SECTION I
PLAN OF EXAMINATION

1. The competitive examination comprises two successive stages:
   (i) Civil Services (Preliminary) Examination (Objective Type) for the selection of candidates for Main Examination; and
   (ii) Civil Services (Main) Examination (Written and Interview) for the selection of candidates for the Meghalaya Civil Service.
2. The Main Examination will consist of written examination and an interview test. The written examination will consist of 8 papers of conventional essay type in the subjects set out in sub-section (B) of Section II out of which one paper will be of qualifying in nature. Marks obtained in Interview for Personality Test will be counted for ranking.
3. Marks thus obtained by the candidates in the Main Examination (written part as well as interview) would determine their final ranking.

SECTION II

Scheme and subjects for the Preliminary and Main Examination.

A. PRELIMINARY EXAMINATION:
   The Examination shall comprise of two compulsory Papers of 200 marks each.
   Note:
   (i) Both the question papers will be of the objective type (multiple choice questions)
   (ii) The General Studies Paper-II of the Civil Services (Preliminary) Examination will be a qualifying paper
   (iii) Details of the syllabi are indicated in Part A of Section III.

B. MAIN EXAMINATION:
   The written examination will consist of the following papers:-

QUALIFYING PAPER

Paper – English – 300 Marks

PAPERS TO BE COUNTED FOR MERIT

Paper I – Essay – 250 Marks

Paper II – General Studies – I (Indian Heritage and Culture, History and Geography of the World and Society) – 250 Marks

Paper III – General Studies – II (Governance, Constitution, Polity, Social Justice and International Relations) – 250 Marks


Paper V – General Studies – IV (Ethics, Integrity and Aptitude) – 250 Marks

Paper VI One Optional Subject from the list of Optional Subjects of Main Examination (250 Marks each paper) – 500 Marks

Sub Total (Written Test) – 1750 Marks

Personality Test – 275 Marks

Grand Total – 2025 Marks

Candidates may choose any one of the optional subjects from amongst the list of subjects.

Note:
(i) The paper on English (Paper A) will be of Matriculation or equivalent standard and will be of qualifying nature only. The marks obtained in this paper will not be counted for ranking.

(ii) Marks obtained by the candidates for the Paper I-VII only will be counted for merit ranking.
2. LIST OF OPTIONAL SUBJECTS FOR MAINS EXAMINATION

1. Agriculture
2. Animal Husbandry and Veterinary Science
3. Anthropology
4. Botany
5. Chemistry
6. Civil Engineering
7. Commerce & Accountancy
8. Economics
9. Education
10. Electrical Engineering
11. English
12. Garo
13. Geography
14. Geology
15. Hindi
16. History
17. Khasi
18. Law
19. Management
20. Mathematics
21. Mechanical Engineering
22. Medical Science
23. Philosophy
24. Physics
25. Political Science and International Relations
26. Psychology
27. Public Administration
28. Sociology
29. Statistics

Note:
(i) The question papers for the examination will be of conventional (essay) type.
(ii) Each paper will be of three hours duration.
(iii) The details of the syllabi are in part B of section III.

C. INTERVIEW TEST

The candidate will be interviewed by the Commission who will have before them a record of his career. He will be asked questions on matters of general interest. The object of the interview is to assess the personal suitability of the candidate for a career in public service by the Commission. The test is intended to judge the mental caliber of a candidate. In broad terms this is really an assessment of not only his intellectual qualities but also social traits and his interest in current affairs. Some of the qualities to be judged are mental alertness, critical powers of assimilation, clear and logical exposition, balance of judgment, variety and depth of interest, ability for social cohesion and leadership, intellectual and moral integrity.

2. The technique of the interview is not that of a strict cross-examination but of a natural, though directed and purposive conversation which is intended to reveal the mental qualities of the candidate.

3. The interview test is not intended to be a test either of the specialized or general knowledge of the candidates which has been already tested through their written papers. Candidates are expected to have taken an intelligent interest not only in their special subjects of academic study but also in the events which are happening around them both within and outside their own State or Country as well as in modern currents of thought and in view discoveries which should rouse the curiosity of well educated youth.
SECTION III
SYLLABI FOR THE EXAMINATION

Part A- Preliminary Examination

Paper I – (200 marks) Duration: Two hours

- Current events of national and international importance
- History of India and Indian National Movement.
- Indian and World Geography - Physical, Social, Economic Geography of India and the World
- Indian Polity and Governance - Constitution, Political System, Panchayati Raj, Public Policy, Rights Issues, etc
- Economic and Social Development - Sustainable Development, Poverty, Inclusion, Demographics, Social Sector initiatives, etc.
- General issues on Environmental Ecology, Bio-diversity and Climate Change
- General Science.

Paper II – (200 marks) Duration: Two hours

- Comprehension
- Interpersonal skills including communication skills;
- Logical reasoning and analytical ability
- Decision-making and problem solving
- General mental ability
- Basic numeracy (numbers and their relations, orders of magnitude, etc.) (Class X level), Data interpretation (charts, graphs, tables, data sufficiency etc. - Class X level)

Note I: Paper –II of the Civil Services (Preliminary) Examinations will be a qualifying with minimum qualifying marks.

Note II: The questions will be of multiple choice objective type.

Note III: It is mandatory for the candidate to appear in both the papers of Civil Services (Prelim) examination for the purpose of evaluation. Therefore a candidate will be disqualified in case he/ she does not appear in both the papers of the Preliminary Examination.
Part B- Main Examination

The main Examination is intended to assess the overall intellectual traits and depth of understanding of candidates rather than merely the range of their information and memory.

The nature and standard of questions in the General Studies papers (Paper II to Paper V) will be such that a person will be able to answer them without any specialized study. The questions will be such as to test a candidate’s general awareness of a variety of subjects, which will have relevance for a career in Civil Services. The questions are likely to test the candidate’s basic understanding of all relevant issues, and ability to analyze, and take a view on conflicting socio-economic goals, objectives and demands. The candidates must give relevant, meaningful and succinct answers.

The scope of the syllabus for optional subject papers (Paper VI and Paper VII) for the examination is broadly of the honours degree level i.e. a level higher than the Bachelors’ Degree and lower than the Masters’ Degree. In the case of Engineering, Medical Science and law, the level corresponds to the bachelors’ degree.

Syllabi of the papers included in the scheme of Civil Services (Main) Examination are given as follows:-

**QUALIFYING PAPER**

Paper A – English – 300 Marks

The aim of the paper is to test the candidates’ ability to read and understand serious discursive prose, and to express his ideas clearly and correctly in English.

The pattern of questions would be broadly as follows

(i) Comprehension of given passages
(ii) Precis Writing
(iii) Usage and Vocabulary
(iv) Short Essays

Note 1: The paper on English will be of Matriculation or equivalent standard and will be of qualifying nature only. **The marks obtained in this paper will not be counted for ranking.**

**PAPERS TO BE COUNTED FOR MERIT**

Paper I – Essay – 250 Marks

Essay: Candidates may be required to write essays on multiple topics. They will be expected to keep closely to the subject of the essay to arrange their ideas in orderly fashion, and to write concisely. Credit will be given for effective and exact expression.

Paper II – General Studies – I (Indian Heritage and Culture, History and Geography of the World and Society ) – 250 Marks

- Modern Indian history from about the middle of the eighteenth century until the present- significant events personalities, issues
- The Freedom Struggle its various stages and important contributors/contributions from different parts of the country
- Post-independence consolidation and reorganization within the country
- History of the world will include industrial revolution, world wars, colonization, decolonization political philosophies like communism, capitalism socialism etc
- Salient features of Indian Society, Diversity of India
- Role of women and women's organization, population and associated issues, poverty and developmental urbanization, their problems and their remedies. Effects of globalization on Indian society.
- Social empowerment, communalism, regionalism & secularism.
- Salient features of world's physical geography.
- Important Geophysical phenomena such as earthquakes, Tsunami, Volcanic activity, cyclone etc geographical features and their location-changes in critical geographical features (including water-bodies and ice-caps) and in flora and fauna and the effects of such changes.
Paper III – General Studies – II (Governance, Constitution. Polity, Social Justice and International Relations) – 250 Marks

- Indian Constitution-historical underpinnings evolution, features, amendments, significant provisions and basic structure
- Functions 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 therein
- Separation of powers between various organs dispute redressal mechanisms and institutions
- Parliament and State legislatures Structure functioning, conduct of business, powers & privileges and issues arising out of these.
- Structure, organization and functioning of the Executive and the Judiciary Ministries and Departments of the Government; pressure groups and formal/informal associations and their role in the Polity
- Salient features of the Representation of People's Act
- Appointment to various Constitutional posts, powers functions and responsibilities of various Constitutional Bodies
- Statutory, regulatory and various quasi-judicial bodies
- Welfare schemes 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 relating to development and management of Social Sector/Services relating to Health, Education Human Resources.
- Issues relating to poverty and hunger Important aspects of governance, transparency and accountability, e-governance- applications, models successes, limitations, and potential; citizens charters transparency & accountability and institutional and other measures.
- Role of civil services in a democracy.
- India and its neighborhood- relations.
- Bilateral, regional and global groupings and agreements involving India and/or affecting India's interests


- Indian Economy and issues relating to planning mobilization, of resources, growth, development and employment.
- Inclusive growth and issues arising from it
- Government Budgeting
- Major crops-cropping patterns in various parts of the country, different types of irrigation and irrigation systems storage, transport and marketing of agricultural produce and issues and related constraints technology in the aid of farmers.
- Issues related to direct and indirect farm subsidies and minimum support prices; Public Distribution System objectives, functioning limitations, revamping issues of buffer stocks and food security; Technology missions; economics of animal-rearing.
- Food processing and related industries in India- scope and significance location, upstream and downstream requirements, supply chain management.
- Land reforms in India
- Effects of liberalization on the economy, changes in industrial policy and their effects on industrial growth.
- Infrastructure: Energy, Ports, Roads, Airports, Railways etc
- Science and Technology- developments and their applications and effects in everyday life.
- Awareness in the fields of IT, Space, Computers, robotics, nano-technology, biotechnology and issues relating to intellectual property rights
- Conservation, environmental pollution and degradation environmental impact assessment.
- Disaster and disaster management Linkages between development and spread of extremism.
• Challenges to internal security through communication networks, role of media and social networking sites in internal security challenges, basics of cyber security; money-laundering and its prevention.
• Security challenges and their management in border areas linkages of organized crime with terrorism.
• Various Security forces and agencies and their mandate.

Paper V – General Studies – IV (Ethics, Integrity and Aptitude) – 250 Marks

This paper will include questions to test the candidates attitude and approach to issues relating to integrity, probity in public life and his problem solving approach to various issues and conflicts faced by him in dealing with society. Questions may utilise the case study approach to determine these aspects. The following broad areas will be covered:

• Ethics and Human Interface: Essence, determinants and consequences of Ethics in-human actions; dimensions of ethics; ethics in private and public relationships Human Values lessons from the lives 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 service, empathy, tolerance and compassion towards the weaker-sections
• Public/Civil service values and Ethics in Public administration: Status and problems; laws, rules, regulations and conscience as sources of ethical guidance; accountability and ethical governance; strengthening of ethical and 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 Ethics, Codes Conduct, Citizen's Charters, Work culture, Quality of service delivery, Utilization of public funds, challenges of corruption.
• Case Studies on above issues.
PAPER VI & PAPER VII
Optional Subject Papers I and II
Candidate may choose any optional subject from amongst the List of Optional Subjects given in Para 2

Agriculture - Optional
of Part B - Main Examination of Civil Services Exam

Paper-I


2. Cropping pattern in different agro-climatic zones of the country. Impact of high-yielding and short-duration varieties on shifts in cropping pattern. Concepts of multiple cropping, multistorey, relay and inter-cropping, and their importance in relation to food production. Package of practices for production of important cereals, pulses, oil seeds, fibres, sugar, commercial and fodder crops grown during Kharif and Rabi seasons in different regions of the country.

Important features, scope and propagation of various types of forestry plantations such as extension, social forestry, agro-forestry, and natural forests.

Weeds, their characteristics, dissemination and association with various crops; their multiplication; cultural, biological and chemical control of weeds.


Soil conservation planning on watershed basis. Erosion and run-off management in hilly, foot hills, and valley lands; processes and factors affecting them. Dryland agriculture and its problems. Technology of stabilising agriculture production in rainfed agriculture area.


5. Farm management, scope, important and characteristics, farm planning. Optimum resources use and budgeting. Economics of different types of farming systems.


7. Agricultural extension, its importance and role, methods of evaluation of extension programmes, socio-economic survey and status of big, small, and marginal farmers and landless agricultural labourers; farm inchanization and its role in agricultural productional and rural employment. Training programmes for extension workers; lab-to-land programmes. Role of Krishi Vigyan Kendra’s (KVK) in dissemination of Agricultural Technology. Non-Government Organisation(NGO) and self help group for rural development.


3. Seed production and processing technologies. Seeds certification Seed testing and storage DNA finger printing and seed registration, Role of public and private sectors in seed production and marketing, Intellectual Property Rights (IPR) issues, WTO issues and its impact on Agriculture.


5. Enzymes and plant pigments; photosynthesis-modern concepts and factors affecting the process, aerobic and an aerobic respiration; C3, C4 and CAM mechanisms. Carbohydrate, protein and fat metabolism.

6. Growth and development, photoperiodism and vernalization Auxins, hormones, and other plant regulators and their mechanism of action and importance in agriculture. Physiology of seed development and germination; dormancy.

7. Climatic requirements and cultivation of major fruits, plants, vegetable crops and flower plants; the package of practices and their scientific basis. Handling and marketing problems of fruit and vegetables. Principal methods of preservation of important fruits and vegetable products, processing techniques and equipment. Role of fruits and vegetables in human nutrition. Raising of ornamental plants, and design and layout of lawns and gardens.


1.2. Minerals in animal diet: Sources, functions, requirements and their relationship of the basic minerals nutrients including trace elements.

1.3. Vitamins, Hormones and Growth Stimulating, substances: Sources, functions, requirements and inter-relationship with minerals.

1.4 Feed additives - Methane inhibitors, probiotics, enzymes, antibiotics, hormones, oligosaccharides, antioxidants, emulsifiers, mould inhibitors, buffers etc. Use and abuse of growth promoters like hormones and antibiotics – latest concepts.

1.5 Conservation of fodders. Storage of feeds and feed ingredients. Recent advances in feed technology and feed processing. Anti-nutritional and toxic factors present in livestock feeds. Feed analysis and quality control. Digestibility trials – direct, indirect and indicator methods. Predicting feed intake in grazing animals.


1.7 Advances in ruminant nutrition, poultry-nutrients and their metabolism with reference to poultry, meat and egg production, Nutrients requirements and feed formulation and broilers at different ages.

1.8 Advances in Non-Ruminant Nutrition-Swine-Nutrients and their metabolism with special reference to growth and quality of meat production, Nutrient requirement and feed formulation for baby-growers and finish pigs.


2. Animal Physiology


2.2 Milk Production and Reproduction and Digestion: Current stains of hormonal control of mammary development, milk secretion and milk ejection. Male and Female reproduction organ, their components and function. Digestive organs and their functions.

2.3 Environmental Physiology: Physiological relations and., their regulation; mechanisms of adaption, environmental factors and regulatory mechanism involved in animal behaviour, methods of controlling climatic stress.

2.4 Semen quality: Preservation and Artificial Insemination-Components of semen, composition of spermatozoe, chemical and physical properties of ejaculated semen, factors affecting semen in vivo and in vitro. Factors affecting semen production and
quality preservation, composition of diluents, sperm concentration, transport of diluted semen. Deep Freezing techniques in cows, sheep and goats, swine and poultry.

Detection of oestrus and time of insemination for better conception.

3. Livestock Production and Management: 3.1 Commercial Dairy Farming-Comparison of dairy farming in India with advanced countries. Dairying under fixed farming and as a specialised farming, economic dairy farming, Starting of a dairy farm. Capital and land requirement, organisation of the dairy farm.

Procurement of goods; opportunities in dairy farming, factors determining the efficiency of dairy animal, Herd recording, budgeting, cost of milk production; pricing policy; Personnel Management. Developing Practical and Economic ration for dairy cattle; supply of greens throughout the year, field and fodder requirements of Dairy Farm, Feeding regimes for day and young stock and bulls, heifers and breeding animals, new trends in feeding young and adult stock; Feeding records.


3.3. Feeding and management of animals under drought, flood and other natural calamities.

4. Genetics and Animal Breeding: Mitosis and Meiosis; Mendelian inheritance; deviations to Mendelian genetics; Expression of genes; Linkage and crossing over; Sex determination, sex influenced and sex limited characters; Blood groups and polymorphism; Chromosome aberrations; Gene and its structure; DNA as a genetic material; Genetic code and protein synthesis; Recombinant DNA technology, Mutations, types of mutations, methods for detecting mutations and mutation rate.

4.1 Population Genetics applied to Animal Breeding: Quantitative Vs. qualitative traits; Hardy Weinberg Law; Population Vs. individual; Gene and genotypic frequency; Forces changing gene frequency; Random drift and small populations; Theory pf path coefficient; Inbreeding, methods of estimating inbreeding coefficient, systems of inbreeding; Effective population size; Breeding value, carnation of breeding value, dominance and epistatic deviation; partitioning of variation; Genotype X environment correlation and genotype X environment interaction; Role of multiple measurements; Resemblance between relatives.

