
   Structure, classification, reproduction and economic importance of Virus, phytoplasma (mycoplasma), bacteria and cyanobacteria. Microbes in industry and agriculture.

2. Plant Pathology
   Knowledge of plant diseases caused by fungi, modes of infection and methods of control.

3. Plant Diversity
   Structure, reproduction, life history, classification and economic importance of algae, fungi, bryophytes pteridophytes and gymnosperms.

4. Angiosperms

5. Taxonomy

BOTANY (CODE NO. 04)
PAPER - II
CELL BIOLOGY, GENETICS AND EVOLUTION, PLANT PHYSIOLOGY, ECOLOGY AND ECONOMIC BOTANY

1. Cell Biology

2. Genetics and Evolution
   Mendelism, concept of gene, structure and types of DNA and RNA, genetic code, protein synthesis and regulation. Theories of organic evolution and evidences.

3. Plant Physiology

4. Ecology

5. Economic Botany
   Plants as sources of food, fodder, fibers, spices, beverages, medicines and timber.
1. Symmetry
Symmetry elements and symmetry operations. Recognition of symmetry point group and symmetry
elements in AB₂ and AB₃ molecules.

2. Atomic structure
Idea of de Broglie matter waves. Heisenberg's uncertainty principle, Schrödinger wave equation
(time independent). Significance of Ψ and Ψ², particle in one-dimensional box, quantum numbers,
radial and angular wave functions, shapes of s, p, d and orbitals, Aufbau principle, Hund's
multiplicity rule, Pauli exclusion principle. Effective nuclear charge.

3. Chemical bonding
Ionic bond, percent ionic character from dipole moment and electronegativity difference,
characteristics of ionic compounds, factors affecting stability of ionic compounds, lattice energy,
Born-Haber cycle; covalent bond and its general characteristics, polarities of bonds in molecules
and their dipole moments. Valency bond theory, concept of resonance and resonance energy.
Molecular orbital theory (LCAO method); bonding in homonuclear and heteronuclear molecules:
H₂⁺, H₂ to Ne₂, NO, CO. The concept of hybridization, character of bonds, bond angles and bond
length. Hydrogen bonding and van der Waals forces. Metallic bonding.

4. Solid State
Forms of solids, law of constancy of interfacial angles, crystal systems and crystal classes
(crystallographic groups). Designation of crystal faces, lattice structures and unit cell. Laws of
rational indices. Bragg's law. X-ray diffraction by crystals. Close packing, radii ratio rules,
calculation of some limiting radii ratio values. Structures of NaCl, CsCl, and KCl. crystal
Imperfections in crystals. Elementary study of liquid crystals.

5. Thermodynamics
Thermodynamic systems, states and processes, work, heat and internal energy; first law of
thermodynamics, work done on the systems and heat absorbed in different types of processes;
calorimetry, energy and enthalpy changes in various processes and their temperature dependence.
Second law of thermodynamics; entropy as a state function, entropy changes in various process,
entropy–reversibility and irreversibility, Free energy functions; criteria for equilibrium, relation
between equilibrium constant and thermodynamic quantities; Nernst heat theorem and third law of
thermodynamics.

Thermodynamics derivations of -
Gibbs-Helmholtz equation,
law of mass action and
Clapeyron-Clausius equations.

6. Electrochemistry
Conductivity and its applications to determine -
Dissociation constant of weak electrolyte
Solubility product of sparingly soluble salts
Conductometric titration.
Debye-Huckel theory of strong electrolytes.
Galvanic cells, concentration cells; electrochemical series, measure-ment of e.m.f. of cells, fuel cells
and batteries.
Processes at electrodes; double layer at the interface of metal and solvent; rate of charge transfer,
current density; overpotential.

7. Chemical kinetics
Concentration dependence of rate of reaction; defferential and integral rate equations for zeroth,
first, and second order of reactions. Effect of temperature and pressure on rate constant. Collisions
and transition state theories.

8. Photochemistry
Absorption of light; decay of excited state by different routes; photochemical reactions between
hydrogen and halogens and their quantum yields.

9. Surface phenomena and catalysis
Absorption from gases and solutions on solid adsorbents, Freundlich and Langmuir adsorption
isotherm; determination of surface area, characteristics and mechanism of reaction on
heterogeneous catalysts.

10. Bio-inorganic chemistry
Essential and trace elements in biological processes, metalloporphyrins with special reference to
haemoglobin and myoglobin. nitrogen fixation, oxygen-uptake proteins, cytochromes and
ferredoxins. Biological role of alkali and alkaline earth metal ions.

11. Coordination chemistry
(1) Introduction to bonding theories in transition metal complexes: Valency bond theory,
crystal field theory, Ligand field theory and molecular orbital theory.
(2) Magnetic properties of transition metal complexes: Magnetic moment (spin only and with
L-S coupling), orbital contribution to magnetic moment.

(4) Isomerism in coordination compounds. IUPAC nomenclature of coordination compounds; stereochemistry of complexes with 4, 5 and 6 coordination numbers; chelate effect and polynuclear complexes; trans effect and its theories; thermodynamic and kinetic stability of complexes.


12. General chemistry of inner transition elements

Lanthanides and actinides: Occurrence, separation, oxidation states and magnetic properties; lanthanide contraction.

CHEMISTRY (CODE NO. 05)
PAPER - II

1. Reaction mechanisms
General methods (both kinetic and non-kinetic) of study of mechanism of organic reactions illustrated by examples–use of isotopes, intermediate trapping, stereochemistry; energy diagrams of simple organic reactions–transition states and intermediates; energy of activation; thermodynamic control and kinetic control of reactions.

2. Reactive intermediates
Generation, geometry, stability and reactions of carbonium ions, carbanions, free radicals, carbenes and benzylics.

3. Name reactions
Aldol condensation, Claisen condensation, Perkin reaction, Knoevenagel reaction, Wittig reaction, Wolff-Kishler reduction, Cannizzaro reaction and von Richter reaction; benzoin condensation; Fischer indole synthesis, Skraup synthesis, Sandmeyer reaction, Reimer-Tiemann reaction and Reformatsky reaction.

4. Synthetic polymers
Addition or chain growth polymerization, free radical vinyl polymerization, ionic vinyl polymerization, Ziegler-Natta polymerization, vinyl polymerization Condensation or step growth polymerization. Polyesters, polyamides, phenol-formaldehyde resins, urea-formaldehyde resins, epoxy resins.

5. Photochemistry
Photochemical reactions of simple organic compounds, excited and ground states, singlet and triplet states, Jablonski diagram. Fluorescence and phosphorescence. Quantum yield and energy transfer process.

6. Organic spectroscopy
Problems pertaining to the structure elucidation of simple organic compounds using UV-visible, IR and NMR spectroscopy.

7. Heterocyclic compounds
Molecular orbital picture and aromatic characteristic of pyrrole, furane, thiophene and pyridine. Methods of synthesis and chemical reactions with particular emphasis on the mechanism of electrophilic substitution. Comparison of basicity of pyridine, piperidine and pyrrole. Preparation and reactions of indole, quinoline and isoquinoline.

8. 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 ethane and n-butane, and cyclohexane. D, L-and R, S-notations of compounds containing chiral centres; projection formulae-Fischer, Newman and Sawhorse of compounds containing two adjacent chiral centres; meso and dl-isomers, erythro and threo isomers; racemization and resolution; geometrical isomers; E and Z notations.

9. Organometallic compounds
Preparation and synthetic uses of Grignard reagents, alkyl lithium compounds.

10. Active methylene compounds
Diethyl malonate and ethyl acetoacetate-applications in organic synthesis; tautomerism (keto-enol).

11. Analytical chemistry
PHYSICS  ( CODE NO. 06 )
PAPER - I

1. Mechanics and Relativity
Conservative force field and potential energy, Gravitational potential, Motion under central force, Kepler's Law, Centre of mass and laboratory coordinate system. Coriolis force and its application's, Conservation of linear and angular momentum, Inertial and non inertial Frams, Michelson - Morley experiment and its implications. Galilian transformation, Lorentz transformation, length contraction, time dilation, velocity addition theorem. Variation of mass with velocity, mass energy equivalence, particle with zero rest mass.

2. Thermal & Statistical Physics

3. Optics

4. Electricity and Electronics
AC circuits, complex numbers and their applications in solving AC circuit problems. Transmission of electric power, Magnetic force on moving Charge, Biot Sevart law, Ampere's Law, Theory of diodes, Types of diodes and their applications. Characteristics of transistors, h parameters, bias stability, thermal runaway. FET: JFET and MOSFET, their construction, working and uses.

5. Sound and Acoustics

PHYSICS  ( CODE NO. 06 )
PAPER - II

1. Quantum Mechanics
De-Broglies Hypothesis, Heisenberg uncertainty relation for p and x, its extension to energy and time, consequences of uncertainty relation, gamma ray microscope, particle in a box. Schrodinger's equation, postulatory basis of quantum mechanics, operators, expectation values, transition probabilities, application to a particle in one and three dimensional boxes, harmonic oscillator.

2. Atomic Spectra
Hydrogen atom, natural occurrence of n, l and m quantum numbers, the related physical quantities, comparison with Bohr's theory. Spectra of hydrogen, deuton and alkali atoms, spectral terms, doublet fine structure, screening constants for alkali spectra for s, p d and f states, selection rules, singlet and triplet fine structure in alkaline earth spectra, L-S coupling and J-J coupling, fine strcture of hydrogen atom.

