PLAN OF EXAMINATION:
The competitive examination for the Combined State / Upper Subordinate Services (General Recruitment / Special Recruitment) Examination, 2019 and Assistant Conservator of Forest / Range Forest Officer Services Examination, 2019 comprise three successive stages viz:-

(1) Preliminary Examination (Objective Type & Multiple choice). 2- Main Examination (Conventional Type, i.e. Written examination). 3- Viva-Voce (Personality Test).

PRELIMINARY EXAMINATION
The Preliminary examination for the Combined State / Upper Subordinate Services (General Recruitment / Special Recruitment) Examination and Assistant Conservator of Forest / Range Forest Officer Services Examination will consist of two compulsory papers of which answer sheet be on OMR sheets. The syllabus for Combined State / Upper Subordinate Services (General Recruitment / Special Recruitment) Examination and Assistant Conservator of Forest / Range Forest Officer Services Examination is mentioned in Appendix-5 of this advertisement. The papers shall be 200 marks each and of two hours durations. Both the papers shall be objective Type & multiple choice in which there shall be 150-100 questions Respectively. The timing of paper I will be from 9.30 to 11.30 A.M. and paper II from 2.30 to 4.30 P.M.

Note: (1) Paper-II of the Preliminary Examination will be a qualifying paper with minimum qualifying marks fixed at 33%. (2) It is mandatory for the Candidates to appear in both the papers of Preliminary Examination for the purpose of evaluation. Therefore a candidate will be disqualified in case he does not appear in both in papers. (3) The merit of the Candidates will be determined on the basis of marks
6. General Studies (Fourth Paper)

5. General Studies (Third Paper)

3. General Studies (First Paper)

Note: -

scientific discipline.

examination which will consist of two papers.

may be expected of a well educated person, who has not made a special study of any

understanding of Science including matters of every day observation and experience, as

require subject specialization, General awareness of the subject is expected from

Economic and Social Development - Sustainable Development, Poverty, Inclusion,

Indian Polity and Governance - Constitution, Political System, Panchayati Raj,

Questions on the Geography of India will relate to Physical, Social & Economic Geography

11. Optional subjects. The syllabus whereof is mentioned in Appendix-6 of this advertisement.

10. Candidates are required to answer only Five questions while they must select

papers of Optional subject and each section will include Four questions.

C) PERSONALITY TEST (VIVA-VOCE) TOTAL MARKS 100

The test will relate to the matter of general interest keeping the matter of academic interest 

view and for general awareness, intelligence, character, expression power/personality, 

general suitability for the service.

APPENDIX-5

Syllabus for Preliminary Examination Pertaining to the Combined State /Upper 

Subordinate Services (General Recruitment /Special Recruitment) Examination 

and Assistant Conservator of Forest /Range Forest Officer Services Examination

Paper-I

General Studies-I

Duration: Two hours

Marks - 200

1. Agriculture
2. Zoology
3. Chemistry
4. Physics
5. Mathematics
6. Geography
7. Economics
8. Sociology
9. Philosophy
10. Geology
11. Psychology

Elementary Mathematics upto Class X level- Arithmatic, Algebra, Geometry and Statistics.

General English upto Class X level.

General mental ability

Comprehension

Interpersonal skills including communication skills.

Logical reasoning and analytical ability.

Decision making and problem solving.

General mental ability

Elementary Mathematics upto Class X level- Arithmetic, Algebra, Geometry and Statistics.

General English upto Class X level.

General Hindi

120 minutes

150 marks

2. Essay

150 marks

3. General Studies (First Paper)

200 marks

4. General Studies (Second Paper)

200 marks

5. General Studies (Third Paper)

200 marks

6. General Studies (Fourth Paper)

200 marks

Compulsory Subject viz: General Hindi, Essay and General Studies (First, Second, Third and Fourth papers) Papers Shall be Conventional type and for solving the questions three hours time is allowed. For optional Question papers three hours time is allowed. Two hours time has been allotted for each optional question paper.

Note: - 1. Timing of examination of paper 3 i.e. 9.30 am to 12.30 pm and 2 pm to 5 pm.

2. A candidate shall be required to obtain such minimum marks in the

compulsory paper of General Hindi, as may be determined by the Government of the

union territory, as the case may be. There shall be Two sections in all the question

papers of Optional subject and each section will include Four questions. Candidates are required to answer only Five questions while they must select

minimum Two questions from each section.

B) OPTIONAL SUBJECTS ARE AS BELOW

1. Agriculture
2. Zoology and Social Development - Sustainable Development, Poverty Inclusion
3. Chemistry
4. Physics
5. Mathematics
6. Geography
7. Economics
8. Sociology
9. Philosophy
10. Geology
11. Psychology

Elementary Mathematics upto Class X level- Arithmatic, Algebra, Geometry and Statistics.

General English upto Class X level.

General mental ability

Comprehension

Interpersonal skills including communication skills.

Logical reasoning and analytical ability.

Decision making and problem solving.

General mental ability

Elementary Mathematics upto Class X level- Arithmetic, Algebra, Geometry and Statistics.

General English upto Class X level.

Elementary Mathematics upto Class X level- Arithmatic, Algebra, Geometry and Statistics.

General English upto Class X level.

Elementary Mathematics upto Class X level- Arithmetic, Algebra, Geometry and Statistics.

General English upto Class X level.

Elementary Mathematics upto Class X level- Arithmatic, Algebra, Geometry and Statistics.

General English upto Class X level.

Elementary Mathematics upto Class X level- Arithmatic, Algebra, Geometry and Statistics.

General English upto Class X level.

Elementary Mathematics upto Class X level- Arithmatic, Algebra, Geometry and Statistics.

General English upto Class X level.

Elementary Mathematics upto Class X level- Arithmatic, Algebra, Geometry and Statistics.

General English upto Class X level.
16- Specific knowledge of Uttar Pradesh – History, Culture, Art, Architecture, Festivals, Folk-Dance, Literature, Regional Languages, Heritage, Social Customs and Tourism.

GENERAL STUDIES-I
- Indian Constitution- historical underpinnings, evolution, features, amendments, significant provisions and basis structure. Role of Supreme Court in evolution of basic provisions of Constitution.
- Freedom and responsibilities of the Union and the States: issues and challenges pertaining to the federal structure, devolution of powers and finances up to local levels and challenges thereto.
- Role of Finance Commission in Centre-State financial relations.
- Separation of powers, dispute redressal mechanisms and institutions. Emergence and use of alternative dispute redressal mechanisms.
- Comparison of the Indian constitutional scheme with that of other major democratic countries.
- Parliament and State legislatures- structure, functioning, conduct of business, power and privileges and concerned issues.
- Salient features of the Representation of People’s Act.
- Appointment to various Constitutional posts, Powers, functions and their responsibilities.
- Statutory, regulatory and various quasi-judicial bodies including NITI Aayog, their features and functioning.
- Government policies and interventions for development in various sectors and issues arising out of their design, implementation and Information Communication Technology (ICT).
- Development processes- the role of Non Governmental Organizations (NGOs), Self Help Groups (SHGs), various groups and associations, donors, charities, institutional and other stakeholders.
- Challenges for vulnerable sections of the population by the Centre and States and the performance of these schemes, mechanisms, laws, institutions and bodies constituted for the protection and betterment of these vulnerable sections.
- Issues out of development and management of Social Sector/Sectors relating to Health, Education, Human Resources.
- Issues relating to poverty and hunger, their implication on body politic.
- Important aspects of governance. Transparency and accountability, e-governance applications, models, successes, limitations, potential, citizens, charters and institutional measures.
- Role of Civil services in democracy in the context of emerging trends.
- India and its relationship with neighbouring Countries.
- Bilateral, Regional and Global groupings and agreements involving India and affecting India’s interest.
- Effect of policies and politics of developed and developing countries on India’s interest- Indian diaspora.
- Important International Institutions, Agencies their structure, mandate and functioning.
- General knowledge of Uttar Pradesh regarding Political, Administrative, Revenue and Judicial System.
- Current affairs and events of Regional, State, National and International importance.

GENERAL STUIDIES-IV
- Economic planning in India, objectives and achievements. Role of NITI Aayog, Pursuit of Sustainable Development Goals (SDG’s).
- Issues of Poverty, Unemployment, Social justice and inclusive growth.
- Components of Government Budgets and Financial System.
- Major Crops, Different types of irrigation and irrigation systems, storage, transport and marketing of agricultural produce, e-technology in the ad of farmers.
- Irrigation: types of irrigation systems and farm techniques, water conservation and minimum support prices, Public Distribution System- objectives, functioning, Limitations, revamping, issues of buffer stocks and food security. Food security missions in agriculture.
- Food and related industries in India- bio-scope and significance, location, upstream and downstream requirements, supply chain management.
- Land reforms in India since independence.
- Effectiveness of liberalization and globalization on the economy, changes in industrial policy, and their effects on industrial growth.
- Infrastructure: Energy, Ports, Roads, Airports, Railways etc.
- Scienec, Technology and developments and their implications in everyday life and in National Security, India’s Science and Technology policy.
- Achievements of Indians in science & technology, indigenization of technology, Development of New technologies, transfer of technology, dual and critical use technologies.
- Awareness in the fields of Information and Communication Technology (ICT) and Space Technology. Computers, Energy sources, nano-technology, microbiology, bio-technology. Issues relating to intellectual property rights (IPR), and digital rights.
- Environmental security and Ecosystems, Conservation of Wild life, Biodiversity,啕改编Adaptation and Environmental education.
- Disaster as a Non-traditional security and safety challenge, disaster mitigation and management.
- Basics of cyber security, money laundering and human trafficking.
- India’s internal security challenges: Terrorism, corruption, insurgency and organized crimes.
- Role, kind and mandate of security forces, Higher defense organizations in India.
- Specific knowledge of Uttar Pradesh Economic Schemes.
- Overview of UP Economy: State Budgets. Importance of Agriculture, Industry, infrastructure and physical resources. Human Resources and Skill development.
- Government schemes and Welfare Schemes.
- Law and Order and Civil Defence with special reference to U.P.

GENERAL STUDIES-III
- Ethics and Human Interface: Essence, determinants and consequences of Ethics in human action, dimensions of ethics, ethics in private and public relationships. Human Values and teachings of great leaders, reformers and administrators, role of family, society and educational institutions in inculcating values.
- Attitude: Content, structure, function, its influence and relation with thought and behavior. moral and political attitudes, social influence and persuasion.
- Aptitude and foundational values for Civil Service, integrity, impartiality and non-partisanship, objectivity, dedication to public services, empathy, tolerance and compassion towards the weaker-sections.
- Emotional Intelligence- concept and dimensions, its utility and application in human life and governance.
- Contributions of moral thinkers and philosophers from India and world.
- Public/Civil Service values and ethics in Public Administration: status and problems, ethical concerns and dilemma. Conflict of private interests and public institutions, laws, rules, regulations and conscience as sources of ethical guidance, accountability and ethical governance, strengthening of moral values in governance, ethical issues in international relations and funding, corporate governance.
- Probity in Governance: concept of public service, philosophical basis of governance and probity, information sharing and transparency in government. Right to Information, codes of conduct, regulatory measures to control non- transparent practices.
- Case studies on above issues.

AGRICULTURE - PAPER-I
1. AGRICULTURE - PAPER -I (SECTION - A)
   Ecology and its relevance. Natural resources and their conservation management.

2. AGRICULTURE - SECTION - B

3. AGRICULTURE - PAPER-II (SECTION-A)

4. AGRICULTURE - PAPER-III

ZOOLOGY
1. ZOOLOGY - PAPER-I
   (Non Chordata, Chordata, Ecology, Ethology, Biostatistics and Economic Zoology)
   Section - A: Non Chordata and chordata
   1. Animal Diversity: General survey, Classification and Interrelationships of following Phyla:
   - Porifera: Canal system; Skeleton and Reproduction.
   - Cnidaria: Polypomorph; Coral reefs; Metagenesis.
   - Platyhelminthes: Parasitic adaptations and host-parasite relationships.
   - Mollusca: Adaptive radiation in Phyla; Bivalves.
   - Arthropoda: Larval forms and parasitism in crustacean; Appendages of prawn; Vision
and respiration in Arthropoda; Social life and metamorphosis in insects.

8. **Mollusca:** Respiration, Pearl formation.

9. **Echinodermata:** General organization, larval forms and affinities.

10. **Chordata:** Origin; Origin of tetrapods.

11. **Pisces:** Lung fishes.

12. **Amphibia:** Neoteny and paedogenesis; parental care.

13. **Reptilia:** Skull type; Dinosaurs

14. **Aves:** Respiration, Respiration, Flightless birds.

15. **Mammalia:** Dentition; Protostomia and Metasomia; Skin derivatives of Eutharia.

**SECTION-B: Ecology, Ethology, Biostatistics and Economic Zoology**

1. **Ecology:** Abiotic and biotic factors; Interspecific and infraspecific relations; Ecological succession; Types of biomes; Biochemical cycles; Food web; Ozon layer; Biosphere; Pollution of air, water and land.