4.2 Breeding Systems: Heritability, repeatability and genetic and phenotypic correlations, their methods of estimation and precision of estimates; Aids to selection and their relative merits; Individual, pedigree, family and within family selection; Progeny testing; Methods of selection; Construction of selection indices and their uses; Comparative evaluation of genetic gains through various selection methods; Indirect selection and Correlated response; Inbreeding, upgrading, cross-breeding and synthesis of breeds; Crossing of inbred lines for commercial production; Selection for general and specific combining ability; Breeding for threshold character.

Paper-II

1 Health and Hygiene


1.3 **Bovine Anatomy-Regional Anatomy**: Paranasal sinuses of OX-surface anatomy of salivary glands. Regional anatomy of infraorbital, maxillary, mandibuloalveolar, mental & coronal nerve block-Regional anatomy of paravertebral nerves, pudential nerve, median, ulnar & radial nervestibial, fibular and digital nerves-Cranial nerves-structures involved in epidural anaesthesia-superficial lymph nodes-surface anatomy of visceral organs of thoracic, abdominal and pelvic cavities-comparative features of locomotor apparatus & their application in the biomechanics of mammalian body.

1.4 **Anatomy of Fowls**: Musculo-skeletal system-functional anatomy in relation to respiration and flying, digestion and egg production.

1.5 Physiology of blood and its circulation, respiration; excretion, Endocrine glands in health and disease.

1.5.1 **Blood constituents**: Properties and functions-blood cell formation-Haemoglobin synthesis and chemistry-plasma proteins production, classification and properties; coagulation of blood; Haemorrhagic disorders-anticoagulants-blood groups-Blood volume-Plasma expanders-Buffer systems in blood. Biochemical tests and their significance in disease diagnosis.

1.5.2. **Circulation**: Physiology of heart, cardiac cycle-heart sounds, heart beat, electrocardiograms, Work and efficiency of heart-effect of ions on heart function-metabolism of cardiac muscle, nervous and chemical regulation of heart, effect of temperature and stress on heart, blood pressure and hypertension, Osmotic regulation, arterial pulse, vasomotor regulation of circulation, shock, Coronary & pulmonary circulation, Blood-Brain barrier-Cerebrospinal fluid-circulation in birds.

1.5.3. **Respiration**: Mechanism of respiration, Transport and exchange of gases-neural control of respiration-chemo-receptors-hypoxia-respiration in birds.


1.5.5. **Endocrine glands**: Functional disorders, their symptoms and diagnosis. Synthesis of hormones, mechanism and control of secretion-hormonal receptors-classification and function.

1.6. **General knowledge of pharmacology and therapeutics of drugs**: Cellular level of pharmacodynamics and pharmacokinetics-Drugs acting on fluids and electrolyte balance-drugs acting on Autonomic nervous system-Modern concepts of anaesthesia and dissociative anaesthetics-Anticoids-Antimicrobials and principles of chemotherapy in microbial-injections-use of harmonics in therapeutics-chemotherapy of parasitic infections-Drug and economic persons in the. Edible tissues of animals-chemotherapy of Neoplastic diseases.

1.7. **Veterinary Hygiene with reference to water, air and habitation**: Assessment of pollution of water, air and soil-Importance of climate in animal health-effect of environment on animal function and performance-relationship between industrialization and animal agriculture-animal housing requirements for specific categories of domestic animals viz. pregnant cows & sows, milking cows, broiler birds-stress, strain & productivity in relation to animal habitation.

2. **Animal Diseases**:

2.1 Pathogenesis, symptoms, post-mortem lesions, diagnosis, and control of infection diseases of cattle, pigs and poultry, horses, sheep and goats.

2.2 Etiology, symptoms, diagnosis, treatment of production diseases of cattle, pig and poultry.

2.3 Deficiency diseases of domestic animals and birds.

2.4 Diagnosis and treatment of nonspecific condition like impaction, Bloat, Diarrhea, Indigestion, dehydration, stroke, poisoning.

2.5 Diagnosis and treatment of neurological disorders.
2.6 Principles and methods of immunization of animals against specific diseases-hard immunity-disease free zones-‘zero’ disease concept-chemoprophylaxis.


2.8 Disease investigation techniques-Materials for laboratory investigation-Establishment Animal Health Centre - Disease free zone.

3. Veterinary Public Health

3.1 Zoonoses : Classification, definition; role of animals and birds in prevalence and transmission of zoonotic diseases-occupational zoonotic diseases.’

3.2. Epidemiology : Principles, definition of epidemiological terms, application of epidemiological measures in the study of diseases and disease control, Epidemiological features of air, water and food borne infections.


4 Milk and Milk Products Technology :


Processing, packaging, storing, distributing, marketing defects and their control and nutritive properties of the following milks : Pasteurized, standardized, toned, double toned, sterilized, homogenized, reconstituted, recombined and flavoured milks. Preparation of cultured milks, cultures and their management, yoghurt, Dahi, Lassi and Srikhand. Preparation of flavoured and sterilized milks. Legal standards, Sanitation requirement for clean and safe milk and for the milk plant equipment.

4.2 Milk Products Technology : Selection of raw materials, assembling, production, processing, storing, distributing and marketing milk products such as Butter, Ghee, Khoa, Channa, Cheese; Condensed, evaporated, dried milk and baby food; Ice cream and Kulli; by products; whey products, buttermilk, lactose and casein. Testing, grading, judging milk products-BIS and Agmark specifications, legal standards, quality control nutritive properties. Packaging, processing and operational control Costs.

5. Meat Hygiene and Technology : 5.1 Meat Hygiene :

5.1.1 Ante mortem care and management of food animals, stunning, slaughter and dressing operations; abattoir requirements and designs; Meat inspection procedures and judgement of carcass meat cuts-grading of carcass meat cuts-duties and functions of Veterinarians in Wholesale meat production.

5.1.2 Hygienic methods of handling production of meat-spoilage of meal and control measures-Post slaughter physicochemical changes in meat and factors that influence their-quality improvement methods-Adulteration of meat and detection-Regulatory provisions in Meat trade and Industry.

5.2. Meat Technology

5.2.1 Physical and chemical characteristics of meat-meat emulsions-methods of preservation of meat-curing, canning, irradiation, packaging of meal and meat products; meat products and formulations.

5.3. By products : Slaughter house by products and their utilization-Edible and inedible byproducts-social and economic implications of proper utilization of slaughter house byproducts-Organ products for food and pharmaceuticals.


**Anthropology – Optional**

_of Part B - Main Examination of Civil Services Exam_

**Paper I**

1.1 Meaning and scope of Anthropology

1.2 Relationship with other disciplines: Social Sciences, Behavioural Sciences, Earth Sciences, History, Economics, Sociology, Psychology, Political Science, Life Science, Medical Science.

1.3 Main branches of Anthropology, their scope and relevance
   a) Social-cultural Anthropology
   b) Physical and biological Anthropology
c) Archaeological Anthropology.

1.4 Human Evolution and emergence of Man.

   **Organic Evolution-Theories** of evolution in historical perspective, pre-Darwinian, Darwinian and Post-Darwinian period. Modern synthetic theory of evolution; brief outline of terms and concepts of evolutionary biology (Doll's rule, Cope's rule, Gause's rule, parallelism, convergence, adaptive radiation, mosaic evolution); Principles of systematics and taxonomy, major primate taxa, tertiary and quaternary fossil primates, Systematics of Hominoidea and Hominidac, Origin and evolution of *Homo erectus and Homo sapiens*.

1.5 Phylogenetic status, characteristics and distribution of the following:
   a) Plio-preleistocene fossil primates-*Oreopithecus*.
   b) South and East African hominids-Plesianthropus/Australopithecus Africaus, Paranthropus, Australopithecus.
   c) *Paranthropus-Homo erectus-Homo erectus javanicus, Homo erectus pekinensis*.
   d) *Homo Heidelbergensis*.
   e) Neanderthal man-La-chapelle-au-saints (Classical type), Mt. Carmelites types (Progressive type).
   f) Rhodesian man
g) *Homo sapiens-Cromagnon, Grimaldi, Chancelede*.

Recent advances in understanding the evolution, distribution and multidisciplinary approach to understand a fossil type in relation to others.
1.5 Evolutionary trend and classification of the order Primates, Relationship with other mammals, molecular evolution of Primates, Comparative anatomy of man and apes, primate locomotion-terrestrial and arboreal adaptation, skeletal changes due to erect posture and its implications.

1.7 Cultural Evolution-broad outlines of pie-historic cultures:

a) Paleolithic
b) Mesolithic
c) Neolithic
d) Chalcolithic
e) Copper--Bronze age f) Iron age

2.1 Family-Definition and typology of "family, household and domestic groups. Basic structure and functions; stability and changes in family. Typological and processual approaches to the study of family. impact of urbanization, industrialization, education and feminist movements. Universality of family-a critique.


3.1 Study of culture, patterns and processes. Concept of culture, patterns of culture, relationships between culture and civilization and society.

3.2 Concept of Social Change and Cultural Change:


3.4 Concept of Society: Society and Culture, Social Institution, Social Groups and Social stratification.

3.5 Approaches to the study of culture and society-classical evolutionism, eco-evolutionism, culture ecology, historical particularism and diffusionism, structural-factionalism, culture and personality, transaction-alism, symbolism, cognitive approach and new ethnography, post structuralism and post-modernism.


5.1 Meaning, scope and relevance, principles governing production, distribution and consumption in communities subsisting on hunting-gathering, fishing, pastoralism, horticulture and other economic pursuits. Formalist and substantivist debate-Dalton, Karl-polany and Marx approach and New Economic Anthropology.*Exchange: gifts, barter, trade, ceremonial exchange and market economy.

5.2 Theoretical foundations. Types of political organisations-band, tribe, chiefdom, state, concept of power, authority and legitimacy. Social control, law and justice in tribal and peasant societies.


8.1 Concept, scope and major branches of human genetics. Its relationship with other branches of science and medicine.

8.2 Method for study of genetic principles in man-family study (pedegree analysis, twin study, foster child, co-twin method, cytogenetic method, chromosomal and karyotypc analysis), biochemical methods, immunological methods, D.N.A. technology and recombinant technologies.

8.3 Twin study method-zygosity, heritability estimates, present status of the twin study method and its applications.

8.4 Mendelian genetics in man-family study, single factor, multifactor, lethal, sub-lethal, and polygenic inheritance in man.

8.5 Concept of genetic polymorphism and selection, Mendelian population, Hardy-Weinberg law; causes and changes which bring down frequency-mutation, isolation, migration, selection, inbreeding and genetic drift. Consanguineous and non-consanguineous mating, genetic load, genetic effect of consanguineous and cousin marriages (statistical and probability methods for study of human genetics).

8.6 Chromosomes and chromosomal aberrations in man, methodology. 
   a) Numerical and structural aberrations (disorders) 
   b) Sex chromosomal aberrations-Klinefelter (XXY), Turner.(XO), Super female (XXX), intersex, and other syndromic disorders. 
   c) Autosomal aberrations-Down syndrome, Patau, Edward and Cri-du-chat syndromes. 
   d) Genetic imprints in human disease, genetic screening, genetic counselling, human DNA profiling, gene mapping and genome study.

8.7 Concept of race in histograhical and biological perspective. Race and racism, biological basis of morphological variation of non-metric and metric characters. Racial criteria, racial traits in relation to heredity and environment; biological basis of racial classification, racial differentiation and race-crossing in man.

8.8 Ethnic groups of mankind-characteristics and distribution in world, racial classification of human' groups. Principal living peoples of world. Their distribution and characteristic.

8.9 Age, sex and population variation as genetic marker-ABO), Rh blood groups, HLA, Hp, transferring, Gm, blood enzymes. Physiological characteristics-Hb level, body fat, pulse rate, respiratory functions and sensory perceptions in different cultural and socio-economic groups. Impact of smoking air pollutions, alcoholism, drugs and occupational hazards on health.

10.1 Relevance in understanding of contemporary society. Dynamics of ethnicity at rural, tribal, urban and international levels. Ethnic conflicts and political developments. Concept of ethnic boundaries. Ethnicity and concept of nation state.

11.1 Concept of human growth and development-stages of growth-prenatal, natal, infant, childhood, adolescence, maturity, senescence.

Factors affecting growth and development genetic, environmental, biochemical, nutritional, cultural and socio-economic.


12.2 Demographic theories-biological, social and cultural.

12.3 Demographic methods-census, registration system, sample methods, duel reporting system.

12.4 Population structures and population dynamics.

12.5 Demographic rates and ratios, life table-structure and utility.

12.6 Biological and socio-ecological factors influencing fecundity, fertility natality and mortality.

12.7 Methods of studying population growth.

12.8 Biological consequences of population control and family welfare.

13.1 Anthropology of sports

13.2 Nutritional Anthropology.

13.3 Anthropology in designing of defence and other equipments.

13.4 Forensic Anthropology.

13.5 Methods and principles of personal identification and reconstruction.

13.6 Applied human genetics-Paternity diagnosis genetic counselling and eugenics.

13.7 DNA technology-prevention and cure of diseases.

13.8 Anthropo-genetics in medicine

13.9 Serogenetics and cytogenetics in reproductive biology.

13.10 Application of statistical principles in human genetics and Physical Anthropology.

PAPER II


2. Demographic profile of India-Ethnic and linguistic elements in the Indian population and their distribution. Indian population, factors influencing its structure and growth.


4. Emergence, growth and development of anthropology in India-contributions of the 19th Century and early 20th, Century scholar-administrators. Contributions of Indian anthropologists to tribal and caste studies. Contemporary nature of anthropological studies in India.

5. Approaches to the study of Indian society and culture-traditional and contemporary.

5.1 Aspects of Indian village-Social organizations of agriculture, impact of market economy on Indian villages.

5.2 Linguistic and religious minorities-social, political and economic status.

6. Tribal situation in India-biogenetic variability, linguistic and socio-economic characteristics of the tribe populations and their distribution. Problems of the tribal Communities-land alienation, poverty indebtedness, low literacy, poor educational facilities, unemployment, underemployment, health and nutrition. Developmental projects-tribal displacement and problems of rehabilitation:
Development of forest policy and tribals, Impact of urbanisation and industrialization on tribal and rural populations.


8. Social change among the tribes during colonial and post-Independent India.
   8.1 Impact of Hinduism, Christianity, Islam and other religions on tribal societies.
   8.2 Tribe and nation state-a comparative study of tribal communities in India and other countries.

9. History of administration of tribal areas, tribal policies, plans, programmes of tribal development and their implementation. Role of N.G.O.s.
   9.1 Role of anthropology in tribal and rural development.
   9.2 Contributions of anthropology to the understanding of regionalism, communalism and ethnic and political movements.

BOTANY - Optional

of Part B - Main Examination of Civil Services Exam

PAPER I

1. **Microbiology and Plant Pathology:** Viruses, bacteria, and plasmids-structure and reproduction. General account of infection, Phytoimmunology. Applications of microbiology in agriculture, industry, medicine and pollution control in air, soil and water.


2. **Cryptogams:** Algae, Fungi, Bryophytes, Pteridophytes-structure and reproduction from evolutionary viewpoint. Distribution of Cryptogams in India and their economic potential.

3. **Phanerogams: Gymnosperme:** Concept of Progymonosperms. Classification and distribution of Gymnosperms. Salient features of Cycadales, Conferrals and Gnetales, their structures and reproduction. General account of Cycadofilicales, Bennettitales and Cordaitailes.


   Comparative account of various systems of Angiosperm Classification. Study of angiospermic families-Mangnoliaceae, Ranunculaceae, Brassicaceae (Cruci-ferac), Rosaceae, Leguminosac, Euphorbiaceae, Malvaceae, Diptercar-paceae, Apiaceae (Umbelliferae), Asclepiadaceae, Verbenacae, Solanaceae, Rubiacae, Cucurbitaceae, Asteraceae (Composite), Poaceae (Gramineae), Arecaceae (Palmac), Liliaceae, Musaceae, Orchidaceae.


4. Plant Utility and Exploitation:

Origin of cultivated plants, Vavilov's centres of origin. Plants as sources for food, fodder, fibres, spices, beverages, drugs, narcotics, insecticides, timber, gums, resins and dyes.


PAPER-II


CHEMISTRY - Optional

of Part B - Main Examination of Civil Services Exam

PAPER-I

1. **Atomic structure**: Quantum theory, Heisenberg's uncertainty principle, Schrodinger wave equation (time independent), interpretation of wave function, particle in one-dimensional box, quantum numbers, hydrogen atom wave functions. Shapes of s, p and d orbitals.

2. **Chemical bonding**: Ionic bond, characteristics of ionic compounds, factors affecting stability of ionic compounds, lattice, energy, Born-Haber cycle; covalent bond, and its general characteristics, polarities of bonds in molecules and their dipole moments. Valence bond theory, concept of resonance and resonance energy. Molecular orbital theory (LCAO method); bonding in homonuclear molecules: H₂+, H₂, He₂⁺ to Ne₂⁺, NO, Co, HF, CN⁻, BeI₂ and CO₂. Comparison of valence bond and molecular orbital theories, bond order, bond strength and bond length.


5. **Liquid State**: Kelvin equation, Surface tension and surface energy, wetting and contact angle, interfacial tension and capillary action.

6. **Thermodynamics and statistical thermodynamics**: Thermodynamic systems, states and processes, work, heat and internal energy; first law of thermodynamics, work done on the systems and heat absorbed in different types of processes; calorimetry, energy and entropy changes in various processes and their temperature dependence. Second law of thermodynamics; entropy as a state function, entropy changes in various process entropy-reversibility and irreversibility. Free energy functions; criteria for equilibrium, relation between equilibrium constant and thermodynamic quantities; Nernst heat theorem and third law of thermodynamics. Micro and macro states; canonical ensemble and canonical partition function; electronic, rotational and vibrational partition functions and thermodynamic quantities; chemical equilibrium in ideal gas reactions.