3. Molecular Spectra and Spectroscopy
Discrete set of electronic energies of molecules, quantization of vibrational and rotational energies, determination of inter nuclear distance, pure rotational and rotation - vibration spectra. Dissociation limits for the ground and other electronic states, transition rules for pure vibration and electronic vibration spectra. Raman effect. Stokes and antistokes lines, complementry character of Raman and infrared spectra, experiemental arrangement for Raman spectroscopy. Fluorescence & phosphorescence.

4. Solid State Physics
Lattices: Lattice types, lattice planes. Common crystal structures Laue's theory of X-ray diffraction, Bragg's Law, electrons in periodic potential; nearly free electron model (qualitative), energy bands, energy gap, metals, semiconductors, insulators, density of states, Fermi energy, Fermi velocity. Mobility of electrons and holes, Hall effect and Hall coefficient.

5. Nuclear Physics
Basic nuclear properties, general concepts of nuclear forces, working of nuclear detectors, G-M counter, proportional and scintillation counters, cloud chamber, spark chambers. Nuclear reactions, Q-value of nuclear reactions, nuclear fission and nuclear fusion (concepts), energy production in stars. Compound nucleus, direct reactions (concepts). Shell model, liquid drop model.

MATHEMATICS  ( CODE NO. 07 )
PAPER - I

1. Abstract Algebra

2. Linear Algebra

3. Differential Calculus

4. Integral Calculus

5. Differential Equation

6. Vector Calculus
Differentiation of vector function, Gradient, divergence & curl in Cartesian, cylindrical & spherical coordinate, Higher order derivatives. Vector integration, Gauss’s, Green’s & stoke’s Theorem, and their applications.

7. Analytical Geometry
Cartesian and polar coordinates in two and three dimensions. Second degree equations in two and three dimensions, Reduction to canonical forms. Straight lines, Shortest distance between two skew lines, plane, Sphere, Cone, Cylinder, Paraboloid, Ellipsoid, Hyperboloids of one and two sheets and their properties.

8. Statistics
Measures of central tendency:- mean, mode, median, measures of dispersion, range, inter quartile range, mean deviation, standard deviation skewness and kurtosis.
Probability - Events, sample space, probability of an event, addition and multiplication Theorem, Baye’s Theorem.
Theoretical Distributions - Binomial, Poisson, Normal distributions and their properties & use. Method of least square, curve fitting, correlation & regression. Partial & multiple correlation (up to three variables)

MATHEMATICS (CODE NO. 07)
PAPER - II

1. Real Analysis & Metric Space

2. Complex Analysis
Continuity and differentiability of complex function.
Analytic function, Cauchy - Riemann Equations, Cauchy’s Theorem, Cauchy’s Integral formula, Power series, Taylor’s series, Laurent’s series. Singularities, Cauchy’s Residue Theorem, Contour Integration, Conformal mapping, Bilinear transformations.

3. Advance Calculus
Functions of several variables, Limit, continuity and differentiability of function of two variables. Partial derivative, Change of variables, Euler’s Theorem on homogenous functions. Taylor’s Theorem for function of two variables. Maxima & minima and saddle point of function of two variable, Lagrange’s method of multipliers. Indeterminate form.
4. Partial Differential Equations
Curve and surfaces in three dimensions, formulation of partial differential equations. Solutions of equation of the type \( \frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R} \). Orthogonal trajectories. Paraffian Differential equation, partial differential equation of first order, solution by Cauchy's method. Charpit method of solution. Linear partial differential equation of second order with constant coefficient.

5. Linear Programming

6. Numerical Analysis

7. Boolean Algebra

8. Mechanics
Statics - Analytical conditions of Equilibrium of coplanar forces. Virtual works, catenary. Forces in three dimensions Poinset's Central axis. Stable & unstable equilibrium.
Dynamics - Velocities & acceleration along radial & transverse directions and along tangential and normal direction. Simple Harmonic motions - Elastic strings.
Motion on smooth & rough plane curves. Motion in a resisting medium. Motion of a particle of varying mass.

STATISTICS (CODE NO. 08)

1. Descriptive Statistics

2. Probability Theory
Important Concepts in Probability - Definition of probability – classical and relative frequency approach to probability, Richard von Mises, Cramer and Kolmogorov’s approaches to probability, merits and demerits of these approaches . Random Experiment : Trial, sample point and sample space, definition of an event, operation of events, mutually exclusive and exhaustive events. Discrete sample space, properties of probability based on axiomatic approach, conditional probability, independence of events, Bayes theorem and its applications. Random Variables ; Definition of discrete random variables, probability mass function, idea of continuous random variable and its properties – moments, measures of location , dispersion, skewness and kurtosis, moment generating function, their properties and uses. Standard univariate discrete distributions and their properties : Discrete Uniform, Binomial, Poisson, Hypergeometric, Negative Binomial and Geometric distributions. Continuous univariate distributions- Uniform, normal , Cauchy, Laplace, Exponential, Chi-square, Gamma and Beta distributions. Bivariate normal distribution (including marginal and conditional
1. Statistical Methods
CIVIL ENGINEERING  (CODE NO. 09)
PAPER - I

1. Structural Analysis
   Determinate and Indeterminate Structures, Degrees of Freedom. Static and Kinematic indeterminacy,
   Principle of Superposition, Virtual Work, Energy theorem, Deflection of Trusses, Redundant Frames.
   Analysis of Determinate and Indeterminate Arches, their influence lines.
   Rolling loads, influence lines for Determinate Beams and Pin-jointed Frames. Mullar Breslau’s
   Principle and influence lines for Indeterminate Beams and Frames.
   analysis of indeterminate beams and frames. approximate methods for analysis of Rigid Frames.
   Matrix Methods of analysis, Stiffness and Flexibility Matrices of Beams. Frames & Trusses, Elements
   of Plastic analysis.

2. Structural Design
   (1) Steel Design
      Factors of Safety and Load Factors.
      Rivetted and Welded connections of Members, Design of Tension, Compression and Flexural
      members, built-up beams and Plate Girder Slab and Gussseted Bases for Columns, Design of
      Roof Trusses. Purling and Coverings, Structural Steel tubes and their connections Industrial
      and Multi-Storyed Buildings Water tank and supporting tower’s design. Plastic Design of
      Continuous Beams & Frames.

   (2) R.C. Design
      Working Stress and Limit State methods for design of Rectangular, T and L Beams, Slabs and
      Columns.
      Isolated and Combined footings, Raft Foundations.
      Overhead, Resting on ground and Underground Water Tanks.
      Design of Bunkers and Silos.
      Methods and Systems of Prestressing, Anchorages. Losses in Prestress, Design of Prestressed
      Concrete Beams.

3. Construction Planning and Management
   Detailed estimates, specifications, analysis and rates of various works in civil engineering.
   Construction activity, work break down structures, scheduling through CPM and PERT analysis,
   cost optimization through network construction, Float times, Bar charts, Project control and super-
   vision, cost reduction measures,
   Cost analysis and resource allocation,
   Fundamentals of engineering economics, methods of appraisal, present work, annual costs, benefit
   cost analysis, Types of tenders and contract conditions.

4. Environmental Engineering
   Water Demand – Per capita Demand, Population Estimation methods
   Water Quality Criteria for various uses viz. Domestic & Non-Domestic, Irrigation effects &
   significance of important parameters and permissible concentration as per relevant standards.
   Transmission of Water- relative merits & demerits of various pipes viz C.I. G.I. Mild Steel.
   A.C. Pressure Pipes. Corrosion of Pipes-types & Methods of control System of distribution & layouts of
   distribution.
   Unit Processes & Operations for Water Treatment viz, Objectives and Design criteria of
   Sedimentation, Coagulation, Flocculation, Chemical Sedimentation. Filtration (slow sand & rapid
   sand), Disinfection, Softening.
   N.O.D.
   Effluent Standards, River Standards.
   Sewage System-Design of Sewer & Storm Sewer, Sewage Pumps.
   Design of Screens, Grit Chamber.
   Design of Primary Sedimentation tank.
   Design of Biological Treatment Units viz Trickling filters, Activated Sludge Treatment and Secondary
   Sedimentation tank.
   Waste Stabilization Ponds- Aerobic, Anaerobic & Facultative Ponds, design criteria and principles.
   Sludge Treatment- Digestion & Sludge Disposal.
   Septic Tanks-design criteria & working
   Self Purification of Streams- oxygen sag curve.
   Types of Pollution-Sources & effects of various pollution viz., Water, Air, Land & Noise, Relevant
   standards.
   Rural Sanitation, Solid Waste- collection & disposal.
1. Water Resources Engineering

2. Transportation Engineering

3. Geotechnical Engineering
1. Circuit theory
Circuit Components, Network graphs, KCL, KVL, Circuit analysis methods: Nodal analysis, mesh analysis, basic network theorems; transient analysis : RL, RC and RLC Circuits; sinusoidal steady state analysis, resonance, Quality factor, balanced three phase circuit analysis. Frequency domain analysis Laplace’s transform, Fourier series (trigonometric & exponential). two port networks and their various parameters; Poles and Zeros driving point & transfer function. Passive filter design theory.

2. Electro Magnetic field Theory and Materials

3. Measurement and Instrumentation
Error analysis, Measurement of current, voltage, power, energy, power factor, resistance, inductance, capacitance and frequency Analysis of Bridges. Electronic measuring instruments: Multimeter, CRO, digital volt meter, frequency counter, Q-meter. transducers, measurements of non-electrical quantities by electrical methods, measurement of displacement, temperature, velocity, pressure, Signal conditioning, Date acquisition system.