2. **Ethology:** Types of animal behaviour; Role of hormones and pheromones in behaviour; Metabolic control; Behavioural genetics.

3. **Biostatistics:** Sampling methods; frequency distribution and measures of central tendency; standard deviation and standard error; correlation and regression; chi-square and t test.

4. **Economic Zoology:** Nest pests of crops (Paddy, Gram and Sugarcane) and stored grains; Apiculture, Sericulture, Lac culture; Pisciculture and Oyster culture.

**ZOOLOGY—PAPER-II**

 Cellular Biology, Genetics, Evolution and Systematics

1. **Cell Biology:** Prokaryotic and Eukaryotic cells; Electron microscopic structure of eukaryotic cells; Cell membrane—structure, functions and transport mechanisms cell organelles; structure of body cells; Cell division— Mitosis and Meiosis; Spindle formation and chromosome movement. 2. Genetics: Mendelian laws of inheritance; Structure of eukaryotic chromosome; giant and lamp—brush chromosomes; Linkage; Gene mapping; Segregation, sex chromosomes and sex determination; Sex linked traits; Gene interactions (codominance, multiple alleles, leaflet genes, Epistatic and Hypostatic genes, Polygenic inheritance); Variation—its types and sources; chromosomal and molecular sources of variation; Klinefelter's syndrome. Down's, Turner's and Klinefelter's syndrome. Regulation of gene expression in prokaryotes and eukaryotes; Recombinant DNA technology—basic principles, tools, vectors and applications; Transgenic animals and plants; Origin of life and experimentation; Evolution— theories; Natural selection; Variation; Calculating allele frequencies (Hardy—Weinberg Method); Concept of species and sub-species; Mechanisms of speciation: Isolation, gene flow and variation. Crystal—Crystallography. Systematics: Principles of Taxonomy; Zoological nomenclature; Fossils; Geological era; Phylogeny of horse and elephant; Origin and evolution of man; Continental distribution of animals; Zoogeographical realms of the world and their characteristic fauna.

**PHYSIOLOGY AND DEVELOPMENT BIOLOGY**

Biochemistry: Structure, classification and biological functions of Carbohydrates, Proteins, Lipids and Nucleic acids, Watson and Crick model of DNA; Genetic Code. Prokaryotic and Eukaryotic cells—high energy compounds; Electrons transport chain; Oxidative phosphorylation; Glycolysis and Krebs/TCA cycle—Enzymes—Nomenclature, classification, Factors affecting enzyme activity and mechanism of action; Enzyme inhibitors. Functions, biochemistry and significance of vitamins, Hypervitaminosis A; Innate and Aquired immunity; immune cells; Immunoglobulins; cytokines (Interleukins). 2. Physiology (with special reference to mammals): Homeostasis, open and closed circulatory system, Neurogenic and Myogenic factors. Blood composition, functions, clotting and blood-gloopy substances; Oxygen and carbon dioxide transport; The cardiac cycle; Neural and Hormonal regulation of heart rate; Mechanism of breathing and its regulation; formation of urine; Homeostatic functions of kidney. Thermoregulation in thermoconformer and thermo regulator animals; Nerve impulse—axonal and synaptic transmission; neurotransmitters; Digestion and absorption of carbohydrate, protein, fats and nucleic acid, control of secretion of digestive juices. Muscular systems—smooth, striated, skeletal; Enzymes—structure and function of human eye and ear; the mechanism of photo-reception, hearing and balance; Hormones-Endocrine, Paracrine and Autocrine. Types of hormone; Mechanism of hormone action at the receptor site. Hormones—insulin, glucagon, adrenal, parathyroid, pancreas, adrenal, gonad and pineal hormones; Regulation of Menstrual cycle; Menarche and Menopause. 3. Development Biology: Gametogenesis, fertilization, cleavage and gastrulation in Branchiopoda, Tardigrada and Echinoderm. 4. Biophysics: Molecular weight of polymers by sedimentation, light scattering viscosity and molecular weight determination by means of light scattering. 5. Spectroscopy: Structure, classification and biological functions of Carbohydrates, Proteins, Lipids and Nucleic acids, Watson and Crick model of DNA; Genetic Code. Prokaryotic and Eukaryotic cells—high energy compounds; Electrons transport chain; Oxidative phosphorylation; Glycolysis and Krebs/TCA cycle—Enzymes—Nomenclature, classification, Factors affecting enzyme activity and mechanism of action; Enzyme inhibitors. Functions, biochemistry and significance of vitamins, Hypervitaminosis A; Innate and Aquired immunity; immune cells; Immunoglobulins; cytokines (Interleukins). 2. Physiology (with special reference to mammals): Homeostasis, open and closed circulatory system, Neurogenic and Myogenic factors. Blood composition, functions, clotting and blood-gloopy substances; Oxygen and carbon dioxide transport; The cardiac cycle; Neural and Hormonal regulation of heart rate; Mechanism of breathing and its regulation; formation of urine; Homeostatic functions of kidney. Thermoregulation in thermoconformer and thermo regulator animals; Nerve impulse—axonal and synaptic transmission; neurotransmitters; Digestion and absorption of carbohydrate, protein, fats and nucleic acid, control of secretion of digestive juices. Muscular systems—smooth, striated, skeletal; Enzymes—structure and function of human eye and ear; the mechanism of photo-reception, hearing and balance; Hormones-Endocrine, Paracrine and Autocrine. Types of hormone; Mechanism of hormone action at the receptor site. Hormones—insulin, glucagon, adrenal, parathyroid, pancreas, adrenal, parathyroid, pancreas, adrenal, gonad and pineal hormones; Regulation of Menstrual cycle; Menarche and Menopause. 3. Development Biology: Gametogenesis, fertilization, cleavage and gastrulation in Branchiopoda, Tardigrada and Echinoderm.
2. Electricity and Magnetism: Coulomb’s Law, Electric Field, Gauss’s Law and its Applications.
5. Quantum Physics: Wave-Particle Duality, Quantum Interference, Quantum Entanglement.
7. Nuclear and Particle Physics: Nuclei, Quantum Chromodynamics, Particle Accelerators.

Physics Paper-II:

1. Electricity and Magnetism: Continuity and Conductivity of Materials, Magnetic Materials.
7. **Economics:** Paper II - Indian Economy

**Section A:**
1. **Basic Characteristics of Under-developed & Indian Economy:** National Income and Per Capita Income: Pattern, Trends, Aggregate and Sectoral Composition etc. Incomes, Inequalities and Regional imbalances in India.
2. **Population Growth and Economic Development:** Censuses of India, Characteristics of Indian population; Demographic Division and Economic Development in India. Urbanisation and Economic Development in India, Gender & Development.
4. **Economic Development and Regional Imbalances and Environmental Pollution, Environmental Degradation and Measures to Control.
5. **Indian Agriculture:** Production and Productivity, Changes in Cropping Pattern, Agriculture reforms. Theories and Quantities of Subsidies, in Agriculture, Agricultural Credit and Subsidies, Food Processing, Agricultural Price Policy, Food Security, WTO and Indian Agriculture.
7. **Services Sector & its Development in India:** Its Importance & Performance, International Comparisons.

**Section B:**
1. **Monetary Institutions of India:** RBI, Commercial Banks, Banking & Non-Banking Financial Institutions, Objectives And Techniques of Monetary Policy in India, Role of RBI under New Regime, E-Banking in India.
2. **Budgetary Trends and Fiscal Policy in India:** Trend of Major Sources of Public Revenue in India, Public Expenditure of the Union & Government of India, Fiscal Deficits in the Union Budget and Fiscal Consolidation, Indian Tax Structure, GST in India. FRBM Act, Fiscal Federalism and Centre- State Financial Relations in India.
3. **Foreign Trade of India:** Voluntary Action Scheme, Balance of Payments Position, Foreign Trade Policy & measures, Convertibility of Rupee, Agri- Export Zones, SEZ etc.
4. **India and WTO:** Issues & Progress. Implications of TRIPS, TRARs, GATS etc. on Indian Economy, Foreign Capital in India, Fdi (Single Brand & Multi Brand), Fit etc. Make in India, Start Ups Programmes.

**8. SOCIOLOGY:** Paper-I

**Section A:**
1. **Fundamentals of Sociology:** and Study of Social Phenomena. Emergence of Sociology, its nature and scope. Methods of study; Problems of objectivity and issues of measurement in Social Science; Sampling and its types: Research Design: Descriptive, Exploratory and Experimental. Techniques of data collection: Observation, Interview schedule and questionnaire. 2. **Theoretical Perspectives- Functionalist: Redcliffe Brown, Malinowski and Merton, Conflict Theory: Karl Marx, Ralf Dahrendorf and Lewis Coser.**
4. **Modernism:** Talcott Parsons and Robert K. Merton. 5. **Post modernism:** Edward Said, Michel Foucault, Homi K. Bhabha, Donna Haraway. 6. **Post colonialism:** Homi K. Bhabha, Dipesh Chakrabarty, Gayatri Chakravorty Spivak. 7. **Feminist sociology:** Gita Mehta, Shampa Kumar, Mridula Misra, Haniya Ali. 8. **Social Anthropology:** Bronislaw Malinowski, A.M. Lévi-Strauss, Radcliffe-Brown, E. Durkheim and Talcott Parsons. 9. **Critical Social Theory:** Theodor W. Adorno, Max Horkheimer and Jürgen Habermas. 10. **Interdisciplinary Approaches:** Sociology and its relation with other social sciences.

**Section B:**
5. Marriage, Family and Kinship: Types and forms of marriage, impact of social legislation on Marriage; Family structure and functions; changing patterns of family, family, joint and nuclear family.

**9. POPULATION:** Paper-II

**Section A:**
1. **Bases of Indian Society:** Traditional Indian Social Organisation: Dharma, Doctrine of Karma, Ashram Vyavahara, Purusharthya and Sanaskar; Socio-Cultural Dynamics: Impact of Buddhism, Islam and the west. Factors responsible for continuity and change. 2. **Sociological Explanation:** Castes & Ibid. Spaces, Castes & Jars, and Castes: Patterns of Caste; and Jars; Classes of equality and social justice. 3. **Population:** Factors responsible for continuity and change. 4. **Sociological Explanation:** Castes & Jars, and Castes: Patterns of Caste; and Jars; Classes of equality and social justice. 5. **Marriage and Kinship:** Marriage among different ethnic groups and its changing trends and future. 6. **Social Problems:** Ethnicity and communalism; Critical Issues of social and political life.

**Section B:**
1. **Basic Characteristics of Under-development & Indian Economy:** National Income and Per Capita Income: Pattern, Trends, Aggregate and Sectoral Composition etc. Incomes, Inequalities and Regional imbalances in India.
9. PHILOSOPHY: PAPER-I (History and Problems of Philosophy)

SECTION-A


SECTION-B


10. Environmental Psychology: Role of environment in behavior, personal space, effects of air pollution, crowd and atmospheric pollution, Interventions for reducing adverse impacts.

12. BOTANY-I: Microbiology, Pathology, Plant Disease, Morphogenesis

Microbiology: Microbial diversity idea of Microbiology of Air, Water and Soil, general-account of Microbial infection and immunity, application of Microbiology with reference to Agriculture, Industry and Medicine.

Plant Pathology: Mode of infection, defence mechanism, control of plant diseases. Important plant diseases caused by viruses, bacteria, fungi and nematodes with special reference to tobacco mosaic, leaf curl of papaya, citrus canker, rust of wheat, smut of barley, leaf blight of potatoes, rust of sugarcane, ear cockle of wheat, ergot of barley, stem gall of coriander and wilt of arhar.

Plant Diversity: Classification, structure, reproduction, life cycles and economic importance of viruses, bacteria, algae, fungi, bryophytes, phaeophytes and gymnosperms including ferns.

Morphology: Morphology of root, stem, leaf, flower and fruits, secondary growth.

Embryology: Angiosperm and gymnosperm and male gametophyte, megasporogenesis and female gametophyte, fertilization, embryo and endosperm development.

Taxonomy: Principles of taxonomy, system of classification of angiosperms (Benth and Hooker, Pakistan), rules of botanical nomenclature, chemical taxonomy distinguishing features of families- Ranunculaceae, Magnoliaceae, Brassicaceae, Malvaceae, Fabaceae, Rosaceae, Apiaceae, Cucurbitaceae, Asteraceae, Rubiaceae Apocynaceae, Solanaceae, Acanthaceae, Verbenaceae, Lamiaceae Euphorbiaceae, Arecaceae, Orchidaceae, Poaceae.

Morphogenesis: Correlation, Polarity, Symmetry, totipotency, differentiation and regeneration of tissues and organs; methods and applications of cell tissue, organ and protoplast cultures, somatic variations, somatic hybrid and cybrids.