7. **Phase equilibria and solutions**: Phase equilibria in pure substances; Clausius-Clapeyron equation; phase diagram for a pure substance; phase equilibria in binary systems, partially miscible liquids-upper and lower critical solution temperatures, partial molar quantities, their significance and determination; excess thermodynamic functions and their determination.
8. **Electrochemistry**: Debye-Huckel theory of strong electrolytes and Debye-Huckel limiting Law for various equilibrium and transport properties. Galvanic cells, concentration cells; electrochemical series, measurement of e.m.f. of cells and its applications fuel cells and batteries.

Processes at electrodes; double layer at the interface; rate of charge transfer, current density; over potential; electro analytical techniques-voltameter, polarography, amperometry, cyclic-voltammetry, ion selective electrodes and their use.

9. **Chemical kinetics**: Concentration dependence of rate of reaction; differential and integral rate equations for zeroth, first, second and fractional order reactions. Rate equations involving reverse, parallel, consecutive and chain reactions; effect of temperature and pressure on rate constant. Study of fast reactions by stop-flow and relaxation methods. Collisions and transition state theories.

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

11. **Surface phenomena and catalysis**: Absorption from gases and solutions on solid adsorbents, adsorption isotherms.-Langmuir and B.E.T. isotherms; determination of surface area, characteristics and mechanism of reaction on heterogeneous catalysts.

12. **Bio-inorganic chemistry**: Metal ions in biological systems and their role in ion transport across the membranes (molecular mechanism), ionospheres, photosynthesis PSI, PSII; nitrogen fixation, oxygen-uptake proteins, cytochromes and ferredoxins.

13. **Coordination chemistry**:

(a) Electronic configurations; introduction to theories of bonding in transition metal complexes. Valence bond theory, crystal field theory and its modifications; applications of theories in the explanation of magnetism and electronic spectra of metal complexes.

(b) Isomerism in coordination compounds. IUPAC nomenclature of coordination compounds; stereochemistry of complexes with 4 and 6 coordination numbers; chelate effect and polynuclear complexes; trans effect and its theories; kinetics of substitution reactions in square-planar complexes; thermodynamic and kinetic stability of complexes.

(c) Synthesis and structures of metal carbonyls; carboxylate anions, carbonyl hydrides and metal nitrosyl compounds.

(d) Complexes with aromatic systems, synthesis, structure and bonding in metal olefin complexes, alkyne complexes and cyclopentadienyl complexes; coordinative unsaturation, oxidative addition reactions, insertion reactions, fluxional molecules and their characterization. Compounds with metal-metal bonds and metal atom clusters.

(e) **Main Group Chemistry**: Boranes, borazines, phosphazenes and cyclic phosphazene, silicates and silicones, Interhalogen compounds, Sulphur – nitrogen compounds, noble gas compounds.

14. **General chemistry of ‘f’ block elements**: Lanthanides and actinides; separation, oxidation states, magnetic and spectral properties; lanthanide contraction.

**Paper-II**

1. **Delocalised covalent bonding**: Aromaticity, anti-aromaticity; annulenes, azulenes, tropolones, fulvenes, sydnones.

2 (a) **Reaction mechanisms**: General methods (both kinetic and non-kinetic) of study of mechanism or organic reactions illustrated by examples-use of isotopes, cross-over experiment, intermediate trapping, stereochemistry; energy diagrams of simple organic reactions-transition states and intermediates; energy of activation; thermodynamic control and kinetic control of reactions.

(b) **Reactive intermediates**: Generation, geometry, stability and reactions of carboniumions and carbanions, free radicals, carbenes, benzynes and nitrenes.
(c) **Substitution reactions**: $S_N1$, $S_N2$, $S_Ni$, $S_N1\prime$, $S_N2\prime$, $S_Ni\prime$ and $S_N1\prime\prime$ mechanisms; neighbouring group participation; electrophilic and nucleophilic reactions of aromatic compound, including simple heterocyclic compounds-pyrrrole, furan thiophene, indole.

(d) **Elimination reactions**: $E1$, $E2$ and $E2c$ mechanisms; orientation in $E2$ reactions—Saytzeff and Hoffmann; pyrolytic syn elimination-acetate pyrolysis, Chugaev and Cope eliminations.

(e) **Addition reactions**: Electrophilic addition to C=C and C=C; nucleophilic addition to C=O, C=N; conjugated oletins and carbonyls.

(i) **Rearrangements**: Pinacol-pinacolone, Hoffmann, Beckmann, Baeyer-Villiger, Favorstki, Fries, Claisen, Cope, Stevens and Wagner-Meerwein rearrangements.

3. **Pericyclic reactions**: Classification and examples; Woodward-Hoffmann rules—electrocyclic reactions, cycloaddition reactions $[2+2$ and $4+2]$ and sigmatropic shifts $[1, 3; 3, 3$ and $1, 5]$ FMO approach.

4. **Chemistry and mechanism of reaction**: Aldol condensation (including directed aldol condensation), Claisen condensation, Dieckmann, Perkin, Knoevenagel, Witting, Clemmensen, Wolff-Kishner, Cannizzaro and von Richter reactions; Stobbe, benzoïn and acyloïn condensations, Fischer indole synthesis, Skraup synthesis, Bischler-Napieralski, Sandmeyer, Reimer-Tiemann and Reformatsky reactions.

5. **Polymeric Systems**

(a) **Physical chemistry of polymers**: Polymer solutions and their thermodynamic properties; number and weight average molecular weights of polymers. Determination of molecular weights by sedimentation, light scattering, osmotic pressure, viscosity, end group analysis methods.

(b) **Preparation and properties of polymers**: Organic polymers—polyethylene, polystyrene, polyvinyl chloride, Teflon, nylon, terylene, synthetic and natural rubber. Inorganic polymers-phosphonitrilic halides, borazines, silicones and silicates.

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

6. **Synthetic uses of reagents**: OsO$_4$, HIO$_4$, CrO$_3$, Pb(OAc)$_4$, SeO$_2$, NBS, B$_2$H$_6$, Na-liquid NH$_3$, LiAlH$_4$, NaBH$_4$, n-BuLi, MCPBA.

7. **Photochemistry**: Photochemical reactions of simple organic compounds, excited and ground states, singlet and triplet states, Norrish-Type I and Type II reactions.

8. **Principles of spectroscopy and applications in structure elucidation**

(a) **Rotational** – Diatomic molecules; isotopic substitution and rotational constants.

(b) **Vibrational** - Diatomic molecules, linear triatomic, molecules, specific frequencies of functional groups in polyatomic molecules.

(c) **Electronic**: Singlet and triplet states $n \rightarrow \pi$ and $\pi \rightarrow \pi^*$ transitions; application to conjugated double bonds and conjugated carbonyls-Woodward-Fieser rules.

(d) **Nuclear magnetic resonance**: Isochronous and anisochronous protons; chemical shift and coupling constants; Application of $H_1$ NMR to simple organic molecules.

(e) **Mass spectrometry**: Parent peak, base peak, daughter peak, metastable peak, fragmentation of simple organic molecules; McLafferty rearrangement.

1.1. Engineering Mechanics: Units and Dimensions, SI Units, Vectors, Concept of Force, Concept of particle and rigid body. Concurrent, Non Concurrent and parallel forces in a plane, moment of force and Varignon's theorem, free body diagram, conditions of equilibrium, Principle of virtual work, equivalent force system.

First and Second Moment of area, Mass moment of Inertia. Static Friction, Inclined Plane and bearings. Kinematics and Kinetics:


1.4. Structural Analysis: Castigliao's theorems I and II, unit load method of consistent deformation applied to beams and pin jointed trusses. Slope-deflection, moment distribution, Kani's method of analysis and column Analogy method applied to indeterminate beams and rigid frames.

1.5. Rolling loads and Influences lines: Influences lines for Shear Force and Bending moment at a section of beam. Criteria for maximum shear force and bending Moment in beams traversed by a system of moving loads. Influences lines for simply supported plane pin jointed trusses.

1.6. Arches: Three hinged, two hinged and fixed arches, rib shortening and temperature effects, influence lines in arches.


2. Design of Structures : Steel, Concrete and Masonry Structures.

2.1 Structural Steel Design : Structural Steel : Factors of safety and load factors. Riveted, bolted and welded joints and connections. Design of tension and compression members, beams of built up section, riveted and welded plate girders, gantry girders, stanchions with battens and lacings, slab and gusseted column bases.

2.2 Design of highway and railway bridges : Through and deck type plate girder, Warren girder, Pratt truss. Design of Concrete and Masonry Structures :

2.3 Concept of mix design. Reinforced Concrete : Working Stress and Limit State method of design Recommendations of LS. codes Design of one way and two way slabs, stair-case slabs, simple and continuous beams of rectangular, T and L sections. Compression members under direct load with or without eccentricity, Isolated and combined footings.Cantilever and Counter fort type retaining walls.

2.4 Water tanks : Design requirements for Rectangular and circular tanks resting on ground.

2.5 Prestressed Concrete : Methods and systems of prestressing, anchorages, Analysis and design of sections for flexure based on working stress, loss of prestress. Design of brick masonry as per I.S. Codes, design of masonry retaining walls.

Part-C

3. Fluid Mechanics, Open Channel Flow and Hydraulic Machines

3.1 Fluid Mechanics : Fluid properties and their role in fluid motion, fluid statics including forces acting on plane and curve-surfaces.

3.2 Kinematics and Dynamics of Fluid flow : Velocity and accelerations, stream lines, equation of continuity, irrotational 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 equation, Navier-Stokes equation, Euler's equation of motion, application to fluid flow problems, pipe flow, plane, curved, stationary and moving vanes, sluice gates, weirs, orifice meters and Venturi meters.

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

3.4 Laminar Flow : Laminar flow between parallel, stationary and moving plates, flow through tube.

3.5 Boundary layer : Laminar and turbulent boundary layer on a flat plate, laminar sublayer, smooth and rough boundaries, drag and lift.

3.6 Turbulent flow through pipes : Characteristics of turbulent flow, velocity distribution and variation of pipe friction factor, hydraulic grade line and total energy line, siphons, expansion and contractions in pipes, pipe networks, water hammer in pipes and surge tanks.

3.7 Open channel flow : Uniform and non-uniform flows, momentum and energy correction factors, specific energy and specific force, 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, classification of surface profiles, control section, step method of integration of varied flow equation, moving surges and hydraulic bore.
3.8 Hydraulic Machines and Hydropower: Centrifugal pumps-Types, characteristics, Net Positive Suction Height (NPSH), specific speed. Pumps in parallel.
Reciprocating pumps, Airvessels, Hydraulic ram, efficiency parameters, Rotary and positive displacement pumps, diaphragm and jet pumps.
Hydraulic turbines, types classification. Choice of turbines, performance parameters, controls, characteristics, specific speed.

Part-D

4. Geotechnical Engineering

Types of soil, phase relationships, consistency limits particles size distribution, classifications of soil, structure and clay mineralogy.
Capillary water and structural water, effective trees and pore water pressure, Darcy's Law, factors affecting permeability, determination of permeability, permeability of stratified soil deposits.
Seepage pressure, quick sand condition, compressibility and consolidation, Terzaghi's theory of one dimensional consolidation, consolidation test.
Compaction of soil, field control of compaction. Total stress and effective stress parameters, pore pressure coefficients.
Shear strength of soils, Mohr Coulomb failure theory. Shear tests.
Earth pressure at rest, active and passive pressures, Rankine's theory, Coulomb's wedge theory, earth pressure on retaining wall, sheet pile walls, Braced excavation.
Bearing capacity, Terzaghi and other important theories, net and gross bearing pressure. Immediate and consolidation settlement.
Subsurface exploration, methods of boring, sampling, penetration tests, pressure meter tests.
Essential features of foundation, types of foundation, design criteria, choice of type of foundation, stress distribution in soils, Business's theory, New mark's chart, pressure bulb, contact pressure, applicability of different bearing capacity theories, evaluation of bearing capacity from field tests, allowable bearing capacity, Settlement analysis, allowable settlement.
Proportioning of footing, isolated and combined footings, rafts, buoyancy rafts, Pile foundation, types of piles, pile capacity, static and dynamic analysis, design of pile groups, pile load lest, settlement of piles, lateral capacity. Foundation for Bridges. Ground improvement techniques preloading, sand drains, stone column, grouting, soil stabilization.
Paper-II
Part-A

Construction Technology, Equipment, Planning and Management

1. Construction Technology:


1.3 Functional planning of building: Building orientation, circulation, grouping of areas, privacy concept and design of energy efficient building; provisions of National Building Code. Building estimates and specifications; Cost of works; valuation.

2. Construction Equipment: Standard and special types of equipment, Preventive maintenance and repair, factors affecting the selection of equipment, economical life, time and motion study, capital and maintenance cost.

2.1 Concreting, equipments: Weigh batcher, mixer, vibration, batching plant, Concrete pump.

2.2 Earth-work equipment: Power shovel hoe, bulldozer, dumper, trailors, and tractors, rollers, sheep tool roller.

3. Construction Planning and Management: Construction activity, schedules, job layout, bar charts, organization of contracting firms, project control and supervision. Cost reduction measures.

3.1 Network analysis: CPM and PERT analysis. Float Times, cashing of activities, contraction of network for cost optimization, updating. Cost analysis and resource allocation.

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

Part-B

4. Survey and Transportation Engineering


4.2 Railways: Permanent way. sleepers, rail fastenings, ballast, points and crossings, design of turn outs, stations and yards, turntables, signals, and interlocking, level-crossing. Construction and maintenance of permanent ways: Super elevation, creep of rail, ruling gradient, track resistance, track effort, relaying of track.

4.4 Drainage of roads: Surface and sub-surface drainage.


Part-C

5. Hydrology, Water Resources and Engineering:

5.1 Hydrology: Hydrological cycle, precipitation, evaporation, transpiration, depression storage, infiltration, overland flow, hydrograph, flood frequency analysis, flood estimation, flood routing through a reservoir, channel flow routing-Muskingam method.

5.2 Ground water flow: Specific yield, storage coefficient, coefficient of permeability, confined and unconfined aquifers, aquifers, aquitards, radial flow into a well under confined and unconfined conditions, tube wells, pumping and recuperation tests, ground water potential.

5.3 Water Resources Engineering: Ground and surface water resource, single and multipurpose projects, storage capacity of reservoirs, reservoir losses, reservoir sedimentation, economics of water resources projects.

5.4 Irrigation Engineering: Water requirements of crops: consumptive use, quality of water for irrigation, duty and delta, irrigation methods and their efficiencies.

5.5 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 suspended load transport, cost analysis of lined and unlined canals, drainage behind lining.

5.6 Water logging: Causes and control, drainage system design, salinity.

5.7 Canal structures: Design of cross regulators, head regulators, canal falls, aqueducts, metering flumes and canal outlets.

5.8. Diversion head work: Principles and design of weirs of permeable and impermeable foundation, Khosla's theory, energy dissipation, stilling basin, sediment excluders.

5.9 Storage works: Types of dams, design, principles of rigid gravity and earth dams, stability analysis, foundation treatment, joints and galleries, control of seepage.

5.10 Spillways: Spillway types, crest gates, energy dissipation.

5.11 River training: Objectives of river training, methods of river training.

Part-D

6. Environmental Engineering

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

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

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

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

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

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


Commerce & Accountancy - Optional
of Part B - Main Examination of Civil Services Exam

Paper-I
Accounting & Finance
Part-I
Accounting, Taxation & Auditing


3. Taxation: Income Tax: Definition. Basis of charge. Incomes which do not form part of total income. Simple problems of computation of income under various heads, i.e., salaries, income from house property, profits and gains from business or profession, capital gains, income of other persons included in assesses's total income. Aggregation of income and set off/carry forward of loss. Deductions to be made from Gross total Income.


5.2. Management of Working Capital and its Components: Forecasting working capital needs, inventory, debtors, cash and credit management.

5.3. Investment Decisions: Nature and Scope of Capital Budgeting-VARIOUS types of decisions including make or buy and lease or buy-Techniques of Appraisal and their application-Consideration of Risk and Uncertainty-Analysis of Non-financial Aspects.

5.4. Rate of Return on Investments: Required Rate of Return-its measurement-Cost of Capital-Weighted Average Cost-Different Weights.


5.7. Raising finance short term and long term: Bank finance-norms and conditions.

5.8. Financial Distress: Approaching BIFR under Sick Industrial Undertakings Act: Concept of Sickness, Potential Sickness, Cash Loss, Erosion of Network


Paper-II

Organization Theory, Behaviours, Human Resource Management and Industrial Relations

Part I

Organization Theory


4. Analysis-Significance of culture to organizations: Limits of rationality-Organizational change, adaptation, growth and development, Professional management Vs. family management, Organizational control and effectiveness.

Part-II

5. Industrial Relations: Nature and scope of industrial relations, the socio-economic set-up, need for positive approach. Industrial labour in India and its commitment-Stages of commitments. Migratory nature merits and shortcoming, Trade Union movement in India-origin, growth and structure; Attitude and approach of management of India-recognition Problems before Indian Trade Union movement.


7. Worker’s participation in management: Philosophy, rationale; present day state of affairs and future prospects. Prevention and settlement of industrial disputes in India.