4. Analog and Digital Electronics

5. Power Electronics
Semiconductor power devices: diode, transistor, SCR, triac, GTO, MOSFET & IGBT, triggering circuits. Phase Control rectifiers. bridge converters : fully Controlled and half Controlled, principles of choppers and inverters.

6. Signals and Systems
Representation and continuous time and discrete time signals and systems; Linear ime Invariant systems; Convolution, impulse response; time domain analysis of LTI systems based on convolution and differential equations, Fourier transform, Laplace transform, Z transform, transferfunction, sampling of signals, DFT, FFT, processing of analog signals through discrete time systems.

ELECTRICAL ENGINEERING (CODE NO. 10)
PAPER - II

PART -I

1. Control System

2. Microprocessors and Microcomputers
8 bit microprocessor 8085 : Architecture, CPU, module design, memory interfacing and I/O, interrupts, PPI 8255.

PART -II

1. Electromechanical energy Conversion
Principles of electromechanical energy conversion, Torque and emf in rotating machines, characteristics and performance analysis of DC machines and their starting and speed control. Transformers: Principles of operation and analysis, regulation, Three phase transformer, Three phase induction machines, and synchronous machines: Their characteristics and performance analysis, speed control. Special machines : Stepper motors, Brushless DC motors, switched reluctance motors, permanent magnet motors, Single phased induction motor (FHP motors) : Performance and analysis;

2. Industrial Drives & Utilisation
3. Power Systems Analysis and control
Performance evaluation of overhead transmission lines and cables, fundamentals of active and reactive power transfer, voltage control and power factor correction, per unit representation, Bus admittance and impedance matrices, Load flow study, Economic operation of power system, Symmetrical components, Analysis of symmetrical and unsymmetrical faults, concept of stability, swing curve and equal area criterion, static VAR systems, basic concepts of HVDC transmission, series and shunt compensation, FACTS. speed control of generators, tie line control and frequency control.

4. Switch gear and protection
Principle of over current, differential and distance protection, concept of solid state relays and circuit breakers various protection scheme for transmission lines, generator and transformer. Protection against surges.

PART - III
Light Current

1. Analog communication
Random variables - continuous, discrete, probability density functions, statistical averages, random signals, and noise, noise equivalent bandwidth, signal transmission with noise, signal to noise ratio, amplitude modulation, DSb, DSB-SC and SSB, modulators and demodulators, phase and frequency modulation, PM and FM signals, narrowband FM, generation and detection of FM and PM.

2. Digital communication
Pulse code modulation (PCM), differential pulse code modulation (DPCM), Delta modulation (DM), Digital modulation and demodulation schemes : Amplitude phase and frequency, keying schemes, (ASK, PSK, FSK), Error control coding, error detection and correction, linear block codes, convolution codes.

3. Satellite Communication, Radar and T
Satellite communication, general overview and technical characteristics earth station equipments, satellite link design, CNR of satellite systems, Radar : basic principles, pulsed systems : CW Doppler radar, FMCW radar, Phase array radar, television systems and standards, colour TV transmission and receiver systems.

4. Microwaves & Antenna
Electromagnetic radiation, Propagation of waves - ground waves, sky wave, space wave, tropospheric scatter propagation. Extraterrestrial communications. Antenna : Various types, gain, resistance, band-width, beam width and polarization, effect of ground. Antenna coupling; high frequency antennas; microwave antennas; special purpose antennas. Microwave Services : Klystron, magnetron, TWT, gun diodes, Impatt, Bipolar and FETs, Microwave integrated circuits. Microwave measurements.

5. Fiber Optic Systems
Multiplexing - Time division multiplexing, frequency division multiplexing, optical properties of materials, refractive index absorption and emission of light, optical fibers lasers and optoelectronic materials, fiber optic links.

MECHANICAL ENGINEERING   ( CODE NO. 11 )
PAPER - I

Note : Use of Design Data Book is permitted.

Free body Diagram and Equilibrium; Trusses and Frames; Stress and Strains in Two Dimension; Mohr's Construction; Beams – Bending Moment and Shear Force Diagram; Bending and Shear Stress Distribution; Torsion of Shafts; Thin and Thick Walled Pressure Vessels; Euler's Theory of Column. Leaf and Helical springs.

2. Theory of Machines
Displacement, Velocity and Acceleration of Plane Mechanisms (Maximum 6 Links), Kliens' Construction; Law of Gearing, Gear Tooth Profile, Epicyclic Gear Trains; Motion Analysis of Cam and Followers; Balancing of Rotating Masses, Reciprocating Masses – Hammer Blow, Tractive Effort and Swaying Couple; Power Transmission by Belt Drive; Analysis of Simple Band, Block, Band and Block Brakes; Dynamometers; Free Vibrating of Single Degree of Freedom Systems; Whirling of Shafts; Gyroscopic Stability of Shaft, Ship and Aeroplane.

3. Design of Machine Elements
Design Concepts; Theories of Failure; Design for Static and Dynamic Loading, Design of Bolted, rivetted and Welded Joints; Design of Shaft and Coupling.

4. Production Engineering
Merchant's Force Analysis, Tool Life and Tool Wear; Cutting fluids, Machinability and Machining Economics; Principles of Non-Traditional Machining Processes – EDM, ECM, USM & Laser; Principles of Design of Jigs and Fixtures; Limits, Fits and Tolerances; Comparators ,Gauge Design; Measurement of Surface Roughness; Interferometry; Acceptance Test of Machine Tools.
5. Production Management
Production Planning and Control; Forecasting Models; Aggregate Production Planning; Material
Requirement Planning; Inventory Control – ABC Analysis, EOQ Model; Linear Programming –
Simplex Method, Transportation & Assignment Model; Simple Queuing Models; PERT & CPM; Quality
Control in Manufacturing, Control Charts for Variables & Attributes.

MECHANICAL ENGINEERING (CODE NO. 11)
PAPER - II
Note: Use of Steam Table and Psychometric Chart are permitted.

1. Thermodynamics
Steady Flow Energy Equation; Entropy and Irreversibility; Availability and Available Energy; Detailed
Analysis of Thermodynamic Cycles and their Limitations.

2. Fluid Mechanics and Machines
Continuity, Momentum and Energy Equations; Flow net; Turbulent Flow through Pipes; Velocity
Distribution in Laminar and Turbulent Flow; Dimensional Analysis; Boundary Layer on a Flat Plate;
Adiabatic and Isotropinc Flow of Compressible Fluids; Classification of Hydraulic Turbines and
Pumps; Specific Speed; Impulse and Reaction Turbines; Velocity Diagrams.

3. Heat Transfer, Refrigeration and Air Conditioning
Critical Thickness of Insulation; Conduction through Walls and Pipes; Heat Transfer from Fins;
Dimensionless Numbers; Free and Forced Convection; Heat Exchange by Radiation between black
and Gray Surfaces; Electrical Analogy; Heat Exchanger Classification; Effectiveness; LMTD and NTU
Methods; Fouling Factor.
Vapour Compression and Vapour Absorption Systems and their Cycle Analysis; Nomenclature,
Properties and Characteristics of Important Refrigerants; Ozone Friendly Refrigerants; Human
Comfort and ASHRAE Comfort Charts; Estimation of Air-Conditioning Loads.

4. Energy Conversion Systems
Theories of Combustion in Compression Ignition and Spark Ignition Engines; Abnormal Combustion;
Carburetion and Fuel Injection; Emissions from Engine and their Control; Modern Trends in IC
Engines; Classification of Steam Turbines, Specific Speed, Velocity Triangles; Open and Closed Cycle
Gas Turbine Plants; Nuclear Power Plants; Renewable Energy Sources.

5. Computer Aided Engineering
Introduction to CAD, 2D and 3D Drawing Concepts; Computer Aided Manufacturing – NC and CNC
Machines, Methods of Part Programming; Elements of Robotics and Automated Material Handling
System; FMS and Expert System.

COMMERCE AND ACCOUNTANCY (CODE NO. 12)
PAPER - I
Accounting, Auditing, Income Tax and Statistics

1. Company Accounts
Problems on amalgamations (absorption and reconstruction) and liquidation of joint stock companies.
Analysis and interpretation of published Accounts. Valuation of shares and Goodwill.

2. Cost & Management Accounts:
Techniques of cost control and cost reduction. Process Costing. Cost volume profit relationship and
Decision making, Budgetary control and standard costing.

3. Auditing
Programming of audit work. Valuation & verification of Assets and Liabilities. Audit of a limited
company, Powers, duties & liabilities of company auditor. Auditor's Report Audit of Computerised A/C
& use of Computers in the Audit of A/c

4. Income Tax
deductions from Gross Total income. Computation of Taxable Income & Tax liability.

5. Statistics
Definition, scope & importance. Measurements of Central tendency, Dispersion, Skewness
Correlation and Index Number.

COMMERCE AND ACCOUNTANCY (CODE NO. 12)
PAPER - II
Business Management & Finance

1. Concept of Modern Management
Scope & principles. Management as a "change agent” Functions of management - Planning,
Organisation, Staffing, Direction, co-ordination & control. Decision-making- concept, Process &
techniques, Social responsibilities of management.

2. Human Resources & Industrial Relations
Recruitment, selection, induction and training systems. Wage payment, Motivation, Communication &
Leadership styles, Causes of Industrial dispute & its settlement.
3. Marketing and Sales Management
Modern concept of marketing, Functions and process of marketing, Marketing - Mix Marketing, Research, Methods of Sales - Promotion, Advertisement and large scale retailing.