Bottedy: LAW-PAPER-I

Cell Biology, Genetics, Physiology, Biochemistry, Ecology and Economic Botony

Cell Structure and functional life, Ultra structure of eucaryotic and prokaryotic cells, structure and functions of plasma membrane, endoplasmic reticulum, chloroplasts, mitochondria, ribosomes, golgibodies, and nucleolus; Cell cycle, mitosis and meiosis; Chromosomal morphology and chemistry, numerical and structural changes in chromosomes and their cytological and genetic effects.

Genetics: Mendel's Law of inheritance, interaction of genes, linkage and crossing over, genetic linkage, recombination, bacteria and viruses, gene mapping, sex linkage, determination of sex, cytoplasmic-inheritance of plastid; gene concept, gene code.

Molecular Genetics: Molecular genetics-DNA as genetic material. Structure and replication of DNA, role of nucleic acids in protein synthesis (transcription and translation) and regulation of gene expression, mutation and evolution, DNA damage and repair, gene amplification, gene rearrangement, oncogene, genetic engineering- restriction enzyme cloning vectors (pBR 322, PT lambda phage), gene transfer, recombinant DNA application of genetic engineering in human welfare.

Physiology and Biochemistry: Water relations of plants, absorption, conduction of water and transpiration; mineral nutrition and ion transport, translocation of photosynthates and nutrients, action and function of water and solutes; classification of carbohydrates; photosynthesis-mechanism, factors affecting photosynthesis, C3 and C4 carbon fixation cycle, photorespiration; plant respiration and fermentation, enzymes and coenzymes, mechanism of enzyme action; secondary metabolites (alkaloids, steroids, terpenes, lipids), nitrogen fixation and nitrogen metabolism, structure of protein and its synthesis.

Plant Growth: Plant growth-growth, Movements and senescence, growth hormones and growth regulators their structure, role and importance in agriculture and horticulture, physiology of flowering, sexual incompatibility, seed germination and dormancy.

Ecology: Scope of ecology, ecological factors, plant communities and plant successions, concept of biosphere, ecosystem structure and functions, abiotic and biotic factors, flow of energy in the ecosystem, applied aspects of ecology, natural resources and their conservation, endangered, threatened and endemic taxa, plant damage and pollution.

Economics of Agriculture: Plants as sources of food, fibre, timber, drugs, rubber, beverages, spices, resin and gums, dyes, essential oils, pesticides and biofertilizers, ornamental plants, energy plantations and petrocos.

13. LAW-PAPER-I

Part A: (Constitutional and Administrative Law)

1. Constitution: Constitutional Law, Constitutional Conventions; Constitutionalism

2. Recent features of Indian Constitution and its Nature.

3. Federalism: Presidential and Parliamentary form of Government; Separation of Power; Rule of Law.


5. Constitutional Position of the President and relations with the Council of Ministers, Constitutional position of Governor and their powers.

6. The Supreme Court and High Courts: their powers and jurisdiction; Public Interest Litigation.

7. Distribution of legislative powers between the Union and States, Administrative and financial relations between Union, States and Local Bodies

8. Principles of Natural Justice: Emerging trends and judicial approach

9. Delegated legislation: Its Constitutionality and judicial and legislative controls

10. Services under the Union and States: Recruitment, conditions of service and qualification, Union Public Service Commission and State Public Service Commission; Powers and Functions


12. Election Commission: Power and Functions

13. Parliamentary Privileges and Immunities

14. Amendment of the Constitution

15. Ombudsman: Lok Pal, Lok Ayukta etc.

Part-B: (International Law)

1. Nature of International Law

2. Sources: Treaty, Custom, General principles of law recognized by civilized nations, subsidiary means for the determination of law

3. Relationship between International Law and Municipal Law. Provisions in Indian Constitution for promotion of International peace and Security and Legislation for giving effect to International agreements,

4. State Recognition and State Succession

5. Territory of States: modes of acquisition and loss of territory

6. Sea: Inland waters, Territorial Sea; Continental Shelf; Exclusive Economic Zone and Ocean beyond national jurisdiction

7. Air space and aerial navigation

8. Outer space; Exploration and use of outer space


10. Jurisdiction of States: basis of jurisdiction and immunity from jurisdiction

11. Extradition and Asylum

12. Diplomatic and Consular Agents

13. Treaties: Formation, application and termination

14. State Responsibility

15. United Nations: Principles and principles; principal organs and their powers and functions

16. Peaceful means for settlement of International disputes

17. Lawful recourse to force: aggression, self-defence and interventions

18. Legality of the use of Nuclear Weapons; Ban on testing of Nuclear and Chemical Weapons; Nuclear Non-proliferation Treaty, CTBT.

19. International Terrorism, State sponsored terrorism, International Criminal Court


Law PAPER-II

1. A. LAW OF CRIMES: (a) Concept of Crimes, Elements, Preparations, and attempt to commit crime. (b) [11] Indian Penal Code, 1860

General exceptions

ii. Join and Constructive liability

iii. Abetment

iv. Criminal conspiracy.

v. Offences against the state

vi. Offences against Public Tranquility

vii. Offences against Human Body

viii. Offences against Property

ix. Offences against Women

x. Defamation

xi. Protection of Civil Rights Act, 1955

xii. Prevention of Corruption Act, 1986

2. LAW OF TORTS:

i. Nature of tortious liability

ii. Liability based upon fault and strict liability

iii. Statutory liability

iv. Vicarious liability including State liability

v. General Defences

vi. Joint tort feasors

vii. Negligence

viii. Remedies.

ix. Defamation

x. Nuisance

xi. Conspiracy

xii. False imprisonment and malicious prosecution.

3. Law of Contracts and Mercantile Law:

i. Nature and formation of contract i.e. contract

ii. Standard form of Contract

iii. Factors vitiating consent

iv. Void, Voidable, illegal and unenforceable contracts

v. Performance of contracts.

vi. Dissolution of contractual obligations

vii. Frustration of contracts

viii. Quasi contracts

ix. Remedies for breach of contract

x. Contract Indemnity, Guarantee and Insurance


xii. Sale of Goods and hire purchase

xiii. Formation, Liability and Dissolution of Partnership

xiv. Negotiable Instruments Act 1881

D. Contemporary Legal Developments:

i. Concept of Public Interest Litigation and Environmental Law

ii. Right to Information Act-2005

iii. Alternative Disputes Resolution-Concept, Types and Prospect

iv. Aims, objectives and Salient features of the competition Law 2002

v. Food for Plea bargainings

vi. Remedies under the Information and Technology Act, 2000 specially Civil Liability

(v) Sections 43 to 64) and Criminal Liability (Section 65 to 75).

14. ANIMAL HUSBANDRY AND VETERINARY SCIENCE

PAPER-I

SECTION A

A. Animal Nutrition: Digestion of feed in ruminants and nonruminants, Nutrient requirements for milk production. Nutrient in animal food, Classification of feed stuff, feeding standards, Principles of rationing and computation of balance ration, Conservation of fodder as silage and hay, treatment of poor quality roughages, Role of enzymes in digestion, minerals in feeds, sources, deficiency symptoms, deficiency syndromes, Vitamin: sources, function and deficiency symptoms, Role of Enzymes in production and reproduction, Metabolism of carbohydrates, proteins and lipids, Feed supplements and feed additive- function and deficiency symptoms, Use of Probiotics and Prebiotics in dairy animals and poultry nutrition; Digestion trials, feeding of animals under stress conditions, feeding of calves, heifers, Bull and cows/buffaloes before and after parturition, Interrelationship of vitamins with mineral, Evaluation of energy and protein proximate analysis of feeds. Requirement and formulation of feeds for layers and broilers.

B. Animal Physiology and Environmental Physiology: Adoption, Mechanism of absorption, growth, measurement of growth, methods of controlling, stress due to temperature during winter and summer. Animal digestive and absorption of carbohydrates, protein and fats in ruminants and nonruminants. Male and female reproductive organ and function, physiology of milk secretion, ejection, hallmark of milk.


ANIMAL HUSBANDRY AND VETERINARY SCIENCE

PAPER-II

SECTION-A


STATISTICS: PAPER-II

SECTION-I: STATISTICAL INFERENCE


16. MANAGEMENT PAPER-I 

The candidates are expected to be acquainted with various management aspects. They should be able to apply theory to practice in the context of world business, in general and business function in India, in particular. For this, they are expected to be well conversant with the environment, in which business functions in India. They should also be able to display knowledge and application of managerial tools of analysis and decision-making in various functional areas.

1. Management Concepts and Evolution, Concept and significance of Management; Management as science or art; distinction between management and administration; Role and Responsibilities of management; Principle of management; Evolution of management thought- classical school, Neo-classical School, modern management school.

2. Planning and Decision Making; Planning, nature, type, significance and limitations; Operations, Policies, policies, procedure of planning, forecasting and decision making. Planning – types, process; Rational decision making and its limitations. Concept of bounded rationality.

3. Marketing and Organizational Behaviour; Organisation- concept, Types, divisions and levels. Span of management; Authority and responsibility; Authority types, sources. Delegation of authority, principles and obstacles to delegation; Centralisation and decentralization of authority; Organisational behaviour- concept and significance. Social and group behaviour. Organisational change, resistance to change; conflict management

4. Directing- principles and techniques, Motivation-Maslow, Herzberg, McClelland, McGregor, Contingency theories; MBO, Leadership, types, Traits of successful leader, Various theories of leadership; Communication-Process, Levels and types, barriers to communication, Measures for effective communication, Role of technology in communication.

5. Controlling-Process; Pre-requisites for effective controlling, Methods of controlling, budgetary and non budgetary methods, Coordination, Concept, Techniques and barriers to Co-ordination.

6. Production and Operations Management; Production Environment, Interplay between business unit and environment, ethics and corporate governance; Monetary Policy, Fiscal Policy, Foreign Capital and Foreign Collaboration; Strategy, concept levels, SWOT analysis core competency and synergy, Porter’s Five Forces Model and Value Chain Analysis, BCG Matrix.

MANAGEMENT PAPER-II

SECTION-I: MARKETING MANAGEMENT

1. Concept of Marketing, Market analysis, Marketing Environment; Marketing Plan; Market Segmentation; Market Target and Positioning; Product Strategies, Product Life-Cycle; Consumer Behaviour; Brand Management; Sales Promotion, Advertising, Management of Sales Force, Pricing Decision, Marketing Channel-Retail Distribution, Internet Marketing, Customer Relationship Management, Rural Marketing in India; International Marketing; Marketing Audit and Control; Ethics in Marketing.

SECTION-II: PRODUCTION MANAGEMENT

1. Meaning and Nature of Production Management; Production Systems; Production Planning and Control, Lean Manufacturing and Flexible Systems; Ranking, Loading and Scheduling for different production system; Site Selection and Plant Location, Plant Layout and Material Handling; Production Design, Inventory Management; Supply Chain Management; Enterprise Resource Planning, Total Quality Management, Six Sigma, PERT and CPM, Waste Management.

SECTION-III: FINANCIAL MANAGEMENT


SECTION-IV: HUMAN RESOURCE MANAGEMENT

1. Nature of Human Resource Management, Scope of Human Resource Management; Job Analysis, Job Design; Recruitment and Selection; Training and Development; Career Planning; 360 degree Performance Appraisal; Worker’s Participation in Management; ESOPs; Trade Union in India; Safety, Welfare, Strike, Lay-Off, Lock-out and Reconciliation; HR Audit; Flexiblility Working Condition; Work from Home; Valuerat Ratios; Benefit Ratios (VRB); Strategy, Concept, Levels and Business Decisions.

17. POLITICAL SCIENCE AND INTERNATIONAL RELATIONS: PAPER-I

SECTION-A


and Types (from the perspectives of structure, blood relation, marriage, residence and succession); Impact of urbanization.

10.5. Kinship: Consanguinity and Affinity; Principles and types of descent (Unilinear, Dual, Bilateral kinship); Forms of descent


13. Religion: Anthropological approaches to the study of religion (evolutionary, psychological and functional) monotheism and polytheism; myths and rituals; forms of magical-religious belief in tribal and peasant societies (animism, animalism, fetichism, naturalism and totemism); religion, magic and science distinguished, magico-religious functions (priest, shaman, medicine man, sorcerer and witch).


15.1 Research Methods in Cultural Anthropology: Field work tradition in anthropology; Distinction between technique, method and methodology; Tools of Data collection- Observation, Interview, Schedule, Questionnaire, Case history, Case study and Genealogy. Secondary sources of information.

15.2 Controlled comparison and cross cultural study.

Anthropology - Paper II

1. Emergence and Development of the Indian Culture and Civilization: Prehistoric (Paleolithic, Mesolithic and Neolithic-Chalcolithic); Protohistoric (Indus Civilization).


3. The structure and function of traditional social system: Varnashrama, Purushatwa, Karma, Rina and Rebirth.


5. Sacred Complex and Nature-Man-Spirit Complex.

6. Impact of Buddhism, Jainism, Islam and Christianity on Indian society including tribes.


9.2 Problems of tribal communities: Land alienation, poverty, indebtedness, low literacy, poor educational facilities, unemployment, health and nutrition.