8. Industrial relations in Public Enterprises: Absenteeism and labour turnover in Indian Industries-causes and remedies.


Economics - Optional

of Parl B - Main Examination of Civil Services Exam

Paper-I


2. Functions of money-Measurement of price level changes-Money and real balances-Monetary standards-High-powered money and the Quantity theory of money, its variants and critiques thereof Demand for and supply of money-The money multiplier. Theories of determination of interest rate-Interest and prices-Theories of inflation and control of inflation.


5. Public finance and its role in market economy in stabilization, supply stability, allocative efficiency, distribution and development. Sources of revenue-Forms of Taxes and subsidies, their incidence and effects; Limits to taxation, loans, crowding-out effects, and limits to borrowing. Types of budget deficits-Public expenditure and its effects.
6. International Economics

(i) Old and New theories of International Trade.
   a) Comparative advantage, Terms of trade and offer curve.
   b) Product cycle and Strategic trade theories.
   c) "Trade as an engine of growth" and theories of under-development in an open economy

(ii) Forms of protection: Tariff and quota.

(iii) Balance of Payments Adjustments Alternative Approaches.
   a) Price versus income, income adjustments under fixed exchange rates.
   b) Theories of policy mix.
   c) Exchange rate adjustments under capital mobility.
   d) Floating Rates and their implications for developing countries; Currency Boards.
   (iv) (a) IMF and the World Bank.
   (b) W.T.O.; TRIMS, TRIPS, Domestic Measures, Different Rounds of WTO talks.
   (c) Trade Blocks and monetary unions.

7. Growth and development.

(i) Theories of growth : Classical and neo-classical theories; The Harrod model; economic development under surplus Labour; wage-goods as a constraint on growth; relative importance of physical and human capitals in growth; innovations and development; Productivity, its growth and source of changes thereof. Factors determining savings to income ratio and the capital-out put ratio.

(ii) Main features of growth : Changes in Sectoral compositions of income; Changes in occupational distribution; changes in income distribution; changes in consumption levels and patterns; changes in savings and investment and in pattern of investment. Case for arid against industrialization. Significance of agriculture in developing countries.

(iii) Relation between state, planning and growth, changing roles of market and plans in growth economic policy and growth.

(iv) Role of foreign capital and technology in growth: Economic development and International Trade and Investment Role of Multinationals. Planning and Economic Development changing Role of Market and planning, private partnership.


(vi) Concept of sustainable development; convergence of levels of living of developed and developing countries; meaning of self-reliance in growth and development.

Paper-II


4. **Industry**: Industrial system of India: Trends in Composition and growth. Role of public and private sectors, Role of small and cottage industries.

5. **National and Per capital income**: Patterns, trends, aggregate and sectoral composition and changes therein.


7. **The post Liberalization Era**:

   (i) New Economic Reforms and Agriculture: Agriculture and WTO, Food processing, subsidies, Agricultural prices and public distribution system. Impact of public expenditure on agricultural growth.

   (ii) New Economic policy and Industry: Strategy of industrialization, Privatization, Disinvestments, Role of foreign direct investment and multinationals.


   (v) New Economic Policy and Monetary System: Role of RBI under the new regime.

   (vi) Planning: Relation between planning and markets for growth and decentralized planning, 73rd and 74th Constitutional amendments.


   (viii) Causes of inflation—role of monetary and supply factors in price level determination, policies towards control of inflation. Effects of inflation under open economy.

**Education- Optional**

of Parl B - Main Examination of Civil Services Exam

Paper- I

1. **Educational Psychology**

   Concept, Need & Scope of Educational Psychology, Methods of Educational Psychology (Introspection, Observation, Case Study), Application of Educational Psychology in Teaching and Learning, Stages of Growth & Development, Adolescent Behaviour: Characteristics, Problems & Role of Education.

   Intelligence: Concept and Nature, Role of Heredity & Environment in Determining Intelligence, Theories of Intelligence (Two factor & Multiple Intelligence), Creativity: Concept & Nature, Characteristics of a Creative Person, Promoting Creativity Through Education.

   Meaning and Nature of Personality, Type and Trait Approaches to Personality, Factors Influencing Personality Development, Measurement of Personality, Individual Differences: Its Educational significance.


   Meaning, Nature & Scope of Counselling, Types of Counselling, Steps & Techniques of Counselling.
2. Foundations of Education


Idealism, Naturalism, Pragmatism.

Education and Democracy, Freedom & Discipline in Education, Components of Education and their Mutual relationship.

Nature & Scope of Educational Sociology, Education as a Social Process, Need for Sociological Approach to Education, School as a Social Sub-system.


Social Group : Primary & Secondary, Social Interaction & Socialization, Education & Cultural Heritage of India, Equalization of Educational Opportunities.

3. Educational Thought & Practices


Education Thoughts – Indian – Rabindra Nath Tagore, Aurobindo Ghosh, Swami Vivekananda

Modern Educational Thought – Radhakrishnan, J. Krishnamurthy, Paulo Freire.
Froebel’s Kindergarten, Montessori Method, Dewey’s Project Method, Gandhi’s Basic Education. Distance Education, Non formal and continuing Education, Inclusive Education.

4. Educational Evaluation & Statistics


Likert’s Attitude Scale, Cattel’s Sixteen Personality Factors (16PF), Stanford Binet Test of Intelligence. Classification of Tests, Concept of Standardized & Teacher Made Test, Characteristics of a good test, Reliability and Method of Determining Reliability by Test – Retest Method, Validity and Method of Determining Content Validity.

Histogram, Frequency Polygon, Cumulative Frequency Curve, Ogive.

Measures of Central Tendency : Mean Median & Mode, Measures of Dispersion : Range, Quartile Deviation, Average Deviation and Standard Deviation.

Concept and types of Correlation, Spearman’s Rank Difference Method of Correlation, Normal Probability curve : Concept & characteristics.

Paper- II

1. Educational System in India

Basic Ideas, Objectives , Curriculum, Methods of Teaching & Role of Teachers of the Following System :- Education in Ancient India : Vedic, Brahmanic & Buddhistic Education, Education in Medieval India.

Education in Colonial India (1813 – 1882) – Character Act (1813), Macaulay’s Minute (1835), Wood’s Despatch (1854), Hunter’s Commission (1882)

Indian University Commission (1902), Sadler’s Commission (1917), Hartog Committee (1929), Sargent Report (1944).


2. Contemporary Indian Education

Type of Pre-primary schools, Aganwadi’s Balwadis, Creches’ Day Care Centres, Integrated Child Development Service (ICDS), Role of Indian Council for Child Welfare (ICCW).
Sarva Shiksha Abhiyan (SSA) : Programme for Universalisation of Elementary Education, Role of Block Resource Centres (BRC’S), cluster Resource Centres (CRC’S) and village Education Committees (VEC’S), Literacy Mission.
Rashtriya Madhyamik Shiksha (RMSA), Vocationalization of Secondary Education, Role of NCERT, CABE and MBOSE, Navodaya Vidyalaya’s : Objectives and Quality Concerns.
Concept Need and Scope of Teacher Education, Pre-Service and In-Service Teacher Education Programmes, Role of DIET, CTE, DERT and NCTE in Teacher Education, Duties and Responsibilities of a Teacher.
Concept, Need, Scope and Programmes of the following:

3. Educational technology

Concept and Scope of Educational Technology, Types of Educational Technology, Systems Approach to Instruction.
Concept & Process of Communication, Types of Class Room Communication, Educational through Mass-Media, ICT in Education.
Programmed Instruction, Computer Aided Instruction, Teaching Aids : Types & Uses.

4. School Management

Concept & Scope of School organization Management, Types of Educational Management ; Centralized and Decentralized, Authoritarian & Democratic, Objectives and Principles of School Management, Characteristics of Successful school Management.
Meaning of Class Room Management, Principles of Class Room Management, Process of Class Room Management, Techniques of Class Room Management.
School Building and design of school plant, School Library, School laboratory, School office.
Function of a School, School time Table & Calendar, Teacher’s Diary, Role of Headmaster & Teachers, Staff Meeting.
Meaning need & scope of inspection and supervision, Distinction between Inspection & Supervision, Objectives & function of supervision, Steps of School supervision.
Programmes of a School, Institutional Planning – Concept, need, objectives, principles and process, Organization of Co-curricular Activities, Evaluation of School Programme.
1. Electrical Circuits-Theory and Applications: Circuit components; network graphs; KCL, KVL; circuit analysis methods: nodal analysis, mesh analysis; basic network theorems and applications; transient analysis; RL RC and RLC circuits; sinusoidal steady state analysis; resonant circuits and applications; coupled circuits and applications; balanced 3-phase circuits. Two-port networks, driving point and transfer functions; poles and zeros of network functions. Elements of networks synthesis. Filter-theory: design, and applications. Active filters. Circuit simulation: Input formats; methods of education formulation; solution of equations; output formats; SPICE.


7. Transformers: Principles of operation and analysis; regulation, efficiency; 3-phase transformers. 3-phase induction machines and synchronous machines: characteristics and performance analysis; speed control. Special machines: Stepper motors, brushless dc motors, permanent magnet motors single-phase motors; FHP.

8. Power Electronics and Electric Drives: Semiconductor power devices; diode, transistor, thyristor, triac, GTO and MOSFET-static characteristics and principles of operation; triggering circuits; phase control rectifiers; bridge converters: fully-controlled and half-controlled; principles of thyristor choppers and inverters; basic concepts of speed control of dc and ac motor drives applications of variable-speed drives.

9. Analog Communication: Random variables - continuous, discrete; probability, probability functions. Statistical averages; probability models; Random signals and noise: white noise, noise equivalent bandwidth; signal transmission with noise; signal to noise ratio. Linear CW modulation: Amplitude modulation: DSB, DSB-SC and SSB. Modulators and Demodulators; Phase and Frequency modulation: PM & FM signals; narrowband FM; generation & detection of FM and PM. Deemphasis, Preemphasis. CW modulation system: Superhetrodyne receivers, AM receivers, communication receivers, FM receivers.- phase locked loop, SSB receiver Signal to noise ratio calculation or AM and FM receivers.
10. Microwaves and Antenna: Electromagnetic radiation, Propagation of waves: ground waves, sky wave, space wave, tropo spheric scatter propagation. Extraterrestrial communications. Antenna: Various types, gain, resistance, bandwidth, beam width and polarization, effect of ground. Antenna coupling; high frequency antennas; microwave antennas; special purpose antennas. Microwave Services: Klystron, magnetron, TWT, gun diodes, Impact; Bipolar and FETs, Microwave integrated circuits. Microwave measurements.

Paper-II


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

6. Power Systems: Analysis and Control: Steady-state performance of overhead transmission lines and cables; principles of active and reactive power transfer and distribution; per-unit quantities; bus admittance and impedance matrices; load flow; voltage control and power factor correction; economic operation; symmetrical components, analysis of symmetrical and unsymmetrical faults. Concept of system stability: swing curves and equal area criterion. Static VAR system. Basic concepts of HVDC transmission; FACTS. Computer control and Automation: Introduction to energy control centres; various states of a power system; SCADA systems and RTUs. Active power control: Speed control of generators, tie-line control, frequency control. Economic dispatch


11. **Fibre Optic System** : Multiplexing - Time division multiplexing. Frequency Division multiplexing. Optical properties of materials : Refractive index absorption and emission of light, optical fibres, lasers and optoelectronic materials Fibre optic links:

**English Literature - OPTIONAL**

**Of part - B- Main Examination of Civil Services Exam**

**PAPER I**

Answers must be written in English.

Texts of detailed study are listed below. Candidates will also 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-A**

1. William Shakespeare : King Lear and The Tempest.
5. William Wordsworth. The following poems:
   
   Ode on Intimations of Immortality, Tintern Abbey, Three years she grew, She dwelt among untrodden ways, Michael, Resolution and Independence, The World is too much with us, Milton, thou shouldst be living at this hour, Upon Westminster Bridge.

6. Alfred Tennyson : In Memoriam.

**SECTION-B**

6. Thomas Hardy. Tess of the d'Urbervilles.
7. Mark Twain. The Adventures of Huckleberry Finn.

**PAPER-II**

Answers must be written in English.

Texts for detailed study are listed below. Candidates will also be required to show adequate knowledge of the following topics and movements :

Modernism; Poets of the Thirties; The stream-of-consciousness Novel; Absurd Drama; Colonialism and Post-Colonialism; Indian Writing in English; Marxist, Psychoanalytical and Feminist approaches to literature; Post-Modernism.
SECTION-A

1. William Butler Yeats. The following poems:


2. T.S. Eliot. The following poems:

   The Love Song of J. Alfred Prufrock, Journey of the Magi, Burnt Norton.

3. W.H. Auden. The following poems:

   Partition, Musee des Beaux Arts, In Memory of W.B. Yeats, Lay your sleeping head, my love, The Unknown Citizen, Consider, Mundus Et Infans, The Shield of Achilles, September 1, 1939, Petition.


6. Philip Larkin. The following poems:
   - Next, Please, Deceptions, Afternoons, Days, Mr. Bleaney.

7. A.K. Ramanujan. The following poems:

   Looking for a Cousin on a Swing, A River, Of Mothers, among other Things, Love Poem for a Wife 1, Small-Scale Reflections on a Great House, Obituary

(All these poems are available in the anthology Ten Twentieth Century Indian Poets, edited by R. Parthasarthy, published by Oxford University Press, New Delhi).

SECTION-B

1. Joseph Conrad, Lord Jim


4. E.M. Forster. A Passage to India.

5. Virginia Woolf. Mrs Dalloway.


GARO - OPTIONAL
of Part - B - Main Examination of Civil Services Exam

PAPER-I

1. Traditional Poetry

1. Mande aro Chatchi De’a
2. Dimrimbri Palwang A’dingko Katchini Anti kaa
3. Jumang Matpu Nika
4. Gongani Kilbolma Supea
5. Churugala aro Sasat So’a
6. Dakgipa Rabuga
7. Sambolrangni Chachenga
8. Wangala
9. Matdoka ba Matchu Den’a
10. Sa’rao Krita

2. Modern Poetry

1. Mikjumang A’gilasak – Jonmni D. Shira
2. Angni Gisik – Couplane G. Momin
3. Matgrik M’i’am Sepi Gitcham – Johindra Ch. Marak
4. Ketket Rim’bo – K.D. Shira
5. Chengoni Manderang – M.R. Sangma
6. O A’chik Song – Evelyn R. Marak
8. Do’kua – Tuniram R. Marak
10. Sigimin Ripengko gisik ra’ani – K.R. Marak
11. Gitanjali (Translated) – H.W. Marak
12. Anga Bebera’a
13. Gitelni Boja
14. Gunni Gopram
15. Rong Gri Mande
16. Salgi Chi’engsa
17. Simteka Gri Gitrang
18. Tom’tomani Nabaon
19. Ma’ani Bi’ani
20. Balwarang Ku’misia
21. Golap Gitchak Balsa
22. San’ Jaksi Chikani
23. Dingchik Gun
24. Chadambeni Gisik
25. Aman’ Kusik
26. Kakket
27. Jotton Ka’an Rama

3. Rhetoric and prosody

Rhetoric and prosody- V.S.B. Sangma

4. Proverbs & Phrases and Essay

1. Aganme’apa- M.S. Sangma & J.L.R. Marak
2. A’chik Composition – K.M. Momin
3. A’chik kattaran – W.K. Sangma
4. A’chik Golporang I, II & III-D.K. Sangma

5. Grammar

1. A’chik Grammar – E.G. Phillips

6. Comprehension & Precis Writing & Essay
7. Garo Literary Criticism

1. Literary Criticism – L.D. Shira
2. Sea Jotani Nama Namgijako See Parakatani A’bachenggipa Bewalrang (Elements of Literary Criticism) - M.S. Sangma

8. Oral Narratives

Apasong Agana – D.S. Rongmuthu

1. A’ko Doka Chiko Gina
2. Gittingko Ba’ani
3. Misini Dedrang A’ningni Dedrango Gro Dinga
4. Mandeni sichenga
5. Susimemani Siani Salo
6. Banggria
7. Wa’alko Ba’a
8. Do’mani Grapa
9. Miko Man’chengani
10. A’ba o’e game Cha’chengani
11. Muniko Man’chenga
12. Marangni Atchia
13. Bisiko Man’chenga
14. Silchiko Man’chenga
15. Danliko Man’chengani
16. Wangalako dakchengani

A’chikni Ku’andik – A.Ch. Momin

1. Man’e Chagipa Manderangni Manianirang Gipin Manianirang aro Dakbewalrang

A’chik Golporang Bak-I

1. Chipu Na’kadok
2. Do’uung
3. Do’kuamung Mese
4. Do’po Deba’a
5. Do’de Gitok
6. Kawatte Ku’dikgila
7. Peru Am’pak Kika
8. Nokmana Bisi Tikja
9. Mat An’chi Pila
10. Mongma aro Okgipu

Paper-II

1. Traditional Drama
   1. Dikki part-1 – L.R. Sangma
   2. Dikki part-II – L.R. Sangma

2. Modern Drama
   1. Skul Master – L.D. Shira
   2. Nokdang – K.M. Momin
   4. Metongbolni Gittim – L.R. Marak

3. Prose
   1. Maniani Bidik – Mihir N. Sangma
   2. Katta Wal’tim – Kroshnil D. Sangma
   3. A’chikni Ma’biding-Moniram Marak

4. Fiction
   1. Dombe Rani – A.R. Sangma
   2. An’chichi bregimin – L.M. Holbrook
   5. Dugalgreni Me’chik – B.Ch. Sangma
5. **History of Garo Language**
   1. A’chikkuni Ma’ambi- M.S.Sangma, Chapter I upto VI

6. **History of Garo Literature**
   1. History of Garo Literature Chapter-I upto 8 – M.S.Sangma
   2. Gisik Matgrikrang- L.D.Shira

**Geography – Optional**

of Part B - Main Examination of Civil Services Exam

Paper-I

Principles of Geography

Section-A

Physical Geography

1. **Geomorphology** : Factors controlling landform development; endogenetic and exogenetic forces; origin and evolution of the earth's crust; physical conditions of the earth's interior; geosynclines; continental drift; isostasy; sea-floor spreading; plate tectonics; mountain building; volcanicity; earthquakes; concepts of geomorphic cycles; landforms associated with fluvial, arid, glacial, coastal and karst cycle; groundwater; Applied Geomorphology. Economic geology and environment.


