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NOTIFICATION

No.A.45011/1/2010-P&AR(GSW), the 3rd February, 2012. In exercise of the powers conferred by the proviso to Article 309 of the Constitution of India, the Governor of Mizoram is pleased to make the following Regulations relating to the Mizoram Civil Services (Combined Competitive) Examinations, namely:-

1. SHORT TITLE AND COMMENCEMENT:

(i) These Regulations may be called the Mizoram Civil Services (Combined Competitive Examination) Regulations, 2011.

(ii) They shall come into force from the date of their publication in the Mizoram Gazette.

(iii) These Regulations shall cover recruitment examination to the Junior Grade of the Mizoram Civil Service (MCS), the Mizoram Police Service (MPS), the Mizoram Finance & Accounts Service (MF&AS) and the Mizoram Information Service (MIS).

2. DEFINITIONS: In these regulations, unless the context otherwise requires:-

(i) 'Constitution' means the Constitution of India;

(ii) 'Commission' means the Mizoram Public Service Commission;

(iii) 'Examination' means a Combined Competitive Examination for recruitment to the Junior Grade of MCS, MPS, MFAS and MIS;

(iv) 'Government' means the State Government of Mizoram;

(v) 'Governor' means the Governor of Mizoram;

(vi) 'List' means the list of successful candidates in the written examination and selected candidates prepared by the Commission under regulation 3(vi) and 3 (xi) of these regulations respectively;

(vii) 'Option' means service preferred by the candidate;

(viii) 'Schedule' means the Schedule appended to these regulations;

(ix) 'Service' means the MCS, MPS, MFAS and MIS;

(x) 'Scheduled Castes' and 'Scheduled Tribes' shall have the same meaning as are assigned to them respectively by clauses (24) and (25) of Article 366 of the Constitution;

(xi) 'Vacancy' means vacancy in the Junior Grade of the MCS, MPS, MFAS and MIS to be filled up by direct recruitment through combined competitive examination;

3. HOLDING OF EXAMINATION:

(i) Combined Competitive Examination for Mizoram Civil Service, Mizoram Police Service, Mizoram Finance & Accounts Service and Mizoram Information Service shall be conducted annually by the Commission in accordance with these regulations and syllabi specified in the Schedule-I appended to these regulations.

(ii) The Mizoram Civil Services (Combined Competitive Examination) shall comprise two successive stages :
   1) Preliminary Examination (Objective Type) for selection of candidates for Main Examination.
   2) Main Examination (Written and Interview) for selection of candidates for