9.3 Impact of developmental projects and their impact on tribal displacement and problems of rehabilitation, New forest policy and tribes. Impact of Urbanization and Industrialization on tribal populations.

10.1 Problems of exploitation and deprivation of Scheduled Castes, Scheduled Tribes and Other Backward Classes. Constitutional safeguards for Scheduled Tribes and Scheduled Castes.

10.2 Social change and contemporary tribal societies: impact of modern democratic institutions, development programmes and welfare measure on tribes and weaker sections and women participation.

10.3 The concept of Ethnicity: Ethnic conflicts and political developments, Unrest among tribal communities; Peace-tribalism; Social change among the tribes during colonial and post-independent India.

11. History of Administration of Tribal Areas: Tribal policies, plans, programmes of tribal development and their implementation.

12. Role of N.G.O. in tribal development.

13. Role of anthropology in tribal and rural development.

20. CIVIL ENGINEERING: PAPER-I

PART-A


Deflection of beams: Mecauy’s method, Mohr’s moment area method, Elastic stability of columns.

Castigliano’s theorems I and II, unit load method of consistent deformation applied to beams and pin jointed trusses. Slope-deflection and moment distribution methods.

Rolling line loadings: Influence line for Uniform Load and Bending moment at a section of a beam. Criteria for maximum shear force and bending moment in beams traversed by a system of moving loads. Influence lines for simply supported plane pin jointed trusses.

Frames: Three hinged, two hinged and fixed arches, rib shortening and temperature effects.


Universal bending moment. Moment of inertia, position of Neutral axis and Principal axes, Calculation of bending stresses.


Cantilever and Counter-fort type retaining walls.

Water Tanks: Design requirements for rectangular and circular tanks resting on ground.

Prestressed Concrete: Methods and systems of prestressing, anchorage, Analysis and design of stress master for flexure based on working stress, loss of prestress, Earthquake Resistant Design of Buildings as per BIS codes.

Introduction to computer aided design of structure

(c) Steel Structural : Factors of safety and load factors. Riveted, bolted and welded joints of steel sections. Design of compression members, beams of built up sections, riveted and welded plate girders, gantry girder, stanchions with battens and lacements.

Part-B

(a) Fluid Mechanics: Fluid properties, types of fluids and their role in fluid motion. Kinematics and dynamics of fluids flow: velocity and acceleration, stream lines, equation of continuity, irrotational and rotational flow, velocity potential and stream function.

Continuity, momentum, energy equations Navier Stokes equation, Euler’s equation of motion Bernoulli’s equation. Applications to fluid flow problems e.g. pipe flow, sluice gates, weirs, etc.

Laminar Flow: Laminar and turbulent boundary layer on a flat plate, laminar sub-layer, smooth and rough boundaries, submerged flow, drag and lift forces.

Turbulent flow through pipes: Characteristics of turbulent flow, velocity distribution and variation of pipe friction factor. Hydraulic grade line and total energy line.

Hydraulics: Uniform and non-uniform flows, momentum and energy correction factors, specific energy and specific force, critical depth, gradually varied flow, classification of surface profiles, control section, step method of integration of varied flow equations, rapidly varied flow, Hydraulic Jump. Surges.


Geotechnical Engineering: Soil types and structure, gradation and particle size distribution, Atterberg’s limits.

Flow through porous media: Effective stress and pore water Pressure, permeability concept, field and laboratory determination of permeability, Seepage pressure, quick sand condition.


Foundation: Type and selection criteria for foundation of structures. Design criteria for foundations, Analysis of distribution of stress for footings and pile, pile group action, pile load tests.

Subsurface exploration of soils, Ground improvement and soil stabilization techniques.

Civil Engineering: PAPER-II

PART-A

(a) Construction Technology, Planning and Management: Building Materials: Physical properties of construction materials with respect to their use, Stones, Bricks, Tiles, Lime, Cement, Mortars, Concrete.

Timber: Properties, defects and common preservation treatments, Ferro cement, fibre reinforced cement High strength concrete.

Use and selection of materials for various uses e.g. Low cost housing, mass housing, High rise buildings.

Building Construction: Masonry Constructions using Brick, stone construction detailing and strength characteristics.


Principle of planning of buildings for residents and specific use. Building code provisions and use.

Basic principles of detailed and Approximate estimating, specifications, rate analysis, principles of valuation of real property. Machinery for earthwork, concreting and their specific uses, Factors affecting selection of construction equipments, operating cost of equipments.


(b) Surveying: Common methods and instruments for distance and angle measurement for Civil engineering works, their use in plane table, traverse survey, leveling, triangulation, contouring and topographical maps. Basic principles of photogrammetry and remote sensing. Introduction to Geographical Information system.

(c) Highway Engineering: Principles of Highway alignments, classification and geometrical design, elements and standards for roads.

Pavement structure for flexible and rigid pavements. Design principles and methodology. Construction methods and materials for stabilized soil, WBM, Bituminous works and CC roads.

Surface and sub-surface drainage arrangements for roads, culvert structures.

Pavement distresses and strengthening by overlays. Design of highways and motorways, Typical design features for channelized, intersection rotary etc., signal designs, standard traffic signs and markings.

(d) Railway Engineering: Permanent way, ballast, sleeper, chair and fastenings, points and crossings, different types of turn outs, crossovers, setting out of points, Maintenance of track, super elevation, creep of rails, ruling gradients, track resistance, tractive effort, curve resistance, Station yards and station, station buildings, platform sidings turn out, Signals and interlocking, Level Crossings.

PART-B

(a) Water Resources Engineering:

Hydrologic cycle, precipitation, evaporation, transpiration, infiltration, overland flow, hydrograph, flood frequency analysis, flood routing through a reservoir, channel flow routing- Muskingum method.

Ground Water Flow: Specific yield, storage coefficient, efficiency of permeable confined and unconfined aquifers, radial flow into a well under confined and unconfined conditions. Open wells and Tubewells.

Ground and surface water resources, single and multipurpose projects, storage capacity of reservoirs, Reservoir Control, Law and reservoir sedimentation.

Water requirements of crops, consumptive use, duty and delta, irrigation methods and their efficiencies.

Waste and sewage disposal systems for irrigation canal, irrigation capacity, canal losses, alignment of main and distributary canals, most efficient section, lined canals and their design, regime

(b) Environmental Engineering:

21. MECHANICAL ENGINEERING: PAPER-I

2. Mechanical Engineering: Vibrating systems of single degree freedom systems, natural frequency, damped and forced vibrations, resonance, force transmissibility, two degree of freedom systems, vibration absorbers, whirling of shafts and critical speeds.
3. Mechanical Components: Materials and strain, elasticity, Hooke's and Hooke's law, stress, two dimensional stress analysis, principal stresses, generalised Hooke's Law, total and distortion strain energy, theories of failures, bending and shear stress in beams. Thin plates. Flattened and Handed Helical Springs. Thin and thick pressure vessels, rotating discs, Buckling of columns.
6. Non Conventional Machining Processes: EDM, ECM, Ultrasonic machining, water jet machining etc, application of laser and plasmas, energy rate calculations. Metrology: concept of fits and tolerances, tools and gauges, comparators, inspection of length, position, profile and surface finish.
7. Manufacturing Management: Product development, value analysis, Break-even analysis, forecasting techniques, Operation Scheduling, Capacity Planning, Assembly line balancing, CPM and PERT, Inventory control, ABC Analysis, EOQ model, material requirement planning, job design, job standards, method work and study measurements.
8. Quality Management: Quality analysis, control charts, acceptance, sampling, total quality management, process control, quality assurance, quality control, quality systems, control charts, acceptance sampling, control methods, Taguchi methods, Six Sigma, Composite and design of experiments methods, Total Quality Management, single and multi course models, Six Sigma queuing model, Value Engineering.

MECHANICAL ENGINEERING: PAPER-II (PART-A)

1. Thermodynamics: Laws of thermodynamics and their applications: T-s diagrams, Maxwell and Clausius equation and their uses; Availability and irreversibility.
2. Fluid Dynamics: Flow of fluids, Manometers, forces on immersed surfaces, stability of floating bodies, Kinematics and dynamics of incompressible fluids. Laminar and turbulent boundary layer flows. Bernoulli's equation, fully developed flow through pipes.

PART-B

1. LC Engines: Classification, Thermodynamic cycles of operation, Performance Calculation, Performance Summary, Combustion in SI and CI Engines, Normal and abnormal combustion, knocking and detonation. Effect of variables on knocking and detonation, Fuels used in SI and CI Engines, Fuel injection, combustion and multi point fuels injection (MPI), Sequential injection, Emission and Control, Turbocharged and Rocket Engines.
2. Steam Engineering: Modern steam generators, Rankine cycle, Modified Rankine cycle and analysis, Natural and artificial draught, flow of steam in convergent and diverging nozzles and impulse or thrust service for flow at maximum discharge, super saturated flow in nozzles. Wilson line.

22. ELECTRICAL ENGINEERING


(iv) Analog & Digital Electronics: semiconductors, semiconductor diodes & zener diode, Bi-polar junction transistor and their parameters. Transistor biasing, analysis of all types of amplifiers including feedback. D. C. amplifiers; Operational amplifiers; Balanced amplifiers, and dual supply amplifiers. Their applications; Feedback oscillators; Colpitts and Hartley types, waveform generators, Multi-vibrators; Boolean algebra. Logic gates Combinational and sequential digital circuits.

Semiconductor devices: A/D & D/A input devices, Analog Multiplexer. Number system and codes, elements of microprocessors & their important applications.


ELECTRICAL ENGINEERING: PAPER-II (PART-B)


SECTION-B: (HEAVY CURRENT)


SECTION-C (Light Current)

23. URDU LITERATURE

Section-A

Candidates will be required to show adequate knowledge of the following topics and movements:
- The Renaissance: Elizabethan and Jacobean Drama; Metaphysical Poetry; The Epic and the mock-epic; Neo-classicism; Satire; The Romantic Movement; The Rise of the Novel; The Victorian Age.

Section-B

Texts for detailed study are listed below:
1. John Milton: Paradise Lost, Book-I
2. John Dryden: All for Love
3. Alexander Pope: The Rape of the Lock
4. William Wordsworth: The following poems: "Tintern Abbey", "Three Years She Grew", "Michael" and "Milton, Thou Shouldst be Living at This Hour"
5. P.B. Shelley: "To a Skylark" and "Ode to the West Wind"
6. Alfred Tennyson: "Ulysses" and "Lotos Eaters"
7. Robert Browning: "My Last Duchess" and "The Lost Leader"
8. Francis Bacon: "Of Studies" and "Of Truth"

Part-I: English Literature

Textual Study of the following works:
2. Charles Dickens: Great Expectations.
3. Thomas Hardy: Far from the Madding Crowd

Part-II: Urdu Literature

Textual Study of the following works:
2. T.S. Eliot, The following poems: "The Love Song of J. Alfred Prufrock" and "Journey of the Magi"
3. William Wordsworth: The following poems: "Tintern Abbey", "Three Years She Grew", "Michael" and "Milton, Thou Shouldst be Living at This Hour"
4. Alfred Tennyson: "Ulysses" and "Lotos Eaters"
5. Robert Browning: "My Last Duchess" and "The Lost Leader"
6. Francis Bacon: "Of Studies" and "Of Truth"
7. Charles Dickens: Great Expectations.

24. URDU LITERATURE PAPER - FIRST

PART-A (PROSE)

(1) Development of Urdu language. (a) Western Hindi and its dialects mainly khar Boli, Braj Bhasha and Haryanvi. (b) Persio-Arabic elements in Urdu. (c) Development of Urdu prose up to Ghalib. (2) Two classical Schools of Urdu Poetry-Delhi Boli, Braj Bhasha and Haryanvi. (3) Persio-Arabic elements in Urdu. (4) Urdu Language. (5) The candidates critical ability.

PART-B (POETRY)


Part-II: Financial Management

1. Nature, scope and objectives of Financial Management; Capital Budgeting decisions; importance, process, limitations, methods-payback period, net present value, internal rate of return and average rate of return.
2. Sources of short, medium and long term funds, preference and equity shares, debenture and bond financing.
3. Working capital management-classification, dangers of inadequate working capital, approaches to estimation of working capital requirement, tools of cash, inventory and receivables management.
4. Cost of capital; Classification and determination, computation of weighted average cost of capital, leverage and its types.
6. Indian market capital- main attributes, distinction between capital and money markets, defects of capital market, working of Indian stock Exchanges, SEBI as a regulator.

Commercie and Accountancy

Paper-II

Organizational Behaviour and Human Resource Management

1. Nature and concept of organization, Organizational theories- classical, neo-classical, bureaucratic and system approaches, merits and demerits of centralization and decentralization.
2. Basis and Sources of power, power structure, barriers and politics.
3. Organizational Goals-Primary, Secondary, Single and multiple goals; displacement, succession, expansion and multiplication of goals.
4. Organization-Types, Structure, line and staff, functional, committee, matrix, and project, formal and informal organization, organizational conflict- causes, cures.