3. **Oceanography** : Bottom topography, of the Atlantic, Indian and Pacific Oceans; temperature and salinity of the oceans; ocean deposits; ocean currents and tides; marine resources, biotic, mineral and energy resources; coral reefs; sea-level changes.

4. **Biogeography** : Genesis of soils; classification and distribution of soils; soil profile; soil erosion and conservation; factors influencing world distribution of plants and animals; problems of deforestation and conservation measures; social forestry, agro-forestry. Wild life, Major gene pool centres.

5. **Environmental Geography** : Human ecological adaptations; transformation of nature by man; environmental degradation and conservation; ecosystems and their management; global ecological imbalances-problems of pollution, global warming, reduction in bio-diversity and depletion of forests. Ecosystem their management and conservation, Environmental degradation, management and conservation, Biodiversity and sustainable development, Environmental policy, Environmental hazards and remedial measures, Environmental education and legislation.

Section-B

Human Geography

6. **Perspectives in Human Geography** : Areal differentiation; regional synthesis; dichotomy and dualism; environmentalism; quantitative revolution and locational analysis; radical, behavioural, human and welfare approaches; cultural regions of the world, cultural regions of the world; human development indicators.
7. Economic Geography: World economic development—measurement and problems; world resources and their distribution; energy crisis; the limits to growth; world agriculture, typology of agricultural regions; agricultural inputs and productivity; food and nutrition problems; famine-causes, effects and remedies; world industries—location patterns and problems; patterns of world trade.

8. Population and Settlement Geography: Growth and distribution of world population; demographic attributes; causes and consequences of migration; concepts of over- under- and optimum population; world population problems.

Types and patterns of rural settlements; hierarchy of urban settlements; concept of primate city and rank-size rule; functional classification of towns; sphere of urban influence; rural-urban fringe; satellite towns, problems of urbanization.

9. Regional Planning: Concept of a region; types of regions and methods of regionalization; growth centres and growth poles; regional imbalances; environmental issues in regional planning; planning for sustainable development.

10. Models, Theories and Laws in Human Geography: System analysis in Human Geography; Malthusian, Marxian and Demographic Transition models; Central Place theories of Christaller and Losch; Von Thunen's model of agricultural location; Weber's model of industrial location; Rostov's model of stages of growth. Heart-land and Rim land theories; laws of international boundaries and frontiers.

Note: Candidates will be required to answer one compulsory map question pertinent to subjects covered by this paper.

Paper-II

Geography of India

Section-A.

1. Physical Setting: Space relationship of India with neighbouring countries; structure and relief; drainage system and watersheds; physiographic regions; mechanism of Indian monsoons; tropical cyclones and western disturbances; floods and droughts; climatic regions; natural vegetation, soil types and their distributions.

2. Resources: Land, surface and groundwater, energy, minerals, and biotic resources, their distribution, utilization and conservation; energy crisis.

3. Agriculture: Infrastructure—irrigation, seeds, fertilizers, power; institutional factors—land holdings, land tenure and land reforms; agricultural productivity, agricultural intensity, crop combination, land capability; agro-and social forestry; green revolution and its socio-economic and ecological implications; significance of dry farming; livestock resources and white revolution; blue revolution; agricultural regionalization; agro-climatic zones, agro-ecological regions.

4. Industry: Evolution of industries; locational factors of cotton, jute, iron and steel, fertiliser, paper, Drugs and pharmaceutical, automobile and cottage industries; industrial complexes and industrial regionalization; new industrial policy; multinationals and liberalization. Special economic Zones, Tourism including eco tourism.

5. Transport, Communication and Trade: Road, railway, waterway, airway and pipeline networks and their complementary roles in regional development; growing importance of ports on national and foreign trade, trade balance; free trade and export promotion zones; developments in communication technology and its impact on economy and society.
Section-B

6. Cultural Setting: Racial and ethnic diversities; major tribes, tribal areas and their problems; role of language, religion and tradition in the formation of cultural regions; growth, distribution and density of population; demographic attributes-sex-ratio, age structure, literacy rate, work-force, dependency ratio and longevity; migration (inter-regional, intra-regional and international) and associated problems, population problems and policies, health indicators.

7. Settlements: Types, patterns and morphology of rural settlements; urban development; census definition of urban areas; morphology of Indian cities; functional classification of Indian cities; conurbations and metropolitan regions; urban sprawl; slums and associated problems; town planning; problems of urbanization.

8. Regional Development and Planning: Experience of regional planning in India; Five Year Plans; integrated rural development programmes; panchayati raj and decentralized planning; common area development; watershed management; planning for backward area, desert drought-prone, hill and tribal area development; multi-level planning; geography and regional planning.

9. Political Aspects: Geographical basis of Indian federalism; state reorganization; regional consciousness and national integration; international boundary of India and related issues; disputes on sharing of water resources; India and geopolitics of the Indian Ocean.

10. Contemporary Issues: Environmental hazards-landslides, earthquakes, floods and droughts, epidemics; issues related to environmental pollution; changes in patterns of land use; principles of environmental impact assessment and environmental management; population explosion and food security, environmental degradation; problems of agrarian and industrial unrest; regional disparities in economic development; concept of sustainable growth and development, environmental awareness, linkages of rivers, globalization and Indian economy.

Note: Candidates will be required to answer one compulsory map question pertinent to subjects covered by this paper.
GEOLOGY - Optional

of Part B - Main Examination of Civil Services Exam

Paper-1

Section-A


Section-B


Paper-II

Section-A


Section-II


Natural hazards-floods, landslides, coastal erosion, earthquakes and volcanic activity and mitigation. Environmental impact of urbanization, open cast mining, industrial and radioactive waste disposal, use of fertilizers, dumping of mine waste and fly-ash. Pollution of ground and surface water, marine pollution Environment protection-legislative measures in India. Sea level changes- causes and impact.
Hindi - Optional
of Part II - Main Examination of Civil Services Exam

Paper-I

Answers must be written in Hindi.

Section-A

1. History of Hindi Language and Nagari Lipi.
   II. Development of Braj and Awadhi as Literary language during medieval period.
   IV. Development of Khari-boli and Nagari Lipi during 19th Century.
   V. Standardisation of Hindi Bhasha & Nagari Lipi
   VI. Development of Hindi as National Language during freedom movement.
   VII. The development of Hindi as a National Language of Union of India.
   VIII. Scientific & Technical Development of Hindi Language.
   IX. Prominent dialects of Hindi and their inter-relationship,
   X. Salient features of Nagari Lipi and the efforts for its reform & Standard form of Hindi.
   XI. Grammatical structure of Standard Hindi.

Section-B

2. History of Hindi Literature.
   2.I. The relevance and importance of Hindi literature and tradition of writing History of Hindi Literature.
   2.2. Literary trends of the following four periods of history of Hindi Literature.

A : Adikal-Sidh, Nath and Raso Sahitya.

Prominent poets-Chandvardai, Khusaro. Hemchandra, Vidyapati.

B : Bhaktikal-Sant Kavyadhara, Sufi Kavyadhara, Krishna Bhaktidhara and Ram Bhaktidhara.

Prominent Poets-Kabir, Jayasi, Sur & Tulsi.

C : Ritikal-Ritikavya. Ritibaddhakavya & Riti Mukta Kavya.

Prominent Poets-Keshav, Bihari, Padmakar and Ghananand.

D : Adhunik Kal

a. Renaissance, the development of Prose, Bharatendu Mandal.
   d. Prominent Poets : Maithili Sharan Gupta, Prasad, Nirala, Mahadevi, Dinkar, Agyeya, Mukhibodh, Nagarjun.

2.3. Katha Sahitya

A. Upanyas & Realism
   B. The origin and development of Hindi Novels.
   C. Prominent Novelists : Premchand, Jainendra, Yashpal, Renu and Bhism Sahani.
   D. The origin and development of Hindi short story.
   E. Prominent Short Story Writers : Premchand, Prasad, Agyeya, Mohan Rakesh & Krishna Sobti.

2.4. Drama & Theatre

A. The origin & Development of Hindi Drama.
   B. Prominent Dramatists : Bharatendu, Prasad, Jagdish Chandra Mathur, Ram Kumar Verma, Mohan Rakesh.
   C. The development of Hindi Theatre.
2.5. Criticism

A: The origin and development of Hindi criticism: Saiddhantik, Vyavharik, Pragativadi, Manovichisheshanvadi & Nai Alochana.
B: Prominent critics: Ramchandra Shukla, Hajari Prasad Dwivedi, Ram Vilas Sharma & Nagendra.

2.6. The other forms of Hindi prose—Lalit Nibandh, Rekhachitra, Sansmaran, Yatra-vrittant.

Paper-II
Answers must be written in Hindi.

This paper will require first hand reading of prescribed texts and will test the critical ability of the candidates.

Section-A
1. Kabir: Kabir Granthawali, Ed, Shyam Sundar Das (First hundred Sakhis.)
2. Surdas: Bhramar Gitsar, Ed, Ramchandra Shukla (First hundred Padas)
3. Tulsidas: Ramcharit Manas (Sundar Kand) Kavitawali (Uttarkand).
4. Jayasi: Padmawat Ed, Shyam Sundar Das (Sinhai Dwip Khand & Nagmativiyog Khand)
5. Bihari: Bihari Ratnakar Ed, Jagnnath Prasad Ratnakar (First 100 Dohas)
6. Maithili Sharan Gupta: Bharat Bharati
7. Prasad: Kamayani (Chinta and Shaddha Sarg)
9. Dinkar: Kurushetra
10. Agyeya: Angan Ke Par Dwar (Asadhya Vina)
11. Mukthiboth: Brahm Rakshahas

Section-B
1. Bharatendu: Bharat Durdasha
2. Mohan Rakesh: Ashad Ka Ek Din
3. Ramchandra Shukla: Chintamani (Part I) (Kavita Hai) Shradhma Aur Bhakti
6. Prasad: Skandgupta
7. Yashpal: Divya
8. Phaniswar Nath Renu: Maila Anchal
9. Mannu Bhandari: Mahabhoj
10. Rajendra Yadav: Ek Dunia Samantar (All Stories)
History - Optional
of Part B - Main Examination of Civil Services Exam
Paper-I

Section-A

1. Sources: Archaeological sources - Exploration, excavation epigraphy, numismatics, monuments, Literary sources - Indigenous: Primary and secondary, poetry, scientific literature, literature, literature in regional language, religious literature. Foreign account: Greek, Chinese and Arab writers.

2. Pre-history and Proto-history: Geographical factors – hunting and gathering (Paleolithic and Mesolithic), Beginning of agriculture (Neolithic and Chalcolithic)

3. The Indus Civilization: Its origins, nature and decline, survival and significance, art and architecture.

4. Patterns of settlement: Economy, social organization and religion in India (c. 2000 to 500 B.C.): archaeological perspectives.

5. Evolution of North Indian society and culture: Evidence of Vedic texts (Samhitas to Sutras).


10-11 India in the Gupta and post-Gupta period (to c. 750): Political history of northern and peninsular India; Samanta system and changes in political structure; economy; social structure; culture; religion.

12. Themes in early Indian cultural history: Languages and texts; major stages in the evolution of art and architecture; major philosophical thinkers and schools; ideas in science and mathematics.

Section-B

13. India, 750-1200: Polity, society and economy. Major dynasties and political structures in North India. "Indian Feudalism" rise of Rajputs. The Imperial Cholas and their contemporaries in Peninsular India. Village communities in the South. Conditions of women. Agrarian economy and urban settlements, Commerce mercantile groups and guilds; towns. Society, the status of the Brahman and the new social order, Indian science and technology, Problem of coinage. Arab conquest of Sind; the Ghaznavide empire.


24. **First half of 18th Century**: Factors behind decline of the Mughal Empire. The regional principalities (Nizam's Deccan, Bengal, Awadh). Rise of Maratha ascendancy under the Peshwas. The Maratha fiscal and financial system. Emergence of Afghan Power. Battle of Panipat, 1761. Internal weakness, political, cultural and economic, on eve of the British conquest.
1. Establishment of British rule in India: Factors behind British success against Indian powers-Mysore, Maratha Confederacy and the Punjab as major powers in resistance; Policy of Subsidiary Alliance and Doctrine of Lapse.

2. Colonial Economy: Tribute system. Drain of wealth and “deindustrialization”, Fiscal pressures and revenue settlements (Zamindari, Ryotwari and Mahalwari Settlements); Structure of the British raj up to 1857 (including the Acts of 1773 and 1784 and administrative organization).

3. Resistance to colonial rule: Early uprisings; Causes, nature and impact of the Revolt of 1857; Reorganization of the Raj, 1858 and after.

4. Socio-cultural impact of colonial rule: Official social reform measures (1828-57); Orientalist-Anglicist controversy; coming of English education and the press; Christian missionary activities in India; Bengal Renaissance; Social and religious reform movements in Bengal and other areas; Women as focus of social reform.


Dislocation of traditional trade and commerce, Deindustrialisation, Decline of traditional crafts, Drain of wealth, Economic transformation of India, Railroad and communication network including telegraph and postal services, Famine and poverty in the rural interior.

6. Early Indian Nationalism: Social background; Formation of national associations; Peasant and tribal uprising during the early nationalist era; Foundation of the Indian National Congress; The Moderate phase of the Congress; Growth of Extremism; The Indian Council Act of 1909; Home Rule Movement; The Government of India Act of 1919.

7. Nationalism under Gandhi’s leadership: Gandhi’s career, thought and methods of mass mobilization; Rowlatt Satyagraha, Khilafat Movements, Non Cooperation Movement, Civil Disobedience Movement, 1940 Satyagraha and Quit India Movement; State People’s Movement.

8. Other strands of the National Movement: (a) Revolutionary movements since 1905; (b) Constitutional politics; Swarajists, Liberals, Responsive Cooperation; (c) Ideas of Jawaharlal Nehru, (d) The Left. (Socialists and Communists); (e) Subhas Chandra Bose and the Indian National Army; (f) Communal strands: Muslim League and Hindu Mahasabha; (g) Women in the National Movement.

9. Literary and cultural movements: Tagore, Premchand, Subraineram Bharati, Iqbal as examples only; New trends in art; Film industry; Writers’ Organizations and Theatre Associations.


11. First phase of Independence (1947-64): Facing the consequences of Partition; Gandhiji’s murder; economic dislocation; Integration of States; The democratic constitution, 1950; Agrarian reforms; Building an industrial welfare state; Planning and industrialization; Foreign policy of Non-alignment; Relations with neighbours.
12. Enlightenment and Modern ideas
   1. Renaissance Background
   2. Major Ideas of Enlightenment: Kant, Rousseau
   3. Spread of Enlightenment outside Europe
   4. Rise of socialist ideas (upto Marx)

13. Origins of Modern Politics
   1. European States System
   3. French Revolution and Aftermath, 1789-1815.
   4. British Democratic Politics, 1815-1850; Parliamentary Reformers, Free Traders, chartists.

14. Industrialization
   1. English Industrial Revolution: Causes and Impact on Society
   2. Industrialization in other countries: USA, Germany, Russia, Japan-

15. Nation-State System
   1. Rise of Nationalism in 19th century
   2. Nationalism : State-building in Germany and Italy
   3. Disintegration of Empires through the emergence of nationalities.

16. Imperialism and Colonialism
   1. Colonial System (Exploitation of New World, Trans-Atlantic Slave Trade, Tribute from Asian Conquests)
   2. Types of Empire: of settlement and non-settlement: Latin America, South Africa, Indonesia, Australia.
   3. Imperialism and Free Trade: The New Imperialism

17. Revolution and Counter-Revolution
   1. 19th Century European revolutions
   2. The Russian Revolution of 1917-1921
   3. Fascist Counter-Revolution, Italy and Germany.
   4. The Chinese Revolution of 1949

18. World Wars
   1. 1st and 2nd World Wars as Total Wars: Societal Implications
   2. World War I : Causes and Consequences
   3. World War II : Political Consequence

19. Cold War
   1. Emergence of Two Power Blocs
   2. Integration of West Europe and US Strategy; Communist East Europe
   3. Emergence of Third World and Non-Alignment
   4. UN and Dispute Resolution

20. Colonial Liberation
   1. Latin America-Bolivar
   2. Arab World-Egypt
   3. Africa-Apartheid to Democracy
   4. South-East Asia-Vietnam

21. Decolonization and Underdevelopment
   1. Decolonization: Break up of colonial Empires: British, French, Duth
   2. Factors constraining Development : Latin America, Africa

22. Unification of Europe
   1. Post War Foundations : NATO and European Community
   2. Consolidation and Expansion of European Community/European Union.