4. Business Finance

5. Financial Institutions & Indian Capital market
Monetary & Credit Policies of Reserve Bank of India. Principal constituents of Indian capital market. Role of stock exchanges and their main functions, Mutual funds : Evolution & expansion, Problem of Direct Foreign Investment in Indian Business and Industries. Disinvestment of Govt. holdings in Public sector undertakings in India.

ECONOMICS ( CODE NO. 13 )
PAPER - I

1. Economic activities and circular flow of income, nature of Micro and Macro economics. Basic problems of the economy, concept and measurement of National Income.
4. Price Theory - Price determination under different market conditions, pricing of factors of production.
6. Banking - Objectives and instruments of credit control. Monetary and credit policies in a planned developing economy.
7. Types and principles of taxation, Principles of public expenditure, Objectives and instruments of Fiscal Policy, Centre - state financial relations.
8. International Trade - Theories of International Trade, Trade Liberalization and W.T.O., Role of foreign capital in economic development, determination of exchange rates, balance of payments.
10. Environmental implications of development - Renewable and non renewable resources, Pollution - land, water, air and de-forestation.

ECONOMICS ( CODE NO. 13 )
PAPER - II

Indian Economy

1. Basic charatistics of Indian economy. Human and natural resources, Structure of Indian Economy and composition of India’s National Income, problems of urban and rural economy.
4. Economic Reforms and social justice in India, Regulation of capital market, foreign currency market and foreign investment.
7. Indian Planning - objectives and strategies, achievements and failures of Indian Planning, Problems of Indian planning.
8. Study of Madhya Pradesh Economy - Natural resources, Human resources, Possibilities & Problems of Agricultural and Industrial development, State domestic product, Resource mobilization.

HISTORY ( Code No. 14 )
PAPER - I

INDIAN HISTORY
PART - I

1. Study sources of Ancient Indian History. Ancient Indian Traditions of Historical writing
2. Prehistoric Cultures in India. - Lower Paleolithic, Mesolithic and new Paleolithic.
5. Rise of Territorial States - (Republican States and Mahajanpadas) Rise of Religious movement in North India. Doctrines and social Dimension of Buddhism and Jainism.
8. Gupta Empire - administration , Economy, Changing pattern of urban development, architecture, art, literature and science.
9. Post Gupta Times ( up to 750 A.D.) – Pallavas, Chaluakyas and Vardhan, Poltiical History of Nothern and Peninsular India, Samanta ( Feudal ) system and Changes in political structure-Economy, Social Structure, culture, religion .
11. Invasion of Arabs, Gaznavi and Ghoris and their Impacts.

PART - II
1. Sources of Medieval Indian History , Traditions of Historical writing
5. Foundation of Mughal Empire- Babur, Humayun, Sher Shah Suri- Conquests and administration.
8. Mughal administration and Policies - Social, religious and economic life, literature, architecture, painting, music, science and technology.
9. Rise and Expansion of the Maratha under the Peshwas. Third Battle of Panipat – Causes, Result and impact.

HISTORY (CODE NO. 14)
PAPER - II (Modern history)

PART - I
1. Sources of Modern Indian History, approaches of Modern Historical Writing
4. British – Maratha , British – Mysore relations, Subsidiary alliance of Wellesley – Maharaja Ranjitsingh and British – Sikh relations.
5. Establishment of supremacy of Lord Hastings and British rule in the 19th century. Reforms of Bantik, Dal Hausie’s Doctrines of Lapse and reforms.
8. Primary Stage of Indian Nationalism - Social Background, Peasants and Tribal revolt in the initial stage of Indian Nationalism Establishment of Indian National congress – Moderatephase and Extremists.
14. Indo-Pak War 1971 and rise of Bangla Desh

PART - II
Modern History of the World

1. Industrial and Agricultural revolution, American war of Independence.
2. French revolution - Nepolian era (1799-1815), Vienna Congress, Concert of Europe.
4. Rise of Nationalism in 19th century Unification of Germany and Italy.
5. 1871 to 1914 - Home and foreign policy of Germany Third republic of France - Foreign & Home Policy.
   1901 to 1924 Russia - Revolution of 1905, Revolution of 1917 and establishment of communism and its economic policy under the leadership of Lenin.
8. World politics between the two World wars - Naziisms, Hitlers home and Foreign policy, Fassistism - Mussoloni's home and foreign policy, Dictatorship in Japan.

Geography (Code No. 15)
PAPER - I

PART - I
Physical Geography

1. Geomorphology
   (1) Origin of the Earth- Theories regarding the origin of the earth.
   (2) Earth’s crust- Origin of rocks, their types, Interior of the earth, Theories regarding the origin of continents and mountains, Agents of denudation- Weathering and Erosion, Work of running water, underground water, glacier, wind and oceanic waves. Earthquakes, Volcanoes and their world distribution.
   (3) Landforms- Mountains, Plateaus and Plains-types and their world distribution

2. Climatology
   (1) Atmosphere: Structure and composition of atmosphere, Vertical distribution of atmospheric layers and their characteristics.
   (2) Temperature: Horizontal distribution of temperature.
   (3) Pressure and wind system: Pressure belts of the globe, Types of winds and their distribution, local winds, jet stream, Air masses and Fronts, Cyclones and Anticyclones and their related weather.
   (4) Humidity, Condensation and Precipitation: Measurement of humidity in the air, Types of condensation and precipitation, Distribution of precipitation over the globe.
   (5) Classification of Climates: The general classification of world climate by Koppen and Thornthwaite.

3. Oceanography:
   (1) Relief features of the ocean beds, Origin of continental shelf, continental slope and basins, ocean deeps and ocean canyons.
   (2) Temperature and salinity of oceans- causes and regional variations.
   (3) Oceanic movements: Waves, Currents and Tide.

PART - II
Geographical Concepts, Human and Economic Geography

1. New Trends in Geography
   Concept of distance, space, region, regionalization and regionalism, Environmental sustainability.
2. Human Geography
(1) Population - growth, density and distribution in the world, Population problems of the
developed and developing countries.
(2) Settlements: origin, types and pattern of rural settlements, Process of urbanization,
morphology and functional classification of towns.

3. Economic Geography
(1) Geography of primary production: Agriculture-wheat, rice, sugarcane, tea, coffee, cotton,
rubber, livestock and fisheries.
(2) Minerals: world production and distribution of iron ore, manganese, tin, and bauxite.
(3) Power Resources; world distribution of coal, petroleum, and hydroelectricity.
(4) Industries: Iron and steel, Cotton textile and Petro chemical industry, Major industrial
regions of the world.
(5) Transport and Communication: Major land, sea and air routes of the world, Changes in
the world economy in the context of globalization.

GEOGRAPHY (CODE NO. 15)
PAPER - II
Geography of India with special reference to Madhya Pradesh

1. Physical Aspects
Geological history of Indian sub-continent, Physiographic divisions and drainage system, Physical
divisions of Madhya Pradesh.

2. Climate
Temperature and pressure conditions, Origin and mechanism of Indian monsoon, Distribution of
rainfall, Climatic regions, Distribution of rainfall and water scarcity areas of Madhya Pradesh.

3. Soils and Natural Vegetation
Soil types and their distribution, Forest types and their distribution. Problems of soil erosion in
Madhya Pradesh, Forest resources of Madhya Pradesh.

4. Population and Settlements
Growth, density and distribution of population, Population policies of India. Tribes of Madhya
Pradesh, Process of urbanization in India, Problems of Indian cities.

5. Economic Aspects
(1) Agriculture - Major crops- their distribution and changing pattern. Contemporary issues
of agricultural sector- Impact of green revolution, Market economy and globalization and
its impact on agriculture pattern and changing trends in M.P.
(2) Minerals and Power Resources - Distribution and production of Iron ore, Manganese,
Bauxite, Mica, Coal, Petroleum and Hydroelectricity.
(3) Industries - Factors of localization and distribution of Iron and Steel, Cotton textile, Sugar
and Cement industries. Emerging industrial areas of Madhya Pradesh.
(4) Trade and Transport - Indian road and rail transport network. Changing pattern of Indian
international trade.
(5) Regional Development and Planning - Concept of regional imbalance and regional
planning. Problems and planning of hill areas, drought prone areas and flood prone
areas. Narmada valley development in Madhya Pradesh.

Geology (Code No. 16)
PAPER - I
General Geology and Geodynamics, Geomorphology, Structural Geology Stratigraphy and
Palaeontology

1. General Geology & Geodynamics
The solar system, meteorites, origin and interior of the earth. Radioactivity and age of the earth.
Volcanoes: Causes and products, volcanic belts. Earthquakes : causes, effects, earthquakes belts,
seismicity of India. Intensity and magnitude, seismographs. Island arcs, deep sea trenches and mid-
oceanic ridges. Continental drift: evidences and mechanics; sea floor spreading, plate tectonics,
Isostasy, orogeny and epeiorogeny.

2. Geomorphology and Remote Sensing
Basic concepts of geomorphology. Weathering and mass wasting. Landforms, slopes and drainage.
Geomorphic cycle and their interpretation. Morphology and its relation to structures and lithology.
Elementary idea about applications of geomorphology. Geomorphology of Indian subcontinent.
Applications of remote sensimg in geology.