Part-II Human Resource Management

1. HRM- Concept, objectives, significance, functions and challenges to HR Managers.
2. Recruitment and selection, methods of training, executive development programmes.
3. Motivation -Concept, theories - Maslow's Need Hierarchy, Herzberg’s ‘hygiene & Alderfer’s 3 Theory: Determinants of morale, morale and productivity.
4. Leadership- types and styles, Wages- methods of wage payment, wage differential and wage policy in India.
6. Collective Bargaining- Concept, features and requirements for successful bargaining; Worker's participation in management- levels and forms of participation, worker's participation in India.
7. Industrial disputes- reasons of industrial disputes, strike, lockout, prevention and settlement of industrial disputes; Trade Union- concept, types and trade union movement in India.

PAPER-I

PUBLIC ADMINISTRATION: PAPER-I Adminstrative Theory

I. Basic concept; Meaning, Scope and significance of Public Administration; Evaluation of Public Administration as discipline (New Public Admin., New Public Management and New Public Services), Private and Public Administration; its role in developed and developing societies; Ecology of Administration-Social, Political, Moral, Economic, Legal, Cultural.
II. Theories of Administration: Classical theory (Herbi Fayol, Luther Gulick and others); Scientific management (Taylor and his associates); Bureaucratic theory (Max Weber and his critics); Human Relations theory (Elton Mayo and his colleagues); Systems approach (Chester Barnard).
III. Principles of Organisation: Hierarchy; Unity of Command, Span of Control, Power, Authority and Responsibility, Coordination, Communication, Supervision, Centralisation, Decentralisation and Delegation.
V. Structure of Organisation: Chief Executive and his/her functions Line, Staff and Auxiliary Agencies, Departments, Corporation, Companies, Boards and Commissions, Heads of department and their relationship.
VI. Personnel Administration: Bureaucracy and Civil Services, Classification, Recruitment, Training, Career Development, Performance Appraisal, Promotion; Pay Structure; Service conditions; Integrity and Discipline, Employer-Employee relations, Retirement benefits; Generalists and Specialists; Career and Short-termism.
VII. Financial Administration: Concepts of Budget, Preparation, enactment and execution of the Budget; Performance Budgeting, Zero Base Budgeting, Accounts and Audit.
VIII. Accountability and Control: Concepts of Accountability and control, Control over Administration; Legislative, Executive, Judicial and Citizen control.
XI. Comparative and Development Administration: Meaning, nature and scope; Contribution of Fred Rigs with special reference to the Prismatic-Sala Model; Concepts Scope and significance of development Administration, Political, Economic and social causes of Development Administration, Controversial issues, Concepts of Administrative Development.
XII. Public Policy: Concepts and significance, Theories of public, public policy formulation, execution and evaluation.

PUBLIC ADMINISTRATION: PAPER-II INDIAN ADMINISTRATION

I. Evolution of Indian Administration: Major Characteristics of Mauryan, Mughal and British Periods.
II. Constitutional Setting: Parliamentary Democracy; Federalism; Secularism, Socialism.
III. Political Executive at the Union Level: President, Prime Minister, Council of Ministers; Cabinet Committees.
IV. Structure of control Administration: Central Secretariat; Cabinet secretariat; Ministries and Departments, Boards and Commissions, Field Organizations.
V. Central-State Relations: Legislative, Administrative and Financial.
VI. Public Services: All India, Central and State Services. Union and State Public Service Commissions; Training of Civil Servants.
VII. Machinery for Planning: Plan formulation at the national level; NITI Aayog, National Development Council, Planning Machinery at the State and District levels.

VIII. Public Sector Undertakings: Forms, Top-level Managements, control and supervision.
IX. Control over Public Expenditure: Parliamentary Control; Role of the Finance Ministry, Comptroller and Auditor General.
X. Administration of Law and Order: Role of Central and State Agencies in Maintenance of Law and Order.
XI. State Administration: Governor, Chief Minister, Council of Ministers, Chief Secretary, Secretariat, Directorates.
XII. District Administration: Role and importance, District Magistrate / Collector, Land Revenue, Law and Order and Developmental functions, District Rural Development Agency, Special Programmes of Rural Areas.
XIII. Local Administration: Panchayati Raj and Urban Local Government, Features, forms and problems, Autonomy of Local Bodies.
XIV. Administration for Welfare: Administration for the welfare of weaker sections with particular reference to Scheduled Castes, Scheduled Tribes; Programme for the welfare of Women.
XV. Issue Areas in Indian Administration: Relationship between political and permanent Executives, Generalists and Specialists in Administration, Integrity in Administration, People's Participation in Administration, Redressal of Citizen's Grievances; Lok Pal and Lok Ayuktas; Administration Reforms in India.

29. MEDICAL SCIENCE

PAPER-I

1. Human Anatomy:
   Gross anatomy, applied anatomy, blood supply and lymphatic drainage of tongue, thyroid, mammary gland, stomach, liver, prostate, gonads, uterus, Heart and lungs.
   Applied anatomy including blood and nerve supply of upper and lower limbs and joints of shoulder, hip and knee.
   Applied anatomy of diaphragm, perineum and inguinal region.
   Applied anatomy of kidney, urinary bladder, uterine tubes and vesicourethra.

2. Embryology:
   Placenta and placental barrier. Development of heart, gut, kidney, uterus, ovary, testis and their common congenital abnormalities.
   Central and peripheral autonomic nervous system: Gross and clinical anatomy of ventricles of brain, circulation of cerebrospinal fluid; Neural pathways and lesions of cutaneous sensations, hearing and vision; Cranial nerves, distribution and clinical significance; Components of autonomic nervous system, Internal capsule and cerebral cortex.

2. HUMAN PHYSIOLOGY

Blood
   IMMUNITY, THROMBOCYTOPENIA
   CV$ CARDIAC CYCLE,
   RESPIRATION-OBSTRUCTIVE DISEASES, ACID BASE BALANCE
   MICTURATION REFLEX.
   GIT, PEPTIC ULCER, LIVER FAILURE, JAUNDICE (OBSTRUCTIVE, HEPATIC, HEMOLYTIC) ACUTE PANCREATITIS
   ENDOCRINE-GUITER, OSTEOMALACIA, MASTER GLAND
   CNS-CEREBRAL STROKE, PARKINSON'S
   DISEASE, HEMIPLEGIA PARAPLEGIA
   SPECIAL SENSES—IGHT BLINNESS, CATRACT, MYOPIA, HYPERMETROPIA,
   AMBLYOPIA
   REPRODUCTION—PREGNANCY TESTS, LACTATION, AMENORRHOEA, STERILITY IN MALE & FEMALE
   OXALATION, SPERM COUNT

Biochemistry
   1. Organ function tests-liver, kidney, thyroid.
   2. Protein synthesis.
   3. Vitamins and minerals.
   4. Polymerase chain reaction (PCR)
   5. Enzymes & Biochemistry
   7. DNA Replication.
   8. RNA Transcription.
   9. DNA Repair Mechanism.
   10. Lipid Profile

Pathology

Microbiology
   1. Drug Nomenclature
   2. Adverse Drug Reactions
   3. Drug Act & Drug Schedules
   4. Drug Clinical Safety
   5. Drug Life.
   6. Drug Advertisement
   7. Drug Addiction
   8. Pharmacovegglance Programme
   9. Prescription Writing
   10. Side effects of the following drugs:
      a. Antidepressants and analgesics, Antibiotics, Antiinflammatory.
      c. Immunosuppressants
      d. Anticancer- Anti-diarrheal, Antitubercular, Diuretics.

6. Pharmacology:
Medical Ethics and Law, Medico-legal aspect of pregnancy, delivery and abortion; Sexual offences, Forensic examination of injuries and wounds; Examination of blood and seminal stains; poisoning, sedative overdose, hanging, drowning, burns, DNA and finger print study.

Medical Science- Paper-II

1. General Medicine:
   A) Aetiology, Clinical features, diagnosis and principals of management of: Ischemic Heart Disease, Hypertension, Diabetes Mellitus, Hypothyroidism, Hyper thyroidism, Epilepsy, Bronchial asthma, Rhinitis, Acute and Chronic Obstructive Lung Disease (COPD), Peritonitis, Hepatitis, Ulcers, PCOD, Polycystic ovaries, Infertility, PMS, PCOS, Dental diseases, Endoscopy.

2. Pediatrics:
   Immunization, Baby friendly hospital, Breast feeding, congenital cyanotic heart disease, respiratory distress syndrome, broncho pneumonia, Neonatal hyperbilirubinemia, Kernicterus. HHF classification and management, PEM grading and management, ARI and Diarrhea of under five children and their management.

3. Dermatology:
   Psoriasis, scabies, eczema, vitiligo, Steven Johnson’s syndrome and TEN, Lichen Planus, Legrosy, Bacterial viral and fungal infections of skin.

4. General Surgery:
   Clinical features, causes, diagnosis and principles of management of: Cleft palate, harelip, Laryngeal tumor, oral and esophageal tumors, Peripheral arterial diseases, varicose veins, Tumours of Thyroid, Adrenal Glands, Breast Abscess, cancer, fibroadenoma and adenosis, Bleeding peptic ulcer, tuberculosis of skin, ulcerative colitis, cancer stomach.

5. Obstetrics and Gynaecology including Family Planning:
   Gynaecological examination, Intra-uterine devices, pills, tubectomy and vasectomy, Medical termination of pregnancy, Lactation, Breastfeeding, Postnatal care, Postpartum hemorrhage, Jaundice, Jaundice in newborn, Breast cancer, cervical cancer, Menopause and its management.

6. Community Medicine (Preventive & Social Medicine)
   Environmental pollution, Cancer cervix, Carcinoma body of uterus and ovary.

7. General Medicine:
   Clinical features, causes, diagnosis and principles of management of: Cleft palate, harelip, Laryngeal tumor, oral and esophageal tumors, Peripheral arterial diseases, varicose veins, Tumours of Thyroid, Adrenal Glands, Breast Abscess, cancer, fibroadenoma and adenosis, Bleeding peptic ulcer, tuberculosis of skin, ulcerative colitis, cancer stomach.

8. General Surgery:
   Clinical features, causes, diagnosis and principles of management of: Cleft palate, harelip, Laryngeal tumor, oral and esophageal tumors, Peripheral arterial diseases, varicose veins, Tumours of Thyroid, Adrenal Glands, Breast Abscess, cancer, fibroadenoma and adenosis, Bleeding peptic ulcer, tuberculosis of skin, ulcerative colitis, cancer stomach.
and Indian constitution. The Indian economy will cover broad features of economic policy in India and its relationship with Indian agriculture. Emphasis will be on the applied aspects. The part relating to statistical analysis, graphs and diagrams will include exercise to test the candidates ability to draw common sense conclusions from information. \[\text{Food production and consumption trends in India. National and International food policies. Production, procurement, distribution and processing constraints. Relation of food production to national dietary pattern and protein and other nutritional deficiencies.} \]

Agricultural Engineering

PAPER-I

SECTION A


SECTION B

3. Irrigation and Drainage: Sources of water for irrigation. Planning and design of minor and major irrigation works, water harvesting, erosion control and drainage. Water supply, drainage and sanitation systems. Rehabilitation of sick and failed wells. \[\text{Irrigation efficiencies, principles of irrigation and its importance. Measurement of irrigation water, measuring devices - orifices, weirs and flumes. Water supply, drainage and sanitation systems. Rehabilitation of sick and failed wells.} \]
physiological and biochemical processes, including photosynthesis and respiration. Enzymes and coenzymes play crucial roles in these processes.


12. Membrane Biology: Examines the structure and function of the extracellular matrix, endomembrane systems, and the role of organelles such as chloroplasts, mitochondria, ER, Golgi apparatus, lysosomes, peroxisomes, and hydrogenosomes.

13. Nucleus and Nucleolus: Explores the structure and function of the nucleus and nucleolus, including nuclear pores.

14. Ultrastructural Details: Provides an overview of the ultrastructure of plant cells, including the wall, cytoplasm, and cell organelles.

15. Thermodynamic Systems: Analyzes the stability and dynamics of thermodynamic systems, including the study of states, processes, and the determination of thermodynamic properties.

(c) Biopolymers: Basic bonding in proteins, DNA and RNA.

(a) Rotational spectra: Diatomic molecules; isotopic substitution and rotational constants.
(b) Vibrational spectra: Diatomic molecules, linear triatomic molecules, specific vibrational frequencies of functional groups in polyatomic molecules.
(c) Electronic spectra: Singlet and triplet states. N→π* and π→π* transitions; application to conjugated hydrocarbons and conjugated carbonyls.
(d) Nuclear magnetic resonance: Isochronous and anisochronous protons; chemical shift and coupling constant; Application of H NMR to simple organic molecules.
(e) Mass spectra: Parent peak, base peak, daugheter peak, metastable peak, fragmentation rules to cleave a molecule. McLafferty rearrangement.
(f) Electron spin resonance: Inorganic complexes and free radicals.