23. Soviet Disintegration and the Unipolar World
   3. End of the Cold War and US Ascendancy in the World
   4. Globalization
Khasi – OPTIONAL

of Part - B - Main Examination of Civil Services Exam

Paper I

1. Khasi Poetry:

1. Soso Tham (1936): "U John Gilpin" from Ka Duitara Ksiar
2. Morkha Joseph (1967) : "Ka Jingiam Briew ha u Lum Jingtep Ingmane" from Ka Ryngkap
3. Enami (1911) : "I Thakemon" from Na ka Thiar ki Longshuwa
4. Soso Tham (1936): "Ki Sngi Barim U Hynniew Trep" from Ka Duitara Ksiar
5. D.S.Khongdup (1968): (a) "U Syntiew ba nga jied" from Na Lum Khasi
7. O.M.Wahlang (1986): (a) "Ka Sohlyngngem" from Ka Jutang Sur Pangnud U khun Khasi
8. Rabon Singh (16th Edition Reprint 1987): (a) "Ka Jingphawar Shadwait" (b) "Ka Jingphawar Iasiat Thong" from Ka Kitap Jingphawar
9. V.G.Bareh (1998 Reprint) : (a) "Ka Duitara Jong Nga" from Ki Poetry Khasi

2. Khasi Drama:

5. S.J.Duncan (1978) : U Androklis bad u Sing

3. Khasi Fiction:

1. John Roberts (1910): Ka Jingiad u Pilgrim
2. W. Tiewsoh (1975) : Kam Kalbut

Paper II

1. Khasi Culture:

1. Feebon Roy (1897): "Shaphang ka Jingiapokha" Lynnong II from Ka Niam jong ki Khasi
2. G.Costa (1937) : "Ka Bishar Khasi" from Ka Riti Jong Ka Ri Laiphew Sylem Bynta II
4. H.O.Mawrie (1973): "U Khasi bad ki Khanatang 1,11,111", chapter 17,18,19 from Ka Pyrkhat u Khasi
5. D.T.Laloo (1978) : "Ka Tynrai ka Ksaw ka Kpong" from Ka Ksaw Ka Kpong U Hynniew Trep

2. Khasi Literary Criticism:

3. H.Elias (1963): "Shaphang ka poitri" from Ka Hamsaia ki Por
4. F.M.Pugh (1968): "Ha ki nongpule" from Ka Sawangka ia ki Sawngut Ba iap Mynsaw

3. Khasi Linguistics

(a) Ka jingroi jingsan ka Drama Khasi naduh u H.C.Roy (1910) haduh u H.Myliiemngap (1980);
(b) Ka Jingroi jingsan ka Poitri Khasi naduh u Soso Tham (1925) haduh u H.W.Sten (1980)
(c) Ka Jingroi jingsan ka Parom (fiction) Khasi naduh u H.C. Roy (1915) haduh u L.H.Pde (1980);
(d) Ka Jingroi Jingsan ka Prose Khasi naduh u Jeebon Roy (1900-1980)
Note: This paper focuses on the kind of development and the factors responsible for such developments. It also studies the major issues dealt by Khasi authors. Besides, it examines the literary standard and value of different works of Literature during the period.

Khasi language study.


LAW - Optional
of Part B - Main Examination of Civil Services Exam

Paper-I

Section-A

1. Constitutional Law of India

   2. Fundamental Rights.
   4. Constitutional Position of the President and relation with the Council of Ministers.
   5. Governor and his Powers.
   6. Appointment and Transfer of Judges of the Supreme Court and the High Courts.
   7. Supreme Court and High Courts: Powers and Jurisdiction.
   9. Distribution of Legislative Powers between the Union and the States.
   10. Administrative Relationship between Union and the States.
   18. Ombudsman: Lokayukta Lokpal etc.

Section-B

2. International Law

   1. Nature and Definition of International Law.
   2. Relationship between International Law and Municipal Law.
   5. Individuals, nationality, statelessness; Human Rights and procedures available for their enforcement.
   6. Territorial jurisdiction of States, Extradition and Asylum.
   7. Treaties: Formation, application, termination and reservation.
   11. Legality of the use of nuclear weapons; ban on testing of nuclear weapons; Nuclear non-proliferation treaty, CTBT.
15. Fundamental principles of international humanitarian law – International conventions and contemporary developments.

**Paper-II**

**Section-A**

1. **Law of Crimes:-**
   1. General Principles of Criminal Liability: mens rea and actus rcus, M mens rca in statutory offences.
   4. Preparations and criminal attempts
   5. General exceptions.
   7. Abetment.
   8. Criminal conspiracy.
   9. Offences against the State.
   10. Offences against public tranquility.
   11. Offences against human body.
   12. Offences against property
   14. Defamation
   15. Protection of Civil Rights Act, 1955
   18. Plea bargaining

2. **Law of Torts :**
   2. Liability based upon fault and strict liability
   3. Vicarious liability including State Liability.
   5. Joint tort feasors.
   6. Remedies.
   7. Negligence
   8. Defamation.
   10. Conspiracy
   11. False imprisonment.
   12. Malicious Prosecution.

**Section-B**

3. **Law of Contracts and Mercantile Law**
   1. Formation of Contract/ E-contract
   2. Factors vitiating consent
   3. Void voidable, illegal and unenforceable agreements.
   4. Performance and discharge of contracts.
   5. Quasi-contracts.
   6. Consequences of breach of contract
   7. Contract of indemnity, guarantee and insurance.
   10. Formation and dissolution of partnership
4. Contemporary Legal Developments

1. Public Interest Litigation.
3. Information Technology Law including Cyber Laws-concepts, purpose/prospects.
4. Alternate Dispute Resolution-Concept, types/prospects.
5. Major statutes concerning environmental law.
7. Trial by media.

Management -Optional

of Part - B - Main Examination of Civil Services Exam

Paper I

The candidate should make a study of the concept and development of management as science and art drawing upon the contributions of leading thinkers of management and apply the concepts to the real life of government and business decision making keeping in view the changes in the strategic and operative environment.

Section-A


Section-B


Paper-II

Section-A


Section-B


Mathematics - Optional
of Part B - Main Examination of Civil Services Exam

Paper-I

Section-A


3. **Analytic Geometry**: Cartesian and polar coordinates in two and three dimensions, second degree equations in two and three variables 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

4. **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, Clarrant's equation, singular solution.

Higher order linear equations with constant coefficients, complementary function and particular integral, general solution, Euler-Cauchy equation.

Section order linear equations with variable coefficients, determination of complete solution when one solution is known using, method of variation of parameters.

Laplace and Inverse Laplace transforms and their properties, Laplace transforms of elementary functions. Application to initial value problems for 2nd other linear equations with constant coefficients.

5. **Dynamics, Statics and Hydrostatics**: Degree of freedom and constraints, rectilinear motion, 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 resistance.

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, centre of pressure, thrust on curved surfaces, equilibrium of floating bodies, stability of equilibrium metacentre, pressure of gases.


Application to Geometry: Curves in space, curvature and torsion. Serret -Furenet's formulae, Gauss and Stokes' theorems, Green's identities.
Paper-II

Section-A

1. **Algebra**: Groups, subgroups, normal subgroups, homomorphism of groups, quotient groups, basic isomorphism theorems, Sylow's group-, permutation groups, Cayley's theorem. Rings and ideals, principal ideal domains, unique factorization domains and Euclidean domains. Field extensions, finite fields.

2. **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, Continuity 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, continuity, differentiability and integrability for sequences and series of functions. Differentiation of functions of several variables, change in the order of partial derivatives, implicit function theorem, maxima and minima. Multiple integrals.


4. **Linear Programming**: Linear programming problem, basic solution, basic feasible solution and optimal solution, graphical method and simplex method of solutions. Duality.

Transportation and assignment problems. Travelling salesman problems.

Section-B

5. **Partial differential equations**: Curves and surfaces in three dimensions, formulation of partial differential equations, solutions of equations of type \( \frac{dx}{p} = \frac{dy}{q} = \frac{dz}{r} \); orthogonal trajectories, pfaffian differential equations; partial, differential equations 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, equations of vibrating string, heat equation, laplace equation.


Representation of unsigned integers, signed integers and reals, double precision reals and long integers. Algorithms and flow charts for solving numerical analysis problems.

Developing simple programs in Basic for problems involving techniques covered in the numerical analysis.
7. **Mechanics and Fluid Dynamics**:

Generalised coordinates, constraints, holonomic and non-holonomic systems. **D’ Alembert’s principle and Lagrange’s equations**, Hamilton equations, moment of inertia, motion of rigid bodies in two dimensions.

Equation of continuity, Euler’s equation of motion for inviscid flow, Stream-lines, path of a particle, potential flow, two-dimensional and axisymmetric motion, sources and sinks, vortex motion, flow past a cylinder and a sphere, method of images. **Navier-Stokes equation for a viscous fluid.**

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**Mechanical Engineering - Optional**

of Part B - Main Examination of Civil Services Exam

**Paper-I**


5. **Manufacturing Management**: System design: factory location-simple OR models, plant layout, methods based, applications of engineering economic analysis and breakeven analysis for product selection, process selection and capacity planning, predetermined time standards.

   System planning, forecasting methods based on regression and decomposition, design and balancing of multi model and stochastic assembly lines, inventory management-probabilistic inventory models for order time and order quantity determination, JIT systems, strategic sourcing, managing inter plant logistics.

   System operations and control: Scheduling algorithms for job shops, applications of statistical methods for product and process quality control applications of control charts for mean, range, percent defective, number of defectives and defects per unit, quality cost systems, management of resources, organizations and risks in projects.

   System improvement: Implementation of systems, such as total quality management, developing and managing flexible, lean and agile Organizations.
PAPER-II

1. THERMODYNAMICS: Basic concept. Open and closed systems, Applications of Thermodynamic Laws, gas equations, Clapeyron equation, availability, irreversibility and Tds relations.


4. Steam Engineering: Steam generation: modified Ranking cycle analysis, Modern steam boilers, steam at critical and supercritical pressures, draught equipment, natural and artificial draught, boiler fuels solid, liquid and gaseous fuels. Steam turbines-Principle, types, compounding, impulse and reaction turbines, axial thrust.

   Steam nozzles: Flow of steam in convergent and divergent nozzle pressure at throat for maximum discharge with different initial steam conditions such as wet, saturated and superheated, effect of variation of back pressure, supersaturated flow of steam in nozzles, Wilson line.

   Rankine cycle with internal and external irreversibility, reheat factor, reheating and regeneration, methods of governing, back pressure and pass out turbines.

   Steam power plants: Combined cycle power generation, heat recovery steam generators (HRSG) fired and unfired, co-generation plants.

MEDICAL SCIENCE - Optional of Part B - Main Examination of Civil Services Exam

Paper-I

Section-A

1. Human Anatomy: Gross and microscopic anatomy and movements of shoulder, hip and knee joints; Blood supply, nerve innervation of hand, Lymphatic system; Karyotyping, medical genetics; Electron microscopic structure of glomerulous and muscle; Gross and microscopic anatomy and blood supply of lungs, heart, kidneys, liver, testis and uterus; Gross anatomy of pelvis, perineum and inguinal region. Cross-sectional anatomy of the body and mid-thoracic, upper abdominal, mid-abdominal and pelvic regions.

Embryology: Major steps in the development of lung, heart, kidney, urinary bladder, uterus, ovary, testis and their common congenital abnormalities; Placenta and placental barrier.

Anatomy of Central and Peripheral Autonomic Nervous System: Neural pathways for cutaneous sensations and vision; Cranial nerves, distribution and clinical significance; Anatomy of autonomic control of gastrointestinal, respirator and reproductive systems.
2. Human Physiology: Central, peripheral and autonomic nervous system; Nerve and muscle excitation, conduction and transmission of impulse, mechanism of contraction, neuromuscular transmission, EMG; Synaptic transmission, reflexes, control of equilibrium, posture and muscle tone, descending pathways, functions of cerebellum, basal ganglia, reticular formation, hypothalamus limbic system and cerebral cortex; Physiology of sleep and consciousness, EEG.; Higher functions of the brain; Vision and hearing.

Endocrine system: Mechanism of action of hormones, formation, secretion, transport, metabolism, function and regulation of secretion of pancreas and pituitary gland.

Physiology of reproductive system: menstrual cycle, lactation, pregnancy.

Blood: Development, regulations and fate of blood cells.

Cardio-vascular, respiratory gastro-intestinal and renal physiology: Cardiac excitation, spread of cardiac impulse, ECG., cardiac output, blood pressure, regulation of cardiovascular functions; Mechanics of respiration and regulation of respiration; Digestion and absorption of food, regulation of secretion and motility of gastrointestinal tract; Glomerular and tubular functions of kidney.

3. Biochemistry: Organ function tests – liver, kidney, thyroid; Protein synthesis, Vitamins and minerals, Restriction fragment length polymorphism (RFLP), Polymerase chain reaction (PCR), Radio-immunoassays (RIA).

Section-B

1. Pathology: Reaction of cell and tissue of injury, inflammation and repair, disturbances of growth and cancer, genetic diseases; Pathogenesis and histopathology of rheumatic and ischaemic heart disease; Bronchogenic carcinoma, carcinoma breast, oral cancer, cancer colon, lymphoma, leukaemia, liver cancer, meningioma and meningitis; Etiology, pathogenesis and histopathology of Peptic ulcer, cirrhosis liver, glomerulonephritis, lobar pneumonia, acute osteomyelitis, hepatitis, acute pancreatitis.


4. Forensic Medicine and Toxicology: Forensic examination of injuries and wounds; Physical and chemical examination of blood and seminal stains; Organo phosphorous poisoning, sedative overdose, hanging, drowning, burns, snake envenomation, DNA and fingerprint study.

Paper-II

Section-A

1. General Medicine: Etiology, clinical features, diagnosis and principles of management (including prevention) of -

Malaria, Typhoid, Cholera, Tetanus, Rabies, Exanthematous Fevers, Tuberculosis, AIDS. Etiology, clinical features, diagnosis and principles of management of:

Rheumatic, ischaemic and congenital heart disease, hypertension. Cardiomyopathy, pulmonary embolism.
Acute and chronic respiratory infections, bronchial asthma.

Occupational lung disease, pleural effusion, disseminated tuberculosis, Malabsorption syndromes, acid peptic diseases, haematemesis. Viral hepatitis, cirrhosis of liver, alcoholic liver disease.

Actue glomerulonephritis, chronic pyelonephritis, renal failure, nephrotic syndrome, renovascular hypertension, diabetes mellitus, anaemias, coagulation disorders, leukaemia, polycythemia and hyperviscosity syndrome, meningitis encephalitis, cardiovascular diseases.

Role of Imageology in the workup of medical problems, ultrasound, echo-cardiogram, CT scan, MRI.

Psychiatry : Common psychiatric disorders, schizophrenia. ECT.


Section B

1. General Surgery : Clinical features, causes, diagnosis and principles of management of-Cervical lymph node enlargement, parotid tumour, oral cancer, cleft palate, harelip, Laryngeal tumour, esophageal tumours, Peripheral arterial diseases, varicose veins, coarctation of aorta, dysfunctions of thyroid parathyroids and adrenals, Tumours of Thyroid, Parathyroid, Adrenal, Pituitary Glands, abscess of breast, cancer breast, fibroadenoma and adenosis of breast, acute and chronic appendicitis, bleeding peptic ulcer, tuberculosis of bowel, intestinal obstruction, ulcerative colitis, renal mass, acute retention of urine, benign prostatic hypertrophy. Haemomthorax, constrictive pericarditis, splenomegaly, chronic cholecystitis, portal hypertension, liver abscess, peritonitis, carcinoma head of pancreas, direct and indirect inguinal hernias and their complications. fractures of femur and spine, Colles' fracture and bone tumours, organ transplantisation, kidney, liver, heart, bone-marrow, Laprascopic surgery.

2. Obstetrics and Gynaecology including Family Planning : Diagnosis of pregnancy, screening of high risk pregnancy, foetoplacental development, labour management, complications of 3rd stage, postpartum haemorrhage, resuscitation of the newborn, diagnosis and management of anaemia and pregnancy induced hypertension, principles of the following contraceptive methods. Intra-uterinc devices, pills, tubectomy and vasectomy, medical termination of pregnancy including legal aspects. Etiology, clinical features, diagnosis and principles of management of - Cancer cervix. Leucorrhoea, pelvic pain, infertility, abnormal uterine bleeding, amenorrhoea, Fibroid and prolapsed of uterus.

3. Preventive and Social medicine: Concept of causation and control of disease in the community, principles and methods of Epidemiology, health hazards due to environmental pollution and industrialisation. Normal nutrition and nutritional deficiency diseases in India. Population trends (World and India), Growth of population and its effect on health and development, objectives, components and critical analysis of each of the following National programmes for the control/eradication of : Malaria, Filaria, Kala-azar, Leprosy, Tuberculosis, Cancer, Blindness, Iodine Deficiency Disease, AIDS & STD and guinea worm.

Objectives, components critical analysis of each of the following National Health and Family Welfare Programmes:

Maternal and child health family welfare Nutrition Immunization.
Philosophy - Optional
of Part B - Main Examination of Civil Services Exam
Paper-I

History and Problems of Philosophy

Section-A

1. **Plato** : Theory of Ideas.
2. **Aristotle** : Form, Matter and Causation.
4. **Spinoza** : Substance, Attributes and Modes, Pantheism; Bondage and Freedom.
5. **Leibnitz** : Monads; Theory of Perception of God.
6. **Locke** : Theory of Knowledge, Rejection of Innate Ideas; substance and qualities.
9. **Kant** : Distinctions between synthetic and analytic judgements and between apriori and aposteriori judgements, Space and Time Categories, Possibility of Synthetic Apriori Judgements, Ideas of Reason and Antinomies; Criticism of Proofs for the Existence of God.
12. **Logical Atomism** : Atomic Facts, Atomic sentences, Logical Constructions and Incomplete Symbols (Russell), Distinction of saying and showing (Wittgenstein)
15. **Existentialism** : Kierkegaard, Sartre.
16. **Quine** : Radical kempiricism.
17. **Strawson** : Theory of Persons.