3. Structural Geology
Fold, fault - their morphology, classification, recognition and effect on outcrops. joints : classification
and importance. Unconformities : types, recognition and significance. Definition and classification of
foliation and lineation and their relation to major structures. Recognition of top and bottom of beds.
Concept of rock deformation. Tectonic framework of India. Geological maps : structural & lithological
symbols and map reading.
4. Stratigraphy

5. Palaeontology

GEOLOGY (CODE NO. 16)
PAPER – II

1. Mineralogy

2. Igneous and Metamorphic Petrology
Generation and crystallization of magma. Crystallization of unicomponent (SiO₂), binary (albite - anorthite and diopside - anorthite) and ternary (diopside - albite - anorthite) component silicate system. Bowen’s reaction series. Magmatic differentiation and assimilation. Forms and structures of igneous rocks. Textures and microstructures of igneous rocks. Classification of igneous rocks. Petrography and petrogenesis of granite, syenite, diorite, basic and ultra basic groups, charnockite, anorthosite and alkaline rocks, carbonatites.

3. Sedimentology

4. Economic Geology

5. Hydrogeology, Engineering Geology and Mining Geology


POLITICAL SCIENCE AND INTERNATIONAL RELATIONS (CODE NO. 17)
PAPER – I

PART - I
Political Theory

1. Indian Political Thinkers
Manu, Kautilya, MN Roy, Gokhle, Tilak, Gandhi,Nehru, Ambedkar and Periyar.

2. Western Political Thinkers

3. Approaches to the Study of Political Theory
Historical, Normative and Empirical.
4. Political Ideologies
Liberalism, Socialism, Marxism, Fascism, Anarchism and Gandhism,

5. Concepts
Sovereignty (Monistic and Pluralist), Liberty, Justice, Equality, Power, Legitimacy, Authority and Political Obligation.

6. Democracy
Theories of Democracy (Classical, Elitist and Contemporary)

7. Behavioural Movement
Behaviouralism and Post-Behaviouralism, Decline of Ideology Debate.

8. Developmentalism
Concept of Political Development, Approaches to Political Development (Gabriel Almond, David Apter, Lucian W. Pye, and Samuel P. Huntington).

9. Modern Concepts
Systems theory, Structural-Functionalism, Political Culture, Political Socialization and Political Modernization.

10. Contemporary Theories
Post modernism, Feminism (Liberal, Marxist, Radical), Environmentalism.

PART - II
Government & Politics of India

1. Indian Freedom Movement
First War of Indian Independence 1857 - Liberal - Extremist and Revolutionary movement, Non Cooperation, Civil Disobedience, Quit India Movement, Role of Women in freedom struggle.

2. History of Constitutional Development

3. Salient features of the Indian Constitution

4. The Executive
Theory & Practice, President, Prime Minister and the Council of Ministers, Governor, Chief Minister and the State Council of Ministers, The Bureaucracy.

5. The Legislature
Role and function of the Parliament & Parliamentary Committee, Lok Sabha & Rajya Sabha, State Legislative Council.

6. The Supreme Court and the High Courts, Judicial Activism, Public interest litigation (PIL)

7. Statutory Institutions / Commissions

8. Party System
Ideology of Political Parties, Fragmentation & regionalisation of political parties, Pressure groups, Patterns of coalition politics, Electoral behavior, Politics in Madhya Pradesh.

9. Class, Caste, Ethnicity and gender issues in Indian Politics, Politics of Regionalism, Naxalite Movement, Communalism, Backward class and Dalit movement.

10. Grassroots democracy
Panchayati Raj and municipal government, significance of 73rd and 74th amendments, grass root movement and Women’s Empowerment, Organization and functions of panchayati Raj System in Madhya Pradesh.

INDIA AND INTERNATIONAL RELATIONS (Code No. 17)
PAPER – II
PART - II
International Relations

1- Determinants of Foreign Policy - Domestic Compulsions, Geopolitics, Economic and Emerging Global order.

2- Theories of International Politics - System, Realist, Idealist, Decision making, Game Theory and Marxist.


4- Cold War and Post, Cold war, Disarmament and Arm’s control.

5- Non-Aligned Movement - Concept, Relevance in Contemporary Global order, South - South Dialogue and North - South Dialogue.

6- International Organisation - U.N. and its specialized agencies (ICL, ILO and UNICEF) Restructuring of the U.N.

7- Regional Organization - EU, SAARC, ASEAN & APEC.

8- Foreign Policy of Major Powers - U.S.A., Russia & China.
10. Major Issue of World Politics - Oil diplomacy and Iraq, Afghanistan-Crisis, Major issue of International Politics after collapse of Soviet Union, International Terrorism

PART - II
India and the World

1. Determinants and characteristics of Indian Foreign policy, Continuity and Change.
2. India's relation with neighbors Pakistan, China, Bangladesh, Sri Lanka and Nepal.
3. India's relation with USA, and Russia.
4. India and SAARC.
5. India and the Non - Aligned movement.
8. India and the Emerging International Economic order - Inter National Agencies, WTO, IMF & IBRD.
10. India and The Third World - Emergence as a Global Order.

PUBLIC ADMINISTRATION (CODE NO. 18)
PAPER – I

PART - I
Administrative Theory

2. New Public Administration concept of New Public Management, Good Governance, Concept and application, Ethics and Administration.
5. Hierarchy, Span of Control, Unity of command, Line and Staff agencies.
7. Decision making theory with special reference to Herbert Simon, Theories of Leadership, Communication, Morale, Motivation (Maslow and Herzberg).
8. Concepts of Accountability and Control, Legislative Executive and Judicial control over Administration.

PART - II

3. Meaning, nature and scope of Comparative Public Administration, Bureaucracy and Ecology.
4. Origin and purpose of Development Administration, Rigg's Prismatic - Sala model, Bureaucracy and Development, Changing profile of Development Administration.
10. Role of Computers in Public Administration, E governance.
1. Evolution of Indian Administration, Kautilya, Mughal period and British Legacy.
2. Indian Constitution, Development, Preamble and Main Characteristics, Parliamentary Democracy, Federal System and Centre - State Relations.
3. The President, Prime Minister, Council of Ministers, Cabinet and its Committees, P.M.O. Central Secretariat, Ministries and departments.
5. Administrative Reforms, Reforms since independence, Reports of the Administrative reforms Commissions, Problems of their implementation.
6. Machinery of Planning, Composition and role, Planning Commission, Role of the National Development Council, Process of Plan formulation at Union and State levels, decentralized planning.
7. Role of Central and State Agencies in maintenance of law and order, Criminalisation of politics and administration.
8. Welfare Administration, Machinery for Welfare Administration at the National level. Special organizations for the welfare of the Scheduled Castes and scheduled Tribes, Welfare Schemes for Women and Children, Problems of Child labour.
9. Major issues in Indian Administrations, Problems of Centre State Relations, Values in Public Service and Administrative Culture, Development and Environmental issues. Indian Administration and Globalization.
10. Disaster management in India, Reservation policy in India, Women Empowerment, Role of NGOs in development.

PART - II
State Administration with special reference to Madhya Pradesh
2. Relationship between Central and State Administration, Basic difference between Central and State Administration.
3. Governor, Chief Minister, Council of Ministers.
4. Chief Secretary, His role and functions, State Secretariat and Directorates, State Planning Board.
5. State Civil Services - Organization and functions of Madhya Pradesh Public Service Commission, Recruitment and Training.
7. Civil Services Tribunals, Tribal Administration in M.P., Lok Ayukta, Economic Offensive wing, Chief Information Commissioner.
8. District Administration - Role of Collector, Tehsil and Tehsildar, Blocks and B.D.O.’s.

SOCIOLOGY ( CODE NO. 19 )
PAPER – I
1. Introduction to sociology
Meaning of sociology, the scientific and humanistic orientations to sociological study, Sociology and development, Sociology and professions.
2. Social research
Meaning, Scope and significance of social research, Formulation and importance of Hypothesis, Methods and techniques - Observation, Interview, Schedule and Questionnaire, Sampling, Case study.
3. Types of research
Basic and applied, Descriptive, Exploratory, Explanatory, Experimental.
4. Sociological thinkers
Karl Marx, V. Pareto, Talcott Parsons, Mahrshi Arbindo, Mahtma Gandhi, B.R. Ambedkar.
5. Individual and society
Social interaction, Social system, Culture and personality, Socialisation, Social values, Social Norms, Social Sanctions.
6. Social stratification and mobility
Meaning, Forms and theories, basis of social stratification, Caste, Class and power.
7. Social Institutions
Family, Marriage and Kinship, Social structure, Functions and changing patterns.
8. Economic institutions
Pre industrial and industrial economic system, industrialization and its impact on society, Globalization and liberalization, Socio-economic determinates of development.
9. Political Institutions
Concept of state and bureaucracy, Good governance-Democratic form and Panchayatiraj, Leadership, Political-parties and voting behavior, Criminalization-of polities.
10. Social Change
Concept and theories, factors of social change, Functions and dysfunctions of religion, Modernization and development. role of Education in Social Change.