CHEMICAL ENGINEERING PAPER II

A) Fluid and Particle Dynamics


B) Mass Transfer


C) Heat Transfer


D) Novel Separation Processes:


CHEMICAL ENGINEERING PAPER II

A) Material and Energy Balances

Material and energy balance calculations in processes with recycle/bypass/purge. Combustion of solid/liquid/gaseous fuels, stoichiometric relationships and excess air requirements. Adiabatic flame temperature.


C) Chemical Reaction Engineering


D) Chemical Technology


A) ENGINEERING MECHANICS, STRENGTH OF MATERIALS AND STRUCTURAL ANALYSIS, ENGINEERING MECHANICS:


B) STRUCTURAL ANALYSIS:


PART-B

DESIGN OF STRUCTURES: STEEL, CONCRETE AND MASONRY STRUCTURES.

- STEEL STRUCTURES:


- CONCRETE AND MASONRY STRUCTURES:


d) Fluid Mechanics, OPEN CHANNEL FLOW AND HYDRAULIC MACHINES

Fluid Mechanics: Fluids and their role in fluid motion, fluid statics including forces acting on plane and curve surfaces, Kinematics and Dynamics of Fluid flow. Velocity distribution, stream lines, equation of continuity, inertial and rotational flow, velocity potential and stream functions, flownet, methods of drawing flownet, sources and sinks, flow separation, free and forced vortices. Control volume equation, continuity, momentum, energy and moment of momentum equations from control volume equations, Navier-Stokes equation, Euler’s equation of motion, application to fluid flow problems, pipe flow, plane, curved, stationary and moving blade flows, Flow through gates, weirs, orifices, Venturis.

- Dimensional Analysis and Similitude: Buckingham’s Pi-theorem, dimensionless parameters, similitude theory, model laws, undistorted and distorted models.

- OPEN CHANNEL Flow: Uniform and nonuniform flows, momentum and energy conservation, continuity, specific energy and energy loss, critical depth, resistance equations and variation of roughness coefficient, rapidly varied flow, flow in contractions, flow at sudden drop, hydraulic jump and its applications surges and waves, gradually varied flow, separation of surface profiles, design of sections for flow over beds, step method of integration of varied flow equation, moving surges and hydraulic bore.

HYDRAULIC MACHINES AND HYDROPOWER:


- Reciprocating pumps, Air vessels, Hydraulic ram, efficiency parameters, Rotary and

GOE GEO ENGINEERING

CIVIL ENGINEERING
PAPER - II
Part-A
CONSTRUCTION TECHNOLOGY, EQUIPMENT, PLANNING AND MANAGEMENT
1. Construction Technology:
Engineering Materials:
Properties and uses; devises in filtering; season and preseration of timber, Plastics, rubber and synthetic materials for Low cost housing. Insulation:
Insulation materials and their uses. Roof Types:
Flat roof and Hip roof, Types of tiles, Types of materials. Earthwork:
Dry and Wet earthwork, Grading and hardening of seedlings; special approaches; establishment and tending.

Part-B
SURVEY AND TRANSPORTATION ENGINEERING
Survey:

Part-C
HYDROLOGY, WATER RESOURCES AND ENGINEERING
Hydrology:
Hydrometric cycle, precipitation, evaporation, transpiration, depression storage, infiltration, overland flow, hydrograph, flood frequency analysis, flood estimation. water budget and pondage. Flow diagram through a reservoir, channel flow routing, Muskingham method. Quantification of soil, specific yield, storage coefficient of permeability, confined and unconfined aquifers, aquifers, aquadats, radial flow into a well under confined and unconfined conditions, tube wells, pumping and recuperation tests, ground water potential.

WATER RESOURCES ENGINEERING:
Ground and surface water resources, single and multipurpose projects, storage capacity of reservoirs, reservoir losses, reservoir sedimentation, economics of water resources projects.

IRRIGATION ENGINEERING:
Water requirements of crops: consumptive use, quality of water, irrigation duty and delta, irrigation method and their efficiencies.

Canals:
Distribution systems for canal irrigation, canal capacity, canal losses, alignment of main and distributory canals, most efficient section, lined canals, their design, regime theory critical shear stress, bed load, local and dispersed load transport, cost analysis of lined and unlined canals, drain-age behind lining.

Water logging:
causes and control, drain-age system design, salinity.

Canal structures:
Design of cross regulators, head regulators, canal falls, aquadats, metering furn and canal outlets.

Storage Works:
Types of dams, design, principles of rigid gravity and earth dams, stability analysis, foundation treatment, joints and galleries, control of seepage. Spillways: Spillway types, crest gates, energy dissipation. River training: Objectives of river training, methods of river training.

ENVIRONMENTAL ENGINEERING
Water supply:
Estimation of requirement of water resources, predicting demand for, water, impurities of water and their significance, physical, chemical and bacteriological analysis, waterborne diseases, standards for portable water.

Wastewater:
water: Pumping and transportation, Water treatment: Principles of coagulation, flocculation and sedimentation; slow-, rapid-, pressure-, filters; chlorination, softening, removal of taste, odour and salinity.

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

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

Sewage characterisation:
BOD, COD, soil dissolved oxygen, nitrogen and TOC. Standards of disposal in normal water course and on land.

Sewage treatment:
Working principles, units, chambers, sedimentation tanks, trickling filters, biological ponds, activated sludge process, septic tank, disposal of sludge, regeneration of wastewater.

Solid waste:
Collection and disposal in rural and urban contexts, management of long- term ill-effects.

Environmental pollution:
Sustainable development. Radioactive wastes and disposal, Environmental impact assessment for thermal power plants, mines, river valley projects. Air pollution, Pollution control acts.

FORESTRY
PAPER-I
SECTION A
1. Silviculture-General:
General Silviculture Principles:
Ecological and physiological factors influencing vegetation, natural and artificial regeneration of forests; methods of propagation, planting, establishment and tending.

2. Silviculture-Systems:
Clear felling, uniform shelter wood selection, co operative and conversion systems. Management of silviculture systems of temperate, sub tropical, humid tropical, dry and tropical coastal forests with special reference to plantation silviculture, choice of species, establishment and management of standards, enrichment methods, technical constraints, intensified mechanized methods, aerial seeding, thinning.

3. Silviculture Mangrove and Cold desert:
Mangrove: Habitat and characteristics, mangrove, plantation establishment and rehabilitation of degraded mangrove formations; silvicultural systems for mangroves; protection of habitats against natural disasters. Cold desert Characteristics, identification and management of species.

4. Silviculture of trees:
Traditional and recent advances in tropical silvicultural research and practices. Silviculture of the most economically important tree species in India such as Acacia catechu, Acacia nilotica, Acacia auricilume, Albizia lebbeck, Albizia procera, Anogeissus latifolius, Azadirachta indica, Bamboo spp, Euphobia monops, Cassia siamea, Cassia equisetifolia, Cedrus deodara, Chukrasia tabularis, Dalbergia sissoo, Eucalyptus spp, Erichia officinalis, Eucalyptus sp, Gmelina Arborea, Hardwickia binata, Lagerstroema Lanceolata, Pinus roxburghii, Populus spp. Pinus carpinus maruapra, Prosopis juliflora, Santalum album, Samecarpus anacrdium, Shorea robusta, Salinella malabarica, Tectona grandis, Terminalis tomentosa, Tamariandus indicus. (contd...)

SECTION-B
1. Agroforestry, Social Forestry, Joint Forest Management and Tribology:
Agroforestry- Scope and necessity; role in the life of people and domestic animals and in integrated land use, planning especially related to (i) soil and water conservation; (ii) water recharge; (iii) nutrient availability to crops; (iv) natural and Siempre vegetación systems; (v) providing ecological balances through pest-predator relationships and (vi) Providing opportunities for enhancing biodiversity, medicinal and other flora and fauna. Agro forestry systems under different agro ecological zones; selection of species and role of multiple trees and NTFPs, techniques, food, fodder and fuel security. Research and Extension needs.

Social/Urban Forestry:
Objectives, scope and necessity; people’s participation.

2. Forest management:
Principles, objectives, methods and practices. Forest management.

3. Forest soils, Soil Conservation Management:
Forests Soils: Classification, factors affecting soil formation; physical, chemical and biological properties.

Forest Soil:
definition, causes for erosion; typeswind and water erosion; conservation and management of eroded soils/areas, wind breaks, shelter belts; sand dunes; reclamatation of saline and alkaline soils, water logged and other waste lands. Role of forest in soil conserving soils. Management of soil organic matter, providing loppings for green leaf manuring; forest leaf litter and composting; and role of microorganisms in ameliorating soils.

N and C cycles, VAM. (contd...)

Page No. - 23
Wildlife Protection Act 1972 and their amendments; Application of Indian Penal Code to
necessity; general principles, Indian Forest Act 1927; Forest Conservation Act, 1980;
Legislation-History of forest development; Indian Forest Policy of 1894, 1952 and 1990,
production and consumption patterns; assessment and projection of market structures;
4. Forest Economics and Legislation:
shifting cultivation and control.
regeneration, human impacts; encroachment, poaching, grazing, live fencing, theft,
control against grazing and browsing animals; effect of wild animals on forest
regeneration in absorption of CO2, Rotational and controlled grazing, different methods of
against fire, equipment and methods, controlled use of fire, economic and environmental
costs; timber salvage operations after natural disasters. Role of aflorestation and forest
regeneration in absorption of CO2; Rotation and controlled grazing, different methods of
control against grazing and browsing animals; effect of wild animals on forest
regeneration, human impacts; encroachment, poaching, grazing, live fencing, theft,
shifting cultivation and control.
4. Ecological and Legislation:
Forest economics: Fundamental principles, cost-benefit analysis; estimation of demand
and supply; analysis of trends in the national and international market and changes in
prices; common problems and their solution; prediction and projection of market trends;
role of private sector and co-operatives; role of corporate financing. Socio-economic
analysis of forest productivity and adequacy; valuation of forest goods and service.

Forest Policy, 1988 of People’s involvement, Joint Forest Management,
Involvement of women; Forest policies and issues related to land use, timber and non-
timber products, sustainable forest management, facilitation policies and
standards, development. Decentralization and Forest Public Administration.
Forest laws; generally, necessary principles, Indian Forest Act 1927, Forest Conservation Act, 1980,
Wildlife Protection Act 1972 and their amendments; Application of Indian Penal Code to
Foresty, Scope and objectives of Forest Inventory.

GEOLOGY

PAPER-I

SECTION-A

(i) General Geology:
The Solar System, meteorites, origin and interior of the earth, Radioactivity and age of
earth; Volcanic-cause and products, volcanic belts, Earthquakes-causes, effects,
earthquake belts, seismicity of India, intensity and magnitude, seismograms, island
shock, deep sea trenches antithesis and mechanics; sea-floor spreading, plate tectonics. Isostasy, orogeny and epeirogeny.
Continents and oceans.

(ii) Stratigraphy and Remote Sensing:
Basic concepts of geoclassification, Weathering and mass wasting, Landslides, slopes and drainage. Geomorphic cycles and their interpretation, Morphology and its relation to
geomorphology, Techniques of remote sensing, digital image processing, Landsat
engineering, hydrology and environmental studies. Geomorphology of Indian sub-
continent. Aerial photographs and their interpretation—memoirs and limitations. The
Magnetic Spectrum. Orbiting satellites and sensor systems. Indian Remote
Sensing Satellites. Satellite data products, Applications of remote sensing in geology.

(iii) Structural geology:
The process of geological mapping and machine recognition, strain, stress and strain ellipsoid and strain—strain relationships of elastic, Plastic and viscous materials, Strain markers in deformed rocks, Behaviour of minerals and rocks under deformation conditions. Folds and faults classification and mechanics. Structural analysis of folds, foliations, lineations, joints and faults, unconformities, Superposed deformation, Tensional relationship between crystallization and deformation. Introduction to petrofabrics.

(iv) Palaeontology:

(v) Stratigraphy and Geology of India:

(vi) Hydrogeology and Engineering Geology:

GEOLOGY

PAPER-II

SECTION-A

(i) Mineralogy:
Classification of crystals into systems and classes of symmetry. International system of
Minerals of granite, Metamorphic Petrology. General principles and classification of magma. Crystallisation of abrite-anorhite, diopsode-anorhite and diopsiidiostromite-silica systems, Reaction principle, Magmatic differentiation and assimilation. Petrogenic significance of the textures and structures of igneous rocks. Petrography and petrogenesis of granites, syenite, diorite, basic and ultrabasic rocks, charnockite, anorthosite and alkaline rocks, Carbonates. Deccan volcanic province, Types and agents of metamorphism, Metamorphic grades and zones, Phase rule. Facies of regional and contact metamorphism, AFK and ACF diagrams Textures and structures of metamorphic rocks, Metamorphism of anorhite, argillaceous and basic rocks, Minerals assemblages, Retrograde metamorphism, Metasomatism and granulitisation, migmatites, granite terranes. India.