Section-B

1. **Carvaka** : Theory of Knowledge, Materialism.
7. **Vedanta** : Schools of Vedanta Sankara, Ramanuja, Madhva (Brahman, Isvara, Atman, Jiva, Jagat, Maya, Avidya Adhyasa, Moksa).
8. **Yoga** : Citta, Cittavritti, Kleshas, Samadhi, Kaivalya.
Paper- II
Section 'A'

Socio-Political Philosophy
2. Sovereignty (Austin, Boidin, Laski, Kautilya).
3. Individual and State.
5. Socialism and Marxism.
6. Humanism.
7. Secularism.
9. Co-existence and violence; Sarvoday.
13. Caste Discrimination: Gandhi and Ambedkar

Section 'B'

Philosophy of Religion
3. Immortality of Soul.
4. Liberation.
5. Problem of Evil.
7. Religion without God.
8. Religion and Morality.

Physics - Optional
of Part B - Main Examination of Civil Services Exam

Paper-I
Section-A

1. Classical Mechanics
(a) Particle dynamics: Law of motion, conservation of energy and momentum, applications to rotating frames, centripetal and Coriolis accelerations, motion under a central force, conservation of angular momentum, Kepler’s laws, Fields and potentials – Gravitational field and potential due to spherical bodies, Gauss and Poison equations, gravitational self energy, two body problem, reduced mass, Rutherford scattering, centre of mass and laboratory reference frames.
(b) Rigid body dynamics: System of particles, Centre of mass, angular momentum, equations of motion, conservation theorems for energy, momentum and angular momentum, elastic and inelastic collisions, rigid body, degrees of freedom, Euler’s theorem, angular velocity, angular momentum, moments of inertia, theorems of parallel and perpendicular axes, equation of motion for rotation, molecular rotations (as rigid bodies), Di and triatomic molecules, precessional motion, top, gyroscope.
2. Special Relativity, Waves & Geometrical Optics

(a) Special Relativity: Michelson-Monkey experiment and its implications. Lorentz transformations-length contraction, time dilation, addition of velocities, aberration and Doppler effect, mass-energy relation, simple application to a decay process. Minkowski diagram, four dimensional momentum vector. Covariance of equations of physics.


(c) Geometrical Optics: Laws of reflection and refraction from Fermat's principle. Matrix method in paraxial optic-thin lens formula, nodal planes, system of two thin lenses, chromatic and spherical aberrations.

3. Physical Optics

(a) Interference: Interference of light-Young's experiment, Newton's rings, interference by thin films,. Michelson interferometer. Multiple 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.


Section-B

4. Electricity and Magnetism


5. Electromagnetic Theory & Black body Radiation


(b) Blackbody radiation: Blackbody radiation and Planck's radiation law- Stefan-Boltzmann law, Wien's displacement law and Rayleigh-Jeans law. Planck mass, Planck length, Planck time,. Planck temperature and Planck energy.

6. Thermal and Statistical Physics

(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.

**Paper-II**

**Section A**


**Section B**


5. **Particle Physics & Solid State Physics**


(b) **Solid State Physics**: Cubic crystal structure. Band theory of solids conductors, insulators and semiconductors. Elements of superconductivity, Meissner effect, Josephson junctions and applications. Elementary ideas about high temperature superconductivity.

Political Science and International Relations - Optional
of Part D - Main Examination of Civil Services Exam

Paper-1

Political Theory and Indian Politics

Section-A

1. Approaches to the study of political theory: Historical, normative and empirical.


4. Democracy and Human Rights: Democratic theory-classical and contemporary. Theories of Human Rights; Theories of justice, equality and revolution, political obligation; New-Social Movements.

5. Theories of Political Culture: Culture and politics in Third World countries.

6. Theories of Political Economy: Classical and contemporary.

7. Political Ideologies: Nature of Ideology; Liberalism, Socialism, Marxism, Fascism, Gandhism and Anarchism.


Section-B

Indian Government and Politics

1. Indian Nationalism: Dadabhai Naoroji, Tilak, Savarkar, Gandhi, Jayaparakash Narain, Nehru, Subhas Bose, Ambedkar, Ram Manobar Lohia.

2. Nature and struggle of Indian freedom struggle: From constitutionalism to mass Satyagraha, Revolutionary Movements, Non-co-operation, Civil Disobedience and Quit India, Indian Naval uprising, Indian National Army; role of women in freedom struggle.

3. Socio-economic dimensions of the nationalist movement: The communal question and the demand for partition; backward caste movements, Trade union and Peasant movements, Civil rights movement.


6. The Executive System in theory and practice: President, Prime Minister and the Council of Ministers; Governor, Chief Minister and the State Council of Ministers, the Bureaucracy.

7. Role and function of the Parliament and Parliamentary Committee: Lok Sabha and Rajya Sabha; changing socio economic profile.

8. The Supreme Court and the High Courts: Judicial Activism; P1L.

10. **Party system**: Ideology and social base of parties; fragmentation and regionalisation. Pressure groups; patterns of coalition politics; trends in electoral behaviour.

11. **Caste, Religion and Ethnicity In Indian Politics**.

12. **Planning and Economic Development**: Role of the Planning Commission; Planning in the era of liberalisation; political dimensions of economic reforms.


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**Paper - II**

**Comparative Politics and International Relations**

**Section-A**

**Comparative Analysis and International Politics**

1. **Approaches to the study of comparative politics**: traditional approaches; political economy, political sociology or political system approaches; Nature of political process in the Third World.

2. **The Modern State**: Evolution, the contemporary trends in the advanced industrial countries and the third world.


4. **Concepts of International politics**: Power, national interest, balance of power, national security, collective security and peace.

5. **Approaches to the Study of International Relations**: Idealist, Realist, Marxist, Functionalist and Systems theory.

6. **Determinants of foreign policy**: Domestic compulsions, geopolitics, geoeconomics and global order.

7. Origin and contemporary relevance of the Cold War, nature of the post-cold war global order.

8. **Major issues of world politics**: Cuban Missile Crisis; Vietnam War, Oil Crisis, Afghan Civil War, Gulf War, Collapse of the Soviet Union, Yugoslav Crisis.

9. **Non-alignment**: Concept and movement; Third World Movements for global justice, Non-alignment in the post cold war era.

10. The evolution of the international economic system—from Bretton woods to WTO, the North-South dimension.

11. **International Organisations UN and its specialized agencies**: International Court of Justice; ILO, UNICEF, WHO UNESCO.

12. Regional, Organizations such as the ASEAN, APEC, EU. SAARC, NAFTA

Section B

India and the World

1. **Indian Foreign Policy**: Historical origins, determinants of foreign policy; the institutions of policy-making; continuity and change.

2. **India and the Non-Alignment Movement**: Evolution and contemporary relevance. Sociopolitical basis of non-alignment-domestic and global.

3. **Major issues in Indian foreign policy**: Sino-Indian Border War (1962); Indo-Pakistan War (1971) and the liberation of Bangladesh; 1PKF in Sri Lanka India as military nuclear power (1998).

4. **Conflict and co-operation in South Asia**: India's relations with Pakistan, Sri Lanka, Bangladesh, Nepal, Regional co-operation and SAARC. Kashmir question in India's foreign policy.

5. India's relation with Africa and Latin America.

6. India and South East Asia; ASEAN.

7. **India and the major powers**: USA, EU, China, Japan and Russia.

8. **India and the UN System**: India's role in UN Peace- Keeping and global disarmament.

9. India and the emerging international economic order; multilateral agencies-WTO, IMF, IBRD, ADB.

10. India and the Nuclear Question: Changing perceptions and policy.

Psychology - Optional

of Part B - Main Examination of Civil Services Exam

Paper-I

Foundations of Psychology

Section A

1. **Introduction**: Psychology as a Science: Definitions and perspective. Psychology in relation to other social and natural sciences. Use of interdisciplinary approach.

2. **Methods of Psychology**: Characteristics and components of methods in psychology (induction, deduction and introspection) observation, Survey, Laboratory and field experiments Clinical and case study. Experimental and quasi experimental methods. Focussed group discussion, brain storming, grounded theory approach.

3. **Research methods and quantitative analysis**: Major steps in psychological research (problem statement, hypothesis formulation, research design, sampling, tools of data collection, analysis and interpretation and report writing). Fundamental versus applied research, Methods of data collection (interview, observation, questionnaire and case study). Research Designs (Ex-post facto and experimental). Application of statistical techniques (t-test, two-way ANOVA correlation and regression and chi-square tests).


5. **Attention and perception**: Attention - factors, influencing attention including set and characteristics of stimulus. Sensation-concepts of threshold, absolute and difference thresholds, signal detection and vigilance. Definition and concept of perception,
biological factors in perception. Perceptual organisation—influence of past experiences, Perceptual defence—factors influencing, space and depth perception, size estimation and perceptual readiness. The plasticity of perception, extrasensory perception, culture and perception, subliminal perception.


7. **Memory** : Concepts and definition of memory and forgetting, 7+/-2 concept and clumping Encoding, storage and retrieval. Factors influencing retention and forgetting. Theories of forgetting (Repression, Decay and Interference theories). The concept of reminiscence.

**Section-B**


9. **Intelligence and Aptitude** : Concept of intelligence and aptitude, nature and theories of intelligence, Spearman, Thurstone, Guilford Vernon, Sternberg and J.P.Das. Emotional intelligence, social intelligence, measurement of intelligence and aptitudes, concept of IQ deviation IQ, constancy of IQ. Measurement of multiple intelligence—fluid intelligence and crystallized intelligence.


11. **Personality** : Concept and definition of personality. Theories of personality (psychoanalytical, socio-cultural, interpersonal, developmental, humanistic, behaviouristic, trait and type approaches). Measurement of personality (projective tests, pencil-paper test). The Indian approach to Personality. Training for personality development.

12. **Language and Communication** : Human language—properties, structure and linguistic hierarchy, Language acquisition-predisposition, critical period hypothesis. Theories of language development (Skinner; Chomsky), Process and types of communication. Effective communication and training.

13. **Attitudes, Values and Interests** : Definitions, concepts of attitudes, values and interests. Components of attitudes, values and interests. Formation and maintenance of attitudes. Measurement of attitudes, values and interests. Theories of attitudes, and attitudes changes and strategies for fostering values.


**Paper - II**

**Psychology : Issues and Applications**

**Section - A**

1. **Psychological Measurement of Individual Difference** : The nature of individual differences, Characteristics and construction of standardized psychological tests. Types of psychological tests. Use, misuse and limitation of psychological tests. Ethical issues in the use of psychological tests.
2. **Well being and Mental Disorders**: Concept of health, positive health, well being and ill health casual factors in, Mental disorders (Anxiety disorders, mood disorders, schizophrenia and delusional disorders; personality disorders, substance abuse disorders). Factors influencing positive health, well being, lifestyle and quality of life.


5. **Application of Psychology to Educational Field**: Psychological principles underlying effective teaching-learning process. Learning styles Gifted, retarded, learning disabled and their training. Training for improving memory and better academic achievement. Personality development and value education. Educational, vocational guidance and Career counselling. Use of Psychological tests in educational institutions.

6. **Community Psychology**: Definition and concept of Community Psychology. Role of community psychologists in social change. Use of small groups in social action. Arousing community consciousness and action for handling social problems. Group decision making and leadership for social change.


Section – B

8. **Application of Psychology to disadvantaged groups**: The concepts of disadvantaged, deprivation and socially deprived. Social, physical, cultural and economic consequences of disadvantaged and deprived groups. Educating and motivating the disadvantaged towards development.

9. **Psychological and the problem of social integration**: The concept of social integration. The problem of caste, class, religion and language conflicts and prejudice. Nature and manifestation of prejudice between the ingroup and outgroup. Casual factors of such conflicts and prejudices. Psychological strategies for handling the conflicts and prejudices. Measures to achieve social integration.

10. **Application of psychology in Information Technology and Mass media**: The present scenario of information technology and the mass media boom and the role of psychologists. Selection and training of psychology professionals to work in the field of IT and mass media. Distance learning through IT and mass media. Intrepreneurship through e-commerce. Multilevel marketing. Impact of TV and fostering value through IT and mass media. Psychological consequences of recent developments in Information Technology.

11. **Application of Psychology in the field of Defence**: The concept of Military psychology, Aviation psychology and Psychological warfare role of military psychologists in the defence. Selection, recruitment and training of personnel. Facilitating the process of adjustment of personnel to military life-role of counselling. Devising psychological tests for defence personnel. Psychological disorders due to war. Human engineering in defence.


Public Administration - Optional

of Part B - Main Examination of Civil Services Exam

Paper- I

Administrative theory

Section – A


3. Structure of public organisations: Typologies of Political Executive and their functions. Forms of public organizations: Ministries and Departments: Corporations; Companies, Boards and Commissions; Ad hoc and Advisory bodies. Headquarters and Field relationships.

4. Administrative Behaviour: Process and techniques of decision-making, communication, morale, motivation theories content, process and contemporary, theories of leadership, traditional and modern.

5. Accountability and Control: Concepts of accountability and Control; Legislative Executive and Judicial Control over administration. Citizen and Administration, Role of Civil society, people's participation, Right to information, administrative corruption, machinery for redressal of citizens' grievances. Citizens Charter.


Section – B

8. **Comparative Public Administration**: Historical and sociological factors affecting administrative systems, administration and politics in different countries, current status of comparative public administration, ecology and administration, Riggian models and their critique.

9. **Development Administration**: Origin and purpose, Rigg’s Prismatic-Sala Model; Bureaucracy and Development; Changing profile of Development Administration; new directions in people’s self development and empowerment.


11. **Personnel Administration**: Objectives of Personnel Administration. Importance of human resource development. Recruitment, training, career development, position classification, discipline, performance appraisal, promotion, pay and service conditions; employer-employee relations, grievance redressal mechanism integrity and code of conduct.


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**Paper II**

**Indian Administration**

**Section – A**

1. **Evolution of Indian Administration**: Kautilya, Mughal period, British legacy.


3. **Union Government and Administration**: President Prime Minister, Council of Ministers, Cabinet committees, Cabinet Secretariat, Prime Minister’s Office, Central Secretariat, Ministries and Departments, Advisory Bodies, Boards and Commissions, Field organizations.

4. **State Government and Administration-Governor**: Chief Minister, Council of Ministers, Chief Secretary, State Secretariat, Directorates.

5. **District Administration**: Changing role of the District Collector: Law and Order and development management. Relationship with functional departments. District administration and the Panchayati Raj institutions. Role and functions of the Sub-Divisional Officer.


7. **Public Sector**: Forms of public undertakings. Their contribution to the economy; problems of autonomy and accountability. Changing role of the public sector in the context of liberalisation.
8. **Civil Services**: Constitutional position, structure, recruitment, training and capacity building, good governance initiatives, code of conduct and discipline, staff associations, political rights, grievance redressal mechanism, civil service neutrality, civil service activism.

9. **Control of Public Expenditure**: Parliamentary control Estimates Committee, Public Accounts Committee, Committee on Public Undertakings, Office of the Comptroller and Auditor General of India, Role of the finance ministry in monetary and fiscal policy area, co-ordination and economy in expenditure.


11. **Machinery for Planning**: Role, composition and review of functions of the Planning Commission; Role of the National Development Council. Process of plan formulation at Union and State levels. Decentralized planning.

12. **Administration of Law and Order**: Role of Central and State Agencies in maintenance of law and order. Criminalisation of politics and administration.


14. **Major issues in Indian Administration**: Problems of Centre-State Relations; Relationship between political and permanent Executives. Values in public service and administrative culture. Lok Pal and Lok Ayuktas. Development and environmental issues. Impact of information Technology on public administration. Indian Administration and Globalisation.

15. **Rural Development**: Institutions and agencies since Independence, rural development programmes, foci and strategies, decentralization and Panchayati Raj, 73rd Constitutional Amendment.

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**Sociology - Optional**

of Part B - Main Examination of Civil Services Exam

**Paper-I**

**General Sociology/Foundations of Sociology/Fundamentals of Sociology**

1. **Sociology-The Discipline**: (a) Modernity and social changes in Europe and emergence of Sociology. (b) Scope of the subject and comparison with other social sciences. (c) Sociology and common sense.

2. **Scientific Study of Social Phenomena**: (a) Science, scientific method and critique. (b) Major theoretical stands of research methodology. (c) positivism and its critique. (d) Fact value and objectivity. (e) Non-positivist methodologies.

3. **Techniques of data collection and analysis**: (a) Qualitative and quantitative methods. (b) Techniques of data collection. (c) Variables, sampling, hypothesis, reliability and validity.

4. **Pioneering contributions to Sociology**:
   a) Karl Mark: Historical materialism, mode of production, alienation and class struggle.
   b) Emile Durkheim: Division of labour, social fact, religion and society.
   c) Max Weber: Social action, ideal types, authority, bureaucracy, protestant ethic and the spirit of capitalism.
   d) Talcott Parsons: Social system, pattern variables.
   e) Robert K. Merton: Latent and manifest functions, anomie, conformity and deviance, reference groups.
5. Marriage and Family: Types and forms of marriage; family-structure and function; personality and socialization; Social control; family, lineage, descent and property; changing structure of family marriage and sex roles in modern society; divorce and its implications; gender issues; role conflicts.