Sociology (Code No. 19)
PAPER – II
1. Ideological bases
Traditional Hindu Social organization Dharma, Ashrama, Karma, Purshartha, Socio-cultural dynamics through the ages - impact of Buddhism, Islam and the west, Factors of unity and change.
2. Caste system
Origin of caste system, Culture and structural views, Change and persistence of caste in modern India, Issues of equality and social justice, Emergence of Dalit consciousness.
3. Class structure
Agrarian and industrial class structure, Emergence of middle class, Elite formation in India.
4. Marriage, family and kinship
Marriage among different ethnic groups, Family structural and functional aspect, changing forms, regional variations in kinship system, impact of legislations and socio-economic change on marriage and family, Generation gap.
5. Agrarian social structure
Peasant society and agrarian systems, Social consequences of land reforms and Green Revolution, Emerging Agrarian class structure, Agrarian unrest.
6. Rural-urban social structure
Features and characteristics of rural and urban social structure Urbanism and urbanization, Slums, Environmental Problems, Poverty and indebtedness, Urban planning and development.
7. Tribal society
Meaning and characteristics of tribe and scheduled tribe, Constitutional provisions to determine scheduled tribe, Tribal economy, means of livelihood, Tribal movement and development, Bhil, Gonda, Korku.
8. Industry and society
Meaning and characteristics of industrialization, Occupational diversification, Trade- unions and human relations, Economic reforms-Liberalisation, Privatisation, Globalisation.
9. Education
10. Social problem
Alcoholism, Drug-addiction, AIDS, Prostitution, Gender discrimination, Youth unrest, Problems of elderly people, Bonded Labour, Corruption, Child Labour, Dowry.

Criminology & Forensic Science (Code No. 20)
PAPER – I
1- Criminology - Definition and scope
2- Crime trends in India
(with reference to National Crime Records Bureau)
3- Crimes against children
(Nature, extent and legal provisions)
4- Crimes against women
(Nature, extent and legal provisions)
5- Crimes against Scheduled Castes and Scheduled Tribes
(Nature, extent and legal provisions)
6- Pre-classical theories of crime
7- Classical theories of crime - Theories of hedonism and deterrence.
8- Positive theories of crime - Constitutional and morphological theories, psychological and psychoanalytical theories.
9- Sociological theories of crime - Differential Association and Anomie.
10- Radical theories of crime - Labelling theory, etc.
11- Punishment - Definition, theories and types
12- Non-institutional treatment of offenders - Probation, temporary release and parole.
13- Institutional treatment of offenders
14- Prisons in India - organisation, Type and functions
15- Correctional services for jail inmates
16. Juvenile institutional and non-institutional services
17. Victims of crime and victim-compensation
18. Crime prevention planning

CRIMINOLOGY & FORENSIC SCIENCE (CODE NO. 20)

PAPER – II

1. Fingerprints - Patterns and types, development, lifting, preservation and comparison.
2. Foot and foot-wear prints - Importance, gait-pattern, preservation, lifting, casting and comparison.
3. Tyre and track marks - Importance, preservation and comparison.
4. Questioned documents - Types and examination, procurement of control samples, alterations, charred documents, class and individual characteristics of handwriting, typed, printed and photo-stat matters and their comparison, indented writing and its development, disguised writing, seal and rubber stamp.
5. Firearms in criminal activities, classification, components of firearms, smooth-bore and rifled firearms, types and structure of cartridge, preservation and forensic examination of firearm, bullet and shell case. Gunshot residues, estimation of range of firing.
6. Tool marks - Type, Identification and Comparative Study.
7. Poisons and toxicology - Definition, classification, types of poisoning, visceral samples for toxicological examinations, isolation and clean-up procedures, analysis of opiates, cannabis, dhatura, nux-vomica, ethyl alcohol, barbiturates, insecticides, arsenic, mercury, lead and zinc.
8. Composition and analysis of blood, semen, saliva, urine and hair.
9. Composition and analysis of fibre, glass, paint, soil and cement.
10. Death investigation - Types of death, medico-legal causes, determination of sex & age, post-mortem procedure, post-mortem changes.
11. Wounds - Types and characteristics, ante-mortem and post-mortem wounds.
12. Scientific investigation of unnatural deaths (accidental, suicidal and homicidal), sexual offences, arson and explosive cases.

PSYCHOLOGY (CODE NO. 21)

PAPER-I

Foundations of psychology

1. Introduction and methods of Psychology
   (1) Psychology as a Science:
   (2) Definitions, relation to other social and natural sciences.
   (3) Methods, Observation, Experiment, Clinical and Case Study, Interview, Questionnaire, Survey and Content analysis.
2. Physiological bases of behaviour
   (1) Receptor, affecter and adjustor system. Genetic bases of behaviour, hormones - their role in physical growth, emotional activity and personality make-up.
   (2) Structure and functions of C.N.S. Autonomic nervous system.
   (3) Sensation - visual, auditory and skin senses: Structure and function.
3. Development of human behaviour
4. Attention and perception
5. Learning
6. Memory
7. Thinking and problem solving
   Concept formation processes. Problem solving - approaches: factors affecting creative thinking.
8. Intelligence and creativity
Concept and definition of intelligence. Theories of intelligence (Spearman, Thurstone, Guilford)
Measurement of intelligence and aptitude, Concept of I.Q. and multiple intelligence. Measurement of
creativity and relationship between creativity and intelligence.
9. Motivation & Emotion
Nature and kinds of motives. Physiological basis of motivation - Hunger & Thurst. Theories of
motivation - drive reduction and need hierarchy modal.
Emotion - Types & theories of emotions, physiological correlates and their measurement.
10. Personality
Concept and definition of personality. Theories of personality Freud, Adler, Jung, Sullivan, Allport,
Lewin, Erickson. Determinants of personality. Personality assessment - projective tests, personality
inventories, situational tests.
11. Social behaviour
Attitudes - Theories of attitude-change and measurement of attitudes. Social perception, impression
formation, attribution theory and interpersonal attraction. Group dynamics - conformity, group
cohesiveness and leadership.

PSYCHOLOGY (CODE NO. 21)
PAPER - II
Applications of Psychology

1. Psychological Measurement and Individual Differences
Characteristics & construction of Psychological test. Types of Psychological test (Intelligence,
Personality, Interest, Aptitude), uses & limitation of psychological test.
2. Educational Psychology
Learning processes in class room. Teacher effectiveness. Motivation for scholastic achievement.
3. Organizational and Industrial Psychology
Organizational climate. Organizational leadership. Organizational development. Communication &
Decision making.
4. Psychopathology & Clinical Psychology
Mental disorders - Symptoms & causal factors. Diagnostic procedures.
Cognitive therapies. Biofeedback therapy.
5. Counselling & Community Psychology
Need & principles of guidance & counselling. Counselling approaches (Directive, Non-directive,
Rational - Emotive, Behaviour Counselling) Organizing guidance programmes in schools and colleges,
Types of intervention in community psychology, primary, secondary & tertiary prevention
programmes.
6. Health Psychology
Models of health.
Health damaging and health promoting life styles & behavior. Cardio - vascular disease &
relaxation technique.
7. Other Applications of Psychology
Sports psychology - improving performance of sports. Exercising & physical fitness. Environmental
psychology - Effects of noise and pollution, effects of crowding & population density, effect of sensory
deprivation.

PHILOSOPHY ( CODE NO. 22 )
PAPER – I
Metaphysics and Epistemology

Candidates will be expected to be familiar with the following western and Indian theories of
epistemology and Metaphysics.
1. Western
(1) Rationalism - Descartes, Spinoza, Leibnitz
(2) Empiricism - Locke, Berkeley, Hume
(3) Critical Philosophy - Kant
(4) Idealism - Hegel
(5) Realism - Moore
(6) Pragmatism - William James
(7) Logical Positivism - A.J. Ayer
(8) Existentialism - Kierkegaard and Sartre
(9) Theories of Truth - Correspondence, Coherence and Pragmatic.
2. Indian
(1) Carvaka - Theory of Knowledge, Materialism
(2) Jainism - Theory of Syadvada
(3) Bondage and liberation.
(4) Buddhism - Pratitya Samputpada, Ksanikvada, Nairatmya vada, Four Noble Truths.
(5) Samkhya - Prakriti, Purusa, Theory of Causation, Theory of Evolution
(6) Yoga - Astanga yoga
(7) Nyaya - Prama, Pramana, God, Liberation.
(8) Vaisesika - Categories, theory of Causation
(9) Mimamsa - Theory of Knowledge
(10) Vedanta - Brahma, Isvara, Atman, Jiva, Jagat Maya, Avidya, Moksha (Samkara and Ramanuja)
(11) Shankar's Anirvachaniya Theory of Error

PHILOSOPHY (CODE NO. 22)

PAPER - II

Socio-Political Philosophy and Philosophy of Religion

1. Socio-Political Philosophy
(1) Socio-Political values - Equality, justice, liberty and scientific temper.
(2) Marriage, family and gender equality.
(3) Study of following ideologies:
   (a) Democracy socialism, fascism, communism, terrorism and sarvodaya.
   (b) Theories of punishment.

2. Philosophy of Religion
(1) Religion, science and morality.
(2) God, proofs of His existence.
(3) Nature of religious experience, reason, revelation and mysticism.
(4) Problem of evil.
(5) Bondage and liberation.
(6) Religious tolerance and secularism.

LAW (CODE NO. 23)

PAPER - I

1. Constitutional Law of India
(1) Preamble to the Constitution.
(2) Fundamental Rights.
(3) Directive Principles of State Policy.
(4) Powers of the President of India and Governor of States.
(5) Indian Legislature.
(6) Indian Judiciary.
(7) Constitutional safeguards to Civil Servants
(8) Union and State Public Service Commissions.
(9) Amendment of the constitution.
(10) Public Interest Litigation.
(11) Protective Discrimination.