(iii) Sedimentology:
Sedimentary rocks : Processes of formation, diagenesis and lithification. Properties of
soils. Classic and modern classification and sedimentary petrography. Principles of
environment, Sedimentary facies and provenance. Sedimentary structures and their
significance. Heavy minerals and their significance. Sedimentary basins of India.

SECTION-B

(i) General Geology:
Processes of formation, diagenesis and lithification, Textural characteristics, Petrogenic
significance of sediments and sedimentary rocks. Sandstone, carbonate rocks and their
sedimentary environments. Sedimentary facies and provenance. Sedimentary structures and their
significance. Heavy minerals and their significance. Sedimentary basins of India.

(ii) Geomorphology and Remote Sensing:

(iii) Hydrogeology and Engineering Geology:

(iv) Economic Geology:
Ore, ore minerals and gangue, tenor of ore, classification of ore deposits. Process of

(v) Mineralogy:
Mathematics

Section-A

Linear Algebra
Vector, space, linear independence and dependence, subspaces, bases, dimensions. Finite dimensional vector spaces. Matrices, Cayley-Hamilton theorem, eigen-values and eigen-vectors, symmetric, skew-symmetric, orthogonal matrices, linear transformation, row and column reduction, Echelon form, equivalence, congruences and similarity, reduction to canonical form, rank, orthogonal, symmetrical, skew symmetrical, unitary, hermitian, skew-hermitian forms- their eigen-values and -vectors. Orthogonal and unitary reduction of quadratic and hermitian forms, possible definite quadratic forms.

Calculus
Real numbers, limits, continuity, differentiability, mean-value theorems. Taylor’s theorem with remainders, indeterminate forms, maxima and minima, asymptotes. Functions of several variables: continuity, differentiability, partial derivatives, maxima and minima. Lagrange’s method of multipliers, Jacobian, Riemann’s definition of definite integral, indefinite integrals, infinite and improper integrals, beta and gamma functions. Double and triple integrals (evaluation techniques only). Areas, surface and volumes, centre of gravity.

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, hyperboloid of one and two sheets and their properties.

Section-B

Ordinary Differential Equations:
Formulation of differential equations, order and degree, equations of first order and first degree, integrating factor, equations of first order but not of first degree, Clairaut’s equation singular solution. Higher order linear equations with constant coefficients, complementary function and particular integral, general solution. Euler-Cauchy equation. Second order and linear equations with variable coefficients, determination of complete solution when one solution is known, method of variation of parameters.

Dynamics, Statics and Hydrostatics:
Degree of freedom and constraints, velocity, acceleration, simple harmonic motion, motion in a plane, projectiles, constrained motion, work and energy, conservation of energy, motion under impulsive forces, Kepler’s laws, orbits under central forces, motion of varying mass, motion under central forces. Equilibrium of a system of particles, work and potential energy, friction, common catenary, principle of virtual work, stability of equilibrium, equilibrium of forces in three dimensions. Pressure of heavy fluids, equilibrium of fluids under given system of forces, Bernoulli’s equation, structure, thrust on curved surface, equilibrium of floating bodies, stability of equilibrium, meta-centre, pressure of gases.

Vector Analysis:
Scalar and vector fields, triple products, differentiation of vector function of a scalar variable, gradient, divergence and curl in Cartesian, cylindrical and spherical coordinates and their physical interpretations. Higher order derivatives, vector identities and vector equations. Application to Geometry; Curves in space curvature and torsion. Serret-Frenet’s formulae, Gauss and Stokes’ theorems, Green’s identities.

Mathematics

Section-A

Algebra:
Groups, sub-groups, normal subgroups, homomorphism of groups, quotient groups, basic isomorphism theorem. Rings, sub-rings, polynomial rings, Cayley theory of groups, ideals, principal ideal domains, unique factorization domains and Euclidean domains. Field extensions, finite fields.

Real Analysis:
Real number system, ordered sets, bounds, ordered field, real number system as an ordered field with least upper bound property, Cauchy sequence, completeness, Compactness and uniform continuity of functions, properties of continuous functions on compact sets. Riemann integral, improper integrals, absolute and conditional convergence of series of real and complex terms, rearrangement of series. Uniform convergence, uniform boundedness, Cauchy criterion, integral test, comparison test, ratio test, root test, alternating series test. Power series, Taylor’s and McLaurin’s series, properties of power series, radius of convergence, interval of convergence, Taylor’s and McLaurin’s series expansion of functions. Differentiation of functions of several variables, change in the order of partial derivatives, implicit function theorem, maxima and minima, Multiple integrals.

Complex Analysis:
Analytic functions, 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.

Linear Algebra:
Linear programming problems, basic solution, feasible solution and optimal solution, graphical method and Simplex method of solutions, Duality. Transportation and assignment problems. Travel salesman problems.

Partial differential equations:
Curves and surfaces in three dimensions, formulation of partial differential equations, solutions of equations of type $dx\tau dy = \phi (x,y,z)$; orthogonal trajectories, Pfaffian differential equations; partial differential equation of the first order, solution by Cauchy’s method of characteristics; Charpit’s method of solutions, linear partial differential equations of the second order with constant coefficients, equation of vibrating string, Bessel equation, Laplace equation.

Numerical analysis and Computer programming:

Machine and flow charts for solving numerical analysis problems.

MECHANICAL ENGINEERING

Section-A

1. Theory of Machines
Kinematics and dynamic analysis of planar mechanisms, Cams, Gears and gear trains, Flywheels, Governors, Balancing of rigid rotors, Balancing of single and multi-cylinder engines, Linear vibration analysis of mechanical systems (single degree and two degrees of freedom), Critical speeds and whirling of shafts, Automatic Controls, Belts and chain drives, Hydrodynamic bearings.

2. Mechanics of Solids
Stress and strain in two dimensions, Principal stresses and strains, Mohr’s construction, linear elastic materials, isotropy and anisotropy, Stress-strain relations, uniaxial loading, thermal stresses, Beams; Bending moment and shear force diagrams, bending stresses and deflection of beams, Shear stress distribution. Torsion of shafts, helical springs, Combined stresses, Thick and thin walled pressure vessels. Stresses and strains. Stress energy concepts adhering to theory of failure. Rotating discs. Shrink fits.

3. Engineering Materials

4. Manufacturing Science

MECHANICAL ENGINEERING

Section-B

1. THERMODYNAMICS
Basic concept; Open and closed systems, Applications of Thermo-dynamic Laws, Gas equations, Occapen equation, Availability, Irreversibility and T-d relations.

2. I.C. Engines

3. HEAT TRANSFER, REFRACTION AND AIR CONDITIONING

4. TURBO-MACHINES AND POWER PLANTS
Continuity, momentum and Energy Equations, Adiabatic and Isentropic flow, Fanno lines, Compressible flow, Flow through turbo-machinery balde, cascades, centrifugal compressor. Dimensional analysis and modelling. Selection of size for steam, hydro nuclear and stand-by power plants, Selection base and peak load power plants, Modern boilers, Duct and air removal equipment, Fuel and cooling water systems, heat balance, station and plant heat rates, operation and maintenance of various power plants, preventive maintenance, economics of power generation.

PHYSICS

Section-A

1. Classical Mechanics (a) Particle dynamics
Centre of mass and laboratory coordinates, conservation of linear and angular momentums, The rocket equation, Rutherford scattering, Galileian transformation, inertial and non-inertial frames, rotating frames, centrifugal and Coriolis forces, Foucault pendulum.

(b) System of particles
Constraints, degrees of freedom, generalised coordinates and momenta, Lagrange’s equations. Applications to linear harmonic oscillator, simple pendulum and central force,
problems Cyclic coordinates, Hamiltonian Lagrange's equation from Hamilton's principle.
(c) Rigid body dynamics
Eulerian angles, angular velocity, principal moments of inertia, Euler's equation of motion of a rigid body, force-free motion of a rigid body, Gyroscope.

2. Special Relativity, Waves & Geometrical Optics
(a) Special Relativity
Michelson-Morley experiment and its implications, Lorentz transformations-length contraction, time dilation, addition of velocities, aberration and Doppler effect, mass energy relation: to a degree using Minkowski's diagram, four dimensional momentum vector. Covariance of equations of physics.
(b) Waves
Simple harmonic motion, damped oscillation forced oscillation and resonance. Beats, stationary waves in a string, Pulses and wave packets. Phase and group velocities. Reflection and Refraction from Huygen's principle.

(c) Geometrical Optics

3. Physical Optics
(a) Interference
Interference of light-Yong's experiment, Newton's rings, Interference by thin films, Michelson Interferometer beam interference and Fabry-Perot interferometer. Holography and simple applications.
(b) Diffraction
Fraunhofer diffraction-single slit, double slit, diffraction grating, resolving power. Fresnel diffraction- half-period zones and zones plates. Fresnel integrals. Application of Cornu's spiral to the analysis of diffraction at a straight edge and by a long narrow slit. Diffraction by a circular aperture and the Airy pattern.
(c) Polarisation and Modern Optics

SECTION-B

4. Electricity and Magnetism
(a) Electrostatics and Magnetostatics
(b) Current Electricity

5. ElectromagneticTheory & Black Body Radiation
(a) Electromagnetic Theory
(b) Blackbody radiation
Blackbody radiation and Planck radiation law-Stefan-Boltzmann law, Wien displacement law and Rayleigh-Jeans law, Planck mass, Planck length, Planck time, Planck temperature and Planck scale.

6. Thermal and Statistical Physics
(a) Thermodynamics
(b) Statistical Physics
Saha ionization formula, Bose-Einstein condensation. Thermodynamic behaviour of an ideal Fermi gas, Chandrasekhar limit, elementary ideas about neutron stars and pulsars, Brownian motion as a random walk, diffusion process, Concept of negative temperatures.

PHYSICS

PAPER-II

1. Quantum Mechanics
(a) Introduction to Quantum Theory
Wave-particle duality, Schroedinger equation and expectation values. Uncertainty principle, Solutions of the one-dimensional Schroedinger equation free particle (Gaussian wave-packet), particle in a box, particle in a finite well, linear, harmonic oscillator, reflection and transmission by a potential step and by a rectangular barrier, use of WKB formula for the lifetime calculation in the alpha-decay problem.

(b) Quantum Mechanics II & Atomic Physics
(a) Quantum Mechanics

(b) Atomic Physics

3. Molecular Physics

SECTION-B

4. Nuclear Physics
Basic nuclear properties-size, binding energy, angular momentum, parity, magnetic moment, Semi-empirical mass formula and applications, Mass paraboloid, Group state degeneracy, magnetic moment and non-central forces, Meson theory of nuclear forces, Salient features of nuclear forces, Shell model of the nucleus-success and limitations, Violation of parity in beta decay, Gamma decay and internal conversion, Elementary ideas about the mass spectrometer, Nuclear decay, Nuclear reactions, Nuclear fission and fusion, energy production in stars, Nuclear reactors.

5. Particle Physics & Solid State Physics:
(a) Particle Physics
Classification of elementary particles and their interactions, Conservation laws, Quark structure of hadrons, Field quanta of electro-weak and strong Interactions, Elementy ideas about Unification of Forces, Physics of neutrinos.
(b) Solid State Physics
Cubic crystal structure, Band theory of solids-conductors, insulators and semiconductors, Elements of superconductivity, Meson effect, Josephson junctions and applications, Elementary ideas about high temperature superconductivity.

6. Electronics

STATISTICS

PAPER-I

Probability
Sample space and events, probability measure and probability space, random variable as a measurable function, distribution function of a random variable, discrete and continuous-type random variable, probability mass function, probability density function, vector-valued random variable, marginal and conditional distributions, stochastic independence of events and of random variables, expectation and moments of a random variable, conditional expectation, convergence of a sequence of random variable in distribution, in probability, in p-th mean and almost everywhere, their criteria and inter-relations, Borel-Cantelli lemmas, convergence of series of independent random variables, convergence in distribution, in probability and almost surely, convergence in mean, large numbers and Kolmogorov's theorems, Glivenko-Cantelli theorem, probability generating function, characteristic function, inversion theorem, Laplace transform, related univariate and continuity theorems, determination of distribution by its moments. Lindberg and Levy forms of central limit theorem, standard discrete and continuous probability distributions, their Inter-relations and limiting cases, simple properties of finite Markov-chains.

Statistical Inference

Non-randomised and randomised tests, critical function, NP tests, Neyman-Pearson lemma, UMP tests, monotone likelihood ratio, generalised Neyman Pearson lemma, similar and unbiased tests, UNPU tests for single and several-parameter families of distributions, likelihood ratio and its large sample properties, chi-square goodness of fit test and its asymptotic distribution.