6. Social Stratification: Concepts-hierarchy, inequality and stratification; theories of stratification-Marx, Davis and Moore and Melvin Tumin’s critique; forms and functions; class-different conceptions of class; class-in-itself and class-for-itself; caste and class; caste as a class.

7. Social Mobility: Types of mobility-open and closed models; intra-and inter-generational mobility; vertical and horizontal mobility; social mobility and social change.

8. Economic System: Sociological dimensions of economic life; the impact of economic processes on the larger society; social aspects of division of labour and types of exchange; features of pre-industrial and industrial economic system; industrialisation and social change; social determinants of economic development.

9. Political System: The nature of power-personal power, community power, power of the elite, class power, organisational power, power of the un-organised masses; authority and legitimacy; pressure groups and political parties; voting behaviour; modes of political participation-democratic and authoritarian forms.

10. Educational System: Education and Culture; equality of educational opportunity; social aspects of mass education; problems of universalisation of primary education; role of community and state intervention in education; education as an instrument of social control and social change; education and modernisation.

11. Religion: Origins of religious beliefs in pre-modern societies; the sacred and the profane; social functions and dysfunctions of religion; monistic and pluralistic religion; organised and unorganised religions; scimitism and antisemitism; religion., sect and cults; magic, religion and science.

12. Science & Technology: Ethics of science; social responsibility of science; social control of science; social consequences of science and technology; technology and social change.

13. Social Movements: Concepts of social movements; genesis of social movements; ideology and social movement; social movement and social change; types of social movements.

14. Social change in Modern Society: (a) Sociological theories of social change. (b) Development and dependency, (c) Agents of social change. (d) Education and social change. (e) Science, technology and social change.

Paper-II
Study of Indian Society

1. Historical Moorings of the Indian Society: (i) Perspective on the Study of Indian Society: (a) Indology (G.S. Ghure). (b) Structural functionalism (M.N.Srinivas). (c) Marxist sociology (A.R.Desai). (ii) Impact of colonial rule on Indian society: (a) Social background of Indian nationalism. (b) Modernization of Indian tradition. (c) Protests and movements during the colonial period. (d) Social reforms.

2. Caste System: Origin of the caste system; cultural and structural views about caste; mobility-in caste; caste among Muslims and Christians; change and persistence of caste in modern India; issues of equality and social justice; views of Gandhi and Ambedkar on caste; caste on an Indian polity; Backward Classes Movement; Mandal Commission Report and issues of social backwardness and social justice; emergence of Dalit consciousness.

3. Class Structure: Class structure in India, agrarian and industrial class structure; emergence of middle class; emergence of classes among tribes; elite formation in India.


5. Agrarian Social Structure: Peasant society and agrarian systems; land tenure systems-historical perspectives, social consequences of land reforms and green revolution; feudalism-semi-feudalism debates; emerging agrarian class structure; agrarian unrest.
6 Industry and Society: Path of industrialisation, occupational diversification, trade unions and human relations; market economy and its social consequences; economic reforms liberalisation, privatisation and globalisation.

7. Political Processes: Working of the democratic political system in a traditional society; political parties and their social base; social structural origins of political elites and their orientations; regionalism, pluralism and national unity; decentralisation of power; panchayati raj and nagarpalikas and 73rd and 74th constitutional amendments.

8. Education: Directive Principles of State Policy and primary education; education; educational inequality and change; education and social mobility; the role of community and state intervention in education; Universalisation of primary education; Total literacy Campaigns; educational problems of disadvantages groups.

9. Religion and Society: Size, growth and regional distribution of different religious groups; educational levels of different groups; problems of religious minorities; communal tensions; secularism; conversions; religious fundamentalism.

10. Tribal Societies: Distinctive features of tribal communities and their geographical spread, problems of tribal communities-land alienation, poverty, indebtedness, health and nutrition, education; tribal development efforts after independence; tribal policy-isolation, assimilation and integration; issues of tribal identity.

11. Population Dynamics: Population size, growth, composition and distribution; components of population growth; birth rate, death rate and migration; determinants and consequences of population growth; issues of age at marriage, sex ratio, infant mortality rate; population policy and family welfare programmes.

12. Dimensions of Development: Strategy and ideology of planning; poverty, indebtedness and bonded labour; strategies of rural development-poverty alleviation programmes; environment, housing, slums, and unemployment; programmes for urban development.

13. Social Change: (i) Visions of Social Change in India (a) Idea of development planning and mixed economy. (b) Constitution, law and social change. (c) Education and social change. (ii) Rural and Agrarian Transformation in India (a) Programmes of rural development, Community Development Programme, Cooperatives, poverty alleviation schemes. (b) Green revolution and social change. (c) Changing modes of production in Indian agriculture. (d) Problems of rural labour, bondage, migration. (iii) Industrialization and Urbanisation in India (a) Evolution of modern industry in India. (b) Growth of urban settlements in India. (c) Working class, structure, growth, class mobilization. (d) Informal sector, child labour. (e) Slums and deprivation in urban areas.(iv) Politics and Society (a) Nation democracy and citizenship. (b) Political parties, pressure groups, social and political elite. (c) Regionalism and decentralization of power. (d) Secularization. (V) Challenges of Social Transformation (a) Crisis of development, displacement, environmental problems and sustainability. (b) Poverty, deprivation and inequalities. (c) Violence against women. (d) Caste conflicts. (e) Ethnic conflicts, communalism, religious revivalism. (f) Illiteracy and disparities in education.


15. Women and Society: Demographic profile of women; special problems-dowry, atrocities, discrimination; existing programmes for women and their impact. Situational analysis of children; child welfare programmes.

1. **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 path mean and almost everywhere, their criteria and inter-relations, Brilits-Cantelli lemma, Chebyshev’s inequality and Khintchine’s weak laws of large numbers, strong law of large numbers and Kolmogorov’s theorems, Glivenko-Cantelli theorem, probability generating function, characteristic function, inversion theorem, Laplace transform, related uniqueness and continuity theorems, determination of distribution by its moments. Linderberg 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.


Non-randomised and randomised tests, critical function, MP tests, Neyman-Pearson lemma, UMP tests, monotone likelihood ratio, generalised Neyman-Pearson lemma, similar and unbiased tests, UMPU tests for single and several-parameter families of distributions, likelihood ratio test 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.


3. **Linear Inference and Multivariate Analysis**: Linear statistical models, theory of least squares and analysis of variance, Gauss-Markoff theory, normal equations, least squares estimates and their precision, test of significance and interval estimates based on least squares theory in one-way, two-way and three-way classified data, regression analysis, linear regression, curvilinear regression and orthogonal polynomials, multiple regression, multiple and partial correlations, regression diagnostics and sensitivity analysis, calibration problems, estimation of variance and covariance components, MINQUE theory, multivariate normal distribution, Mahalanobisc’s D-2 and Hotelling’s T statistics and their applications and properties, discriminant analysis, canonical correlograms, one-way MANOVA, principal component analysis, elements of factor analysis.
4. 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, stratified 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 and the Horvitz-Thompson estimators, non-negative variance estimation with reference to the Horvitz-Thompson estimator, non-sampling errors, Warner's' randomised response technique for sensitive characteristics.

Fixed effects model (two-way classification) random and mixed effects models (two-way classification per cell), CRD, RBD, LSD and their analyses, incomplete block designs, concepts of orthogonality and balance, BIBD, missing plot technique, factorial designs: 2^n, 32 and 33, confounding in factorial experiments, split-plot and simple lattice designs, transformation of data Duncan's multiple range test.

Paper II

I. Industrial Statistics: Process and product control, general theory of control charts, different types of control charts for variables and attributes, X, R, s, p, np and c charts, cumulative sum chart, V-mask, single, double, multiple and sequential sampling plans for attributes, OC, ASN, AOQ and ATI curves, concepts of producer's and consumer's risks, AQL, LTPD and AOQL, sampling plans for variables, use of Dodge-Romin and Military Standard tables.

Concepts of reliability, maintainability and availability, reliability of series and parallel systems and other simple configurations, renewal density and renewal function, survival models (exponential), Weibull, lognormal, Rayleigh, and bath-tub, different types of redundancy and use of redundancy in reliability improvement, problems in life-testing, censored and truncated experiments for exponential models.

2. Optimization Techniques: Different, types of models in Operations Research, their construction and general methods of solution, simulation and Monte-Carlo methods, the structure and formulation of linear programming (LP) problem, simple LP model and its graphical solution, the simplex procedure, the two-phase method and the M-technique with artificial variables, the duality theory of LP and its economic interpretation, statistics sensitivity analysis, transportation and assignment problems; rectangular games, two-person zero-sum games, methods of solution (graphical and algebraic).

Replacement of failing or deteriorating items, group and individual replacement policies, concept of scientific inventory management and analytical structure of inventory problems, simple models with deterministic and stochastic demand with and without lead time, storage models with particular reference to dam type.

Homogeneous discrete-time Markov chains, transition probability matrix, classification of states and ergodic theorems, homogeneous continuous-time Markov chains, Poisson process, elements of queuing theory, M/M/1, M/M/K, G/M/1 and M/G/1 queues. Solution of statistical problems on computers using well-known statistical software packages like SPSS.


Commonly used index numbers-Laspeyre's, Paasche's and Fisher's ideal index numbers, chain-base index number uses and limitations of index numbers, index number of wholesale prices, consumer price index number, index numbers of agricultural and industrial production, test for index numbers like proportionality test, time-reversal test, factor-reversal test, circular test and dimensional invariance test.
General linear model, ordinary least square and generalised least squares methods of estimation, problem of multicollinearity, consequences and solutions of multicollinearity, autocorrelation and its consequences, heteroscedasticity of disturbances and its testing, test for independence of disturbances, Zellner’s seemingly unrelated regression equation model and its estimation, concept of structure and model for simultaneous equations, problem of identification-rank and order conditions of identifiability, two-stage least squares method of estimation.

Present official statistical system in India relating to population, agriculture, industrial production, trade and prices, methods of collection of official statistics, their reliability and limitation and the principal publications containing, such statistics, various official agencies responsible for data collection and their main functions.

4. Demography and Psychometry: Demographic data from census, registration, NSS and other surveys, and their limitation and uses, definition, construction and uses of vital rates and ratios, measures of fertility, reproduction rates, morbidity rate, standardized death rate, complete and abridged life tables, construction of life tables from vital statistics and census returns, uses of life tables, logistic and other population growth curves, fitting a logistic curve, population projection, stable population quasi-stable population, techniques in estimation of demographic parameters, morbidity and its measurement, standard classification by cause of death, health surveys and use of hospital statistics.

Methods of standardisation of scales and tests, Z-scores, standard scores, T-scores, percentile scores, intelligence quotient and its measurement and uses, validity of test scores and its determination, use of factor analysis and path analysis in psychometry.

Zoology - Optional

of Part B - Main Examination of Civil Services Exam

Paper - I

Section – A

1. Non-chordata and chordata :
   (a) Classification and relationship of varous phyla upto sub-classes; Acoelomata and Coelomate, Protostomes and Deuterostomes, Bilaterlia and Radiata, Status of Protista, Parazoa, Onychophora and Hemichordata; Symmetry.
   (b) Protozoa: Locomotion, nutrition, reproduction; evolution of sex; General features and life history of Paramaecium, Monocystis, Plasmodium and Leishmania.
   (c) Porifera: Skeleton, canal system and reproduction.
   (d) Coelenterata: Polymorphism, defensive structures and their mechanism; coral reefs and their formation; metagenesis; general features and life history of Obelia and Aurelia.
   (e) Platyhelminthes: Parasitic adaptation; general features and life history of Fasciola and Taenia and their relation to man.
   (f) Nemathelminthes: General features, life history and parasitic adaptation of Ascaris; nemathelminths in relation to man.
   (g) Annelida: Coelom and metamerism; modes of life in polychaetes; general features and life history of nereis (Neanthes), earthworm (Pheretima) and leach (Hirudinaria).
   (h) Arthropoda: Larval forms and parasitism in Crustacea; vision and respiration in arthropods (prawn, cockroach and scorpion); modification of mouth parts in insects (cockroach, mosquito, housefly, honey bee and butterfly); metamorphosis in insects and its hormonal regulation; social organization in insects (termites and honey bees).
(i) **Mollusca**: Feeding, respiration, locomotion, shell diversity; general features and life history of Lamellidens, Pila and Sepia, torsion and detorsion in gastropods.

(j) **Echinodermata**: Feeding, respiration, locomotion larval forms; general features and life history of Asterias.

(k) **Protochordata**: Origin of chordates; general features and life history of Branchiostoma and Herdamania.

(l) **Pisces**: Scales, respiration, locomotion, migration,

(m) **Amphibia**: Origin of tetrapods; parental care, paedomorphosis.

(n) **Reptilia**: Origin of reptiles; skull types; status of Sphenodon and crocodiles.

(o) **Aves**: Origin of birds; flight adaptation, migration.

(p) **Mammalia**: Origin of mammals; denitition; general features of egg-laying mammals, pouched-mammals, aquatic mammals and primates; endocrine glands and other hormone producing structures (pituitary, thyroid, parathyroid, adrenal, pancreas, gonads) and their interrelationships.

(q) Comparative functional anatomy of various systems of vertebrates (integument and its derivatives, endoskeleton, locomotory organs, digestive system, respiratory system, circulatory system including heart and aortic arches; urinogenital system, brain and sense organs (eye and ear).

**Section - B**

2. **Ecology**:

(a) **Biosphere**: Concept of biosphere, biomes, Biogeochemical cycle, human induced changes in atmosphere including green house effect, ecological succession, biomes and ecotones, community ecology. Concept of ecosystem – structure and function of ecosystem, types of ecosystem, ecological succession, ecological adaptation.

(b) Population, characteristics, population dynamics, population stabilization.

(c) Conservation of natural resources- mineral mining, fisheries, aquaculture; forestry; grassland; wildlife (Project Tiger); susainable production in agriculture-integrated pest management.

(d) Environmental biodegradation; pollution and its impact oil biosphere and its prevention.

3. **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; cryptsis, 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.

4. **Economic Zoology**:

(a) Apiculture, sericulture, lac culture, carp culture, pearl culture, prawn culture, vermiculture.
(b) Major infectious and communicable diseases (smallpox, plague, malaria, tuberculosis, cholera and AIDS) their vectors, pathogens and prevention.

(c) Cattle and livestock diseases, their pathogens (helminths) and vectors (ticks, mites, Tabanus, Stomoxys)

(d) Pests of sugar cane (Pyrrhula perpusilla); oil seed (Achaea janata) and rice (Sitophilus oryzae), transgenic animals.

(e) Medical biotechnology, human genetic disease and genetic counselling, gene therapy.

(f) Forensic biotechnology.

5. Biostatistics:

   Designing of experiments; null hypothesis; correlation, regression, distribution and measure of central tendency, chi square, student - test, F-test (one-way & two-way F-test).

6. Instrumental methods:

   (a) Spectrophotometer, flame photometer, Geiger-Muller counter, scintillation counting.

   (b) Electron microscopy (TEM, SEM).

   Paper - II

   Section - A

I. Cell Biology:

   (a) Structure and function of cell audits organelles (nucleus, plasma membrane, mitochondria, Golgi bodies, endoplasmic reticulum, ribosomes and lysosomes), cell division (mitosis and meiosis), mitotic spindle and mitotic apparatus, chromosome movement.

   (b) Watson-Crick model of DNA, replication of DNA, protein synthesis, transcription and transcription factors.

2. 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, cistron concept; genetics of blood groups.

   d) Mutations and mutagenesis : radiation and chemical.

   e) Cloning technology, plasmids and cosmids as vectors, transgenics, transposons, DNA sequence cloning and whole animal cloning (Principles and methodology).

   f) Regulation and gene expression in pro- and eu-karyotes.

   g) Signal molecules, cell death, defects in signaling pathway and consequences.

   h) Human genome mapping; DNA finger-printing.

   i) RFLP, RAPD and AFLF and application of RFLP in DNA finger-printing, ribozyme technologies, human genome project, genomics and proteomics.
3. **Evolution: Theory of**:
   
   (a) Origin of life
   
   (b) Natural selection, role of mutation in evolution, mimicry, 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.

4. **Systematics**
   
   (a) Zoological nomenclature; international code; cladistics.

**Section – B**

5. **Biochemistry**
   
   (a) Structure and role of carbohydrates, fats, lipids, proteins, amino acids, 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: types and mechanisms of action; immunoglobulin and immunity; vitamins and co-enzymes.
   
   (e) Bioenergetics.

6. **Physiology** (with special reference to mammals)
   
   (a) Composition and constituents of blood; blood groups and Rh factor in man; 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.

7. **Developmental/Biology**
   
   (a) Gametogenesis: spermatogenesis, composition of semen, in vitro and in vivo capacitation of mammalian sperm, Oogenesis, totipotency, fertilization, morphogenesis and morphogen, blastogenesis, establishment of body axes formation, fate map, gestulation in frog and chick, genes in development in chick homeotic genes, development of eye and heart placenta in mammals.
(b) Cell lineage, cell to cell interaction, Genetic and induced teratogenesis, role of thyroxine in control of metamorphosis amphibian, paedogenesis and neoteny, cell death, aging.

(c) Developmental genes in man, in vivo fertilization, and embryo transfer, cloning.

(d) Stem cells: sources types and their use in human welfare.

(e) Biogenetic law.