2. Administrative Law
(1) Development of Administrative Law.
(2) Delegated Legislation and Judicial and Parliamentary control over it.
(3) Principles of Natural Justice.
(4) Administrative Adjudication and Administrative Tribunals.
(5) Writs - Mandamus, Certiorari, Prohibition, Habeas corpus and Quo-warranto.
(6) Ombudsman - Lokpal, Lokayukts and Central Vigilance Commission.
(7) Statutory Public Corporations and their control.

(1) Land and Land Revenue.
(2) Revenue officers and their powers.
(3) Procedure of Enquiry by Revenue Officer.
(4) Survey and Settlement.
(5) Assessment of Land Revenue.
(6) Record of Rights.
(7) Tenure holders - Their rights and obligations.
(8) Consolidation of Holdings.
1. Law of Crimes (Indian Penal Code, 1860)
   (1) Definition.
   (2) General Exceptions to criminal liability.
   (3) Joint and constructive liability (Sections - 34, 141 and 149 I.P.C.)
   (4) Offences against Public Tranquility.
   (5) Offences against human body.
   (6) Offences against property.
   (7) Defamation.
   (8) Offences against women (Sections - 292, 304-B, 354, 498-A & 509 IPC)

2. Criminal Procedure Code, 1973
   (1) Preliminary consideration, extent, applicability, definitions etc..
   (2) Constitution and Power of Courts.
   (3) (a) Police - Power of arrest, Search and seizure of property.
         (b) Power to investigate.
         (c) Preventive powers of Police.
   (4) Duty of Public to assist Police, Magistrate and to give information about certain offences.
   (5) Rights of the arrested person.
   (6) Process to compel appearances:
         (a) Summons
         (b) Warrant of arrest
         (c) Proclamation and attachment.
         (d) Other rules regarding processes.
   (7) Processes to compel the production of articles, things etc.
   (8) Consequences of irregularities of illegalities in search.
   (9) Jurisdiction of courts in inquiry and trial.
   (10) Conditions required for initiation of proceedings.
   (11) Complaints to Magistrates and Commencement of proceedings before Magistrates.
   (12) Charge.
   (13) Plea bargaining
   (14) Different types of trials and procedure thereof.
   (15) General provisions relating to inquiries and trials.
         (a) Period of limitation (Chapter XXXVI C.R.P.C.)
         (b) Autrefois acquit and autrefois convict
         (c) Principle of estoppels.
         (d) Compounding of offences
         (e) Withdrawal from Prosecution.
         (f) Pardon to accomplice.
         (g) Legal aid to accused at State expense.
   (16) Bail and anticipatory bail.
   (17) Judgment.
   (18) Appeals
   (19) Reference, Revision and Review.
   (20) Lok Adalat and Legal services.

3. Law of Torts
   (1) Negligence and Contributory Negligence.
   (2) Nuisance.
   (3) Principles of strict liability.
   (4) Vicarious liability including state liabilities.
   (5) Consumer dispute redressal agencies - their powers and functions.
   (6) Consumer Protection Act, 1986
   (7) Agencies relating to environmental protection - Powers, Functions and Remedies.

4. Mercantile Law
   (1) General Principles of Law of Contract (Section 1 to 75 of the Indian Contract Act, 1872).
   (2) Law of Indemnity, Guarantee
   (3) Law of Bailment, Pledge and Agency.
   (4) Law of Sale of goods.
   (5) Law of Partnership.
   (6) Law Relating to Negotiable Instruments.
ENGLISH LITERATURE  ( CODE NO. 25 )
PAPER - I
Elizabethan to Romantic Era
The paper covers the literary period from the Renaissance to the Romantic Movement. The candidates are expected to be acquainted with major literary movements, currents, besides the socio-cultural background of the periods. The course content intends to test the first hand knowledge of the candidates with regard to the major authors and their representative works:
1. Christopher Marlowe - 'Dr. Faustus'
2. William Shakespeare - 'Macbeth'
3. Francis Bacon - 'Of Studies', 'Of Truth', 'Of Friendship', 'Of Revenge.'
4. John Donne - 'Extasie', 'Anniversarie'
5. John Milton - 'Paradise Lost', Book-I,
6. John Dryden - 'Mac Flecknoe'
7. Alexander Pope - 'Rape of the Lock'
8. William Wordsworth - 'The Solitary Reaper'
9. S.T. Coleridge - 'Rime of the Ancient Mariner'
10. P.B. Shelley - 'To A Skylark'
11. Jane Austen - 'Pride and Prejudice'
12. Charles Lamb - 'A Bachelor's Complaint'

ENGLISH LITERATURE  ( CODE NO. 25 )
PAPER - II
Victorian to Modern Era
The Second paper incorporates various literary trends ranging from the Victorian to the modern era. The candidates are expected to possess first hand knowledge of representative British, American and Indian Writing in English.
1. Tennyson - 'Ulysses', 'Crossing the Bar'
2. Robert Browning - 'My Last Duchess', 'Prospice'
3. Matthew Arnold - 'Dover Beach'
4. Charles Dickens - 'David Copperfield'
5. Thomas Hardy - 'Mayor of Casterbridge'
6. D.G. Rossetti - 'Blossom'
7. George Bernard Shaw - 'Candida', 'Joan of Arc'
8. Eugene O'Neill - 'Mourning Becomes Electra'
9. Mulik Raj Anand - 'Coolie'
10. A.K. Ramanujan - 'A River'
11. Girish Karnad - 'Hayavadana'
12. Ernest Hemingway - 'A Farewell to Arms'
13. Robert Frost - 'Mending Wall'
14. T.S. Eliot - 'Love Song of Alfred J. Prufrock'

SANSKRIT LITERATURE  ( CODE NO. 26 )
PAPER - I
DRAMA, PROSE AND COMPOSITION
1. Abhijnana - Shakuntalam of Kalidasa.
2. Svapnasavadattam of Bhasa.
3. Shukanasopadesha from Bana's Kadambari.
4. Translation in Sanskrit.
5. Composition - an essay in Sanskrit.
Questions will be based on detailed textual study of units (i) and (ii).

SANSKRIT LITERATURE  (CODE NO. 26)
PAPER- II
KAVYA, HISTORY OF SANSKRIT LITERATURE AND VYAKARANA

1. Kiratarjuniyam of Bharavi,
2. Nalopakhyanam from Mahabharata,
3. History of Sanskrit Literature.
   (1) General study of the following Kavyas:
       Ramayana, Mahabharata, Shrimad - Bhagawata, Buddhacharita, Saundarananda,
       Raghuvarsha, Kumarsambhava, Meghaduta, Ritusamhara, Bhattacharya,
       Hayagrivavabha, Janakiharana, Kiratarjuniya, Shishupalavadha, Naishadhacharita,
       Shrikantacharita, Nalchampu, Rajaratangini, Vikramakadevacharita, and
       Nitishatak of Bharthrihari.
   (2) General study of the dramas of the following authors:
       Bhasa, Ashvaghosha, Kalidas, Suddhakara, Vishkhdatta, Bhavabhuti, Harsha,
       Bhattacharyya, Murari, Rajashekara, Shrikrishna Mishra, Jayadeva.
   (3) General Study of the works of the following prose writers:
       Bana, Dandi, Subandhu, Vadibhasimha, Dhanapala, Sodhala.

4. Vyakarana
   (1) Sandhi,
   (2) Samasa,
   (3) Karaka

5. (1) Kridanta Pratyaya -
       Tumun, Tavyat, Aniyar, Yat, Shatri, Shanach, Kta,
       Ktavatu, Namul, Lyut.
   (2) Taddita Pratyaya -
       An, in, Matvarthiya, Shyan, Tva, Imanich.
   (3) Alankara -
       Upama, Utpreksha, Rupaka, Arthantaranyasa, Svabhavokti, Kavyalinga, Atishayokti,
       Vibhavana, Vishesokti, Apahnuti, Drishtanta, Nidarshana, Anuprasa, Yamaka.

Questions will be based on detailed textual study of unit (i) and (ii)

URDU LITERATURE  ( CODE NO. 27 )
PAPER - I
Urdu Zaban ki mukhtasar tarikh/Asnaf-e- Nasr aur Ahm nasr nigar.