Confidence bounds and its relation with tests, uniformly most accurate (UMA) and UMA unbiased confidence bounds, Kolmogorov's test for goodness of fit and its consistency, sign test and its optimality, Wilcoxon signed-ranks test and its consistency, Kolmogorov-Smirnov two-sample test, run test, Wilcoxon-Mann Whitney test median test, their consistency and asymptotic normality.

Wald's SPRT and its properties, OC and ASN functions, Wald's fundamental identity, SPRT and its estimation.

Linear Inference and Multivariate Analysis Linear statistical models, theory of least squares and analysis of variance, Gauss-Markoff theory, normal equations, least squares criterion and their applications, test statistic and significance level, Student's t-statistic and F-statistic, Elementary ideas about the multivariate normal distribution, Wishart's distribution and its role in multivariate analysis, properties and characteristics of the Wishart distribution, likelihood and its role in multivariate analysis, Mahalanobis' D2 and hotelling's T2 statistics and their applications and properties, discriminant analysis, canonical correlations, one-way MANOVA, principal component analysis, elements of factor analysis.

Sampling Theory and Design of Experiments An outline of fixed-population and super-population approaches, distinctive features of finite population sampling, probability sampling designs, simple random sampling with and without replacement, random sampling, systematic sampling and its efficacy for structural populations, cluster sampling, two-stage and multi-stage sampling ratio and regression, methods of estimation involving one or more auxiliary variables, two-phase sampling, probability proportional to size sampling with and without replacement, the Hansen-Hurwitz-Wright estimator. Non-negative variance estimation with reference to the Horvitz Thompson estimators, non-sampling errors, Warner's randomised response technique for reducing non-sampling errors.

Fixed effects model (two-way classification) random and mixed effects models (two-way classification with equal number of observation per cell), CRD, RBD, LSD and their applications, concept of block design, concept of confounding and orthogonality and balance, BIB, missing plot technique, factorial designs: 2, 3 and 3, confounding in factorial experiments, split-plot and simple lattice designs.

STATISTICS

PAPER-II

I. Industrial Statistics

(b) Reliability
Concepts of reliability, maintainability and availability, reliability of series and parallel systems, reliability of components, random sampling, systematic sampling and its efficacy for structural populations, cluster sampling, two-stage and multi-stage sampling ratio and regression, methods of estimation involving one or more auxiliary variables, two-phase sampling, probability proportional to size sampling with and without replacement, the Hansen-Hurwitz-Wright estimator. Non-negative variance estimation with reference to the Horvitz Thompson estimators, non-sampling errors, Warner's randomised response technique for reducing non-sampling errors.

Fixed effects model (two-way classification) random and mixed effects models (two-way classification with equal number of observation per cell), CRD, RBD, LSD and their applications, concept of block design, concept of confounding and orthogonality and balance, BIB, missing plot technique, factorial designs: 2, 3 and 3, confounding in factorial experiments, split-plot and simple lattice designs.

CONTD...
I. Ecology:
(a) Biosphere: Biogeochemical cycles, green-houses effect, ozone layer and its impact, ecological succession, biomes and ecosystems.
(b) Population, characteristics, population dynamics, population stabilization.
(c) Conservation of natural resources mineral mining, fisheries, aquatic culture, forestry, grassland, wildlife (Project Tiger); sustainable production in agriculture-integrated pest management.
(d) Environmental biodegradation; pollution and its impact on biosphere and its prevention.

II. Ethology:
(a) Behaviour: Sensory filtering, responsiveness, sign stimuli, learning, instinct, habituation, conditioning, imprinting.
(b) Role of hormones in drive; role of pheromones in alarm spreading; crypsis, predator detection, predator tactics, social behaviour in insects and primates, courtship (Drosophila, 3-spine stickleback and birds).
(c) Orientation, navigation, homing: biological rhythms; biological clock, tidal, seasonal and circadian rhythms.
(d) Methods of studying animal behaviour.

III. Economic Zoology:
(a) Agriculture, sericulture, lac, culture, carp culture, pearl culture, prawn culture.
(b) Major infectious and communicable diseases (smallpox, plague, malaria, tuberculosis, cholera and AIDS); vectors, pathogens, and prevention.
(c) Cattle and livestock diseases, their pathogens (he lmimts) and vectors (l icks, mice, Babes, Stomoxys).
(d) Pests of sugar cane (Py rilla perpussica), oil seed (A chaea Janata) and rice (S ilophus oryzae).

IV. Biostatistics:
(a) Designing of experiments; null hypothesis; correlation, regression, distribution and measure of central tendency, chi square, student-t test, F-test (one-way & two-way F-test).
(b) Instrumental methods:
(i) Spectrophotometry, flame photometry, Geiger-Muller counter, scintillation counting.
(ii) Electron microscopy (TEM, SEM).

ZOOLOGY
PAPER-II
Section-A

I. Cell Biology:
(a) Structure and function of cell an its organelles (nucleus, plasma membrane, mitochondria, Golgi bodies, endoplasmic reticulum ribosomes and lysosomes), cell division (mitosis and meiosis), mitotic spindle and mitotic apparatus, chromosome movements.
(b) Watson-Crick model of DNA; replication of DNA, protein synthesis, transcription and translation factors.

II. Genetics
(a) Gene structure and functions; genetic code.
(b) Sex chromosomes and Sex determination in Drosophila, nematodes and man.
(c) Mendel's laws of inheritance, recombination, linkage, linkage-maps, multiple alleles, cis-trans concept; genetics of blood groups.
(d) Mutations and mutagenesis; radiation and chemical.
(e) Cloning technology, plasmids and cosmids as vectors, transgenics, transgens, DNA sequence cloning and whole animal cloning (Principles and methodology).
(f) Regulation and gene expression in pro-and eu- karyotes.
(g) Signal transduction; pedigree analysis; congenital diseases in man.
(h) Human genome mapping; DNA fingerprinting.

II. Evolution
(a) Origin of life.
(b) Natural selection, role of mutation in evolution, mimiry, variation, isolation, speciation.
(c) Fossils and fossilization; evolution of horse, elephant and man.
(d) Hardy-Weinberg law; causes of change in gene frequency.
(e) Continental drift and distribution of animals.

IV. Systematics
(a) Zoological nomenclature; international code; cladistics.

Biochemistry
(a) Structure and role of carbohydrates, fats, lipids, proteins, aminocids, nucleic acids; saturated and unsaturated fatty acids, cholesterol.
(b) Glycolysis and Krebs cycle, oxidation and reduction, oxidative phosphorylation; energy conservation and release, ATP, cyclic AMP- its structure and role.
(c) Hormone classification (steroid and peptide hormones), biosynthesis and function.
(d) Enzymes, and mechanisms of action; immunogl obulin and immunity; vitamins and co-enzymes.
(e) Bioenergetics.

II. Physiology (with special reference to mammals)
(a) Composition and constituents of blood; blood groups and Rh factor in man; coagulation, factors and mechanism of coagulation; acid-base balance, thermo regulation.
(b) Oxygen and carbon dioxide transport; haemoglobin; constituents and role in regulation.
(c) Nutritive requirements; role of salivary glands, liver, pancreas and intestinal glands in digestion and absorption.
(d) Excretory products; nephron and regulation of urine formation; osmoregulation.
(e) Types of muscles, mechanism of contraction of skeletal muscles.
(f) Neuron, nerve impulse- its conduction and synaptic transmission; neurotransmitters.
(g) Vision, hearing and olfaction in man.
(h) Mechanism of hormone action.
(i) Physiology of reproduction, role of hormones and pheromones.

II. Developmental Biology
(a) Differentiation from gamete to neurula stage; dedifferentiation; metamplasia, induction, morphogenesis and morphogen; fate maps of gastrulation in frog and chick; organogenesis of eye and heart, placentaion in mammals.
(b) Role of cytoplasm in and genetic control of development; cell lineage; causation of morphogenesis in frog and insects; paedogenesis and neotyry; degrowth and cell death; ageing, biotransgenesis; regeneration; teratogenesis; neoplasia.
(c) Invasiveness of placenta; in vitro fertilization; embryo transfer, cloning.
(d) Baer's law, evo-devo concept.

Animal Husbandry and Vet. Science
Paper-I
Section-A

Livestock industry - its scope and potential
Human population in relation to wild life.
Significance of wild life.
Animal Genetics and Breeding
Animal Genetics: Mendelian inheritance, Expression of genes, linkage and crossing over.
Section-B

Animal diseases:
- Infection and immunity: Principles and method of immunization of animals against specific diseases.
- Herd immunity: disease free zone. zero disease concept.
- Parvo disease, Rabies in pets in relation to human health.


Materials and methods for collection and samples for veterolegical investigation.

Extenstion- Principles of extension, different methods adopted to educate the farmers under rural conditions.

Generation of technology- Its transfer and feed back. Problems and constrains in transfer of technology. Animal husbandry programmes for rural development.

Animal Husbandry and Vet. Science

Paper-II

Part-A

A - Animal Nutrition:

B - Animal Physiology:
- Physiological mechanisms and livestock product. Growth rate & animals production. Nervous and hormonal controlling mechanism. Physiology of Reproduction. Lactation and egg laying. Physiology of digestive system of various classes of animals including wild animals. Semen evaluation, preservation & artificial insemination in various classes of animals.

Section-B

A-Livestock production & Management:
- General care and management of livestock - Cattle, buffalo, Goats, Sheep and Poultry. General care and management of wild animals. Feeding and management of livestock and wild animals under drought. Flood and other natural disaster.
- Classification, grading and marketing of livestock and their products.
- Milk and milk products-
  - Milk-Collection, transportation of raw milk, quality testing and grading of raw milk, milk pasteurization, standardization, & Homogenization. Reconstituted and recombined milk.
  - Milk Product technology- Production, Processing, storage, distribution and marketing of milk products such as butter, Ghee, Khoya, Chhena, Cheese, condensed and dried milk, ice-cream, yoghurt, Dahi and Shrikhand and their testing and grading. Bill specification, legal standards, quality control and nutritive properties of various milk products.
- Milk by product technology- whey products, butter milk, Lactose, and casein.

Horticulture "Fruit and Plantation Crops"

Paper-i

Section 'A'


Section 'B'


Horticulture "Vegetables and Ornamental crops"

Paper-ii

Section 'A'


Section 'B'


Environmental Science

Paper First

Part-A
- Basics of Environmental Science, Definition meaning and Scope. Importance of the study of Environmental Science. Environmental Segments: Geosphere, lithosphere, Hydrosphere, atmosphere and biosphere- their spread, composition and interaction.
- Environmental and ecological principles: Ecological terminology and definitions, level of organization, habitat and niche, individual, species, population. Community, biome and ecosystem organization.
- Ecological Succession: Hydrarch and xerarch, concept of climax and seral communities.
- Concept of ecosystem: biotic and abiotic components, structural and functional attributes of ecosystem, productivity, energy flow, food chain, food web and ecological pyramids, terrestrial and aquatic ecosystems. Biogeochemical cycles of C, N and P and hydrological cycle.

Part-B

- Natural resources:- water- its sources, surface and ground water, global distribution and uses of water, water crisis and conservational strategies.
- Soil and land, Resources of India and its uses, conservational strategies and integrated use and planning.
- Minerals and matters- their uses and mining operations.
- Forest resources of India, forest cover, community and social forestry, afforestation programmes, forest conservation Act and national forest conservation strategy.
- Wildlife sanctuaries and national parks in India, Wildlife conservation Act, concept of biosphere reserves.
- Renewable and non renewable sources of energy and its optimization.

Environmental Science

Paper- Second

Part-A
- Environmental disruptions, soil erosion, deforestation, drought, flood, fire and desertification- processes, causal factors and their mitigative measures.
- Environmental pollution: Air pollution-sources, effects on plants, animal, man and monuments and their Control measures. Air quality standards.
- Water pollution, types and major sources of water pollutants, effects of water pollutants on physico-chemical and biological properties of water bodies, process and control of eutrophication, water born diseases with special reference to water pollution.
- Types and major sources of soil pollutants, effects of soil pollutants on fertility and biological properties of soil.
- Major sources of noise pollution, effects of noise on human health.
- Anthropogenic and other biotic activities grazing, burning and mining etc. and their impact on environment and agriculture, effect of industrialization on environment.
- Introduction to global environmental problems viz: acid rain, ozone depletion, global house gases, Global warming and climatic changes.
- Solid waste disposal and its effects on surrounding environment and management, waste management in domestic, industrial and urban areas, energy generation from wastes.

Part-B
- Introduction and scope of environmental management, environmental ethics and drama of ecology.
- Basic concepts of sustainable development, industrial ecology and recycling industry.
- National and international Environmental conservation strategies and organizations.
- Population and Environment, concept of carrying capacity and population regulation.
- Natural Disasters: causes and effects of cyclone, tornadoes, earthquake, avalanche, land slides and volcanoes, disaster warning, mitigation, preparedness and management.
- Environmental education and awareness, concept and practice of restoration ecology.
- Current Environmental issues and priorities in India for environmental management.

Secretary