1. Urdu ki paidaish ke bare m-e-n mukhtalif nazariyat aur uska irtiqua aur Urdu ke qadeem nam
   (Hindi/ Hindvi/Rekhta/Urdu-e mualla wagherah.
   ( Various theories about the origin of urdu language and its development, as well as its original name
   (Hindi-Hindvi/Rekhta/Urdu-e mualla etc.)
2. 'Yadgare ghalib’
   (Mukhtasar Edition) Az Hali, Muratteba Daya narain - Nigam )
   (Yadare Ghalib” (Abridged edition) by Hali, Edited by Daya Narain Nigam
3. Urdu Afsana aur Drama (Urdu short stories & Drama)
   (1) Darjzel afsane aur afsana nigar
       (a) Kafan - PremChand
       (b) Mahalaxmi ka pul - Krishna Chandra
       (c) Lajwanti - Rajendra Singh Bedi
       (d) Do Shala - Gilani Bano
   (2) Drama - Dr. Tamkin ki uljhan - Ibrahim Yusuf.
       (2) Drama - Anarkali - Imitiyaz Ali Taj

4. Darjzel inshaiy-e Aur inshaiya nigar
   (1) Insan kisi hal m-en khush nahin rehta - Md. Husain Azad.
   (2) Mirza Zahirdar Baig - Nazeer Ahmed
   (3) Chiriya Chire ki kahani - Abul kalam Azad
   (4) Tassub - Sirsyed Ahmed Khan
   (5) Shahzade ka bazar m-en ghisatna - Khwaja Hasan Nizami

5. Ghalib ke khutoot
   (1) Banaam Alauddn khan Alai ( Suno Alam Dohain)
   (2) Banam meer mehdi majrooh (mardalayar terjawab talabi n-e)
   (3) Banam Har Gopal - Tufah (Bhai Mujh men aurtum m-em nama nigari kahe - ko hai)
Study of Ghalib as a writer of letters in the light of the above "khutoot" (letters)
URDU LITERATURE    (Code No. 27)

PAPER - II

1. Urdu men ghazal Aur Uski Maqbooliyat ke Asbab. (Ghazal in Urdu and the reason of its popularity)

   (1) Wali (a) yad karna har ghadi Usyar Ka.
   (2) Meer taqui Meer -
      (a) Munh taka hi karehe jistis ka
      (b) Ulti hogain Sab tadbiren kuchch na dawa ne kam kiya
      (c) Hamare age tira jab kasune naam liya”
   (3) Ghalib
      (a) Yeh na thi hamari quismat ke wisaaee yar hota.
      (b) Phir mujhe didae tar yad aya.
   (4) Momin
      (a) Gheron pe khul na jai kahin raz dekhna.
      (b) Asar usko zara nahin hota
   (5) Hasrat Mohani - Husne Beparwa ko khudbino khud ara kardiya.
   (6) Firaq Gorakhpuri - Nigahe naz ne parde uthai hain kya kya.

   (1) Sauda
   (2) Zauq
   (3) Anis
   (4) Dabeer,

   (1) Sahrubayan - Meer Hasan
   (2) Gulzare Naseem - Daya Shankar “Naseem”

5. Urdu m-en nazm aur darj zel nazmo-n aur unk-e Shairon ka khusoosi Mutalea.
   (1) Nazeer akbar abadi
      (a) Aadmi Nama
      (b) Holi
   (2) Pandit Brijnarain Chakbast- Ramayan ka ek Seen
   (3) Iqbal
      (a) Taranai Hindi
      (b) Shoai Ummid
   (4) Josh Malihabadi -Kisan
   (5) Faiz Ahmed Faiz - Tanhai
   (6)Jan Nisar Akhtar - yeh Zakhm to apna Hissa Hain

ANTHROPOLOGY    (CODE NO. 28)

PAPER - I

NOTE -
Part - I is compulsory.
Candidates may opt either Part- II (A) or Part - II (B).
Each part (i.e. I and II) carries 150 marks.

PART - I

1. Meaning and scope of Anthropology and its main branches
   (1) Social-Cultural Anthropology
   (2) Biological Anthropology.
   (3) Archeological Anthropology.
   (4) Linguistic Anthropology.

2. Concept of culture and it attributes
   Ethos & Edos, Cultural Integration, Form and Content, Cultural Relativism.
   Aspects of culture : Material & non-material.
   Meaning of Society, Community, Group and Institution, Culture and Civilization.

3. The field work Tradition in Anthropology, Geneological method, Observation, Case-study, Interview Schedule and Questionnaire.

4. Organic Evolution
   Views and evidences, Theories of Organic Evolution :
   Darwinism, Neo-Darwinism, Lamarckism, Neo-Lamarckism, Synthetic Theory.

5. Man’s position in the animal kingdom, Physical Characteristics of mammals and primate, Geographical distribution and chief Physical characteristics of prosimii (Lemuriforms, Lorisiforms and Tarsiforms), Anthropoidea (New world monkeys and old world monkeys), Pongidae (Gibbon, Orang-Utan, Chimpanzee, Gorilla).
6. Geological Time-scale, The Great Ice-Age
7. Prehistoric cultural hierarchy
General features of Paleo, meso and neolithic cultures of Europe and India (with special reference to Soan, Madrasian and Narmada stratigraphies and tool-traditions) Mesolithic pattern in India. Neolithic Complex and associated problems in India.
8. Proto-Historic hierarchy
Indus valley civilization, Ganges valley civilization (Doaba), Megalithic civilization.
9. Language, Society and Culture - How are they interrelated ?

PART - II (A)

1. Social Institutions
2. Primitive Economy
3. Political Organization
Primitive law and Political organization, distinctions between state and stateless societies, Leadership, authority and system in stateless society, natural and cultural background of law in primitive and modern societies. Means of social control in primitive societies.
4. Definition and theories of religion
5. Concepts and theories
Evolution and socio-cultural evolutionism (L.H. Morgan, E.B. Tylor), Diffusion and diffusionism (German-Austrian) Pattern and pattern based theory of culture (R. Benedict) Function and functionalism (B. Malinowski), Structure-functionalism (A.R. Radcliffe-Brown)
6. Psychological Anthropology
Culture - personality school, Basic personality and modal personality. National character studies.
7. Growth of Anthropology in India
Major contributions of D.N. Majumdar, M.N. Srinivas, S.C. Dube and L.P. Vidyarthi.

PART - II (B)

1. Fossil evidence of Human Evolution
2. Comparative anatomy of Man and Apes, Types of locomotion, The effect of erect posture on the skeleton of man with special reference to skull, Vertebral column, Pelvic girdle and limbs.
3. Human Genetics : aims and scope, Cell
Cell division, Role of mitotic and meiotic cell division, Laws of heredity, Mechanism of heredity, Types of inheritance : autosomal, sex linked, dominant and recessive, chromosomes and genes: normal and abnormal chromosomes, Sex-chromosomal aberrations : Klinefelter, Turner and Down syndrome, Concept of DNA and RNA.
5. Human growth and development
Definition and scope, Methods of studying human growth : Longitudinal, semi-longitudinal and cross-sectional, Retarded growth, Growth spurt, Ageing, Nutritional requirements for normal growth, Malnutrition, Under-nutrition.
6. Ecology
Definition and scope, Varieties of human ecosystems, Environmental pollution, Biological demography: definition and scope, Demographic profiles: Fertility, Mortality, Morbidity.
ANTHROPOLOGY (CODE NO. 28)

PAPER - II

1. Basic concepts
Culture, civilization, Great Tradition, Little tradition, sacred complex, Universalization, parochialization, sanskritization, Westernization, Dominant caste, Folk-society, Jajmani system, Tribe-caste continuum.

2. India’s traditional social system
Purusharth Chatusthaya, Varanahramdharma, Hindu social laws pertaining to family and marriage, Social disabilities and the problem of untouchability.


4. Ethnographic profiles of Indian tribes
Racial, linguistic and socio-economic characteristics. Problems of tribal people: Land alienation, Indebtedness, bonded labour. Food-gathering, Pastoralism, Shifting cultivation, Terrace cultivation and settled agriculture, Forest policy and tribals, Tribal displacement and rehabilitation.

5. The problems of culture contact

6. History of tribal administration and development
Pattern of tribal administration during the British and the post British periods. Plans, policies and strategies of tribal development in post Independence period. The response of tribal people towards government’s measures for their development.


MILITARY SCIENCE (CODE NO. 29)

PAPER - I

ART OF WAR

PART - I

Indian

1. Ancient Period
   (1) Indo-Greek Art of war with special reference to the Battle of Hydaspus 326 B.C.
   (2) Mauryan military system as described by Magasthenese.
   (3) Kautalya’s Philosophy of war.

2. Medieval Period: Study of military systems
   (1) Rajput military system with special reference to the Battle of Tarain (1192 AD).
   (2) Mughal military system with special reference to the First battle of Panipat (1526-AD).
   (3) Maratha military system with special reference to the Third Battle of Panipat (1761 AD).
   (4) Sikh military system with special reference to the Battle of Sobraon (1846AD).

3. Pre-Independence Period
   (1) Battle of Plasay 1757 AD.
   (2) 1857 Liberation movement.
   (3) Re-organisation of Army in India under the CROWN.

4. Post Independence period
   (1) Sino-Indian war, 1962 causes and lessons-political, strategical and tactical.
   (2) Indo-Pak war 1965 causes and lessons political, strategical and tactical.
   (3) Indo-Pak war 1971 causes and lessons political, strategical and tactical.

PART - II

Western

(1) Greek and Roman Art of war with reference to the battle of Arbella (331 B.C.) and battle of Cannae (216 B.C.).
(2) Emergence and decline of cavalry with reference to the battle of Hastings (1066 A.D.) and battle of Crecy (1346 A.D.).
(3) Impact of Science and Technology on warfare.
(4) Revolution in tactics
   (a) War of American Independence (1776-1782 A.D.).
   (b) French Revolution and Nepoleanic Art of war.

PART - III

Modern
1. National Power-Concept and importance.

2. Elements of National power.

3. National security strategies
   (1) Balance of power,
   (2) Collective security,
   (3) Regional defence,
   (4) Non-alignment,
   (5) Deterrence.

4. Geo strategical location of India.

5. Internal and External threats to Indian security.


7. India’s Nuclear policy.

PART - II
Theory and Practice of War

1. Definition of war, nature and characteristics of war.

2. Insurgency and counter-insurgency with special reference to Indian security.

3. Terrorism: Problems and solutions.

4. Development of Nuclear weapons and their effect on war.

5. Space weapons and security.

6. Chemical and Biological weapons and security.

7. Problems and prospects of disarmament and arms control.

PART - III
Regional Study

1. Indian ocean and Indian security.

2. Role of SAARC in promoting regional cooperation and security.

3. India’s Foreign Policy with special reference to Indian security.

4. War and peace time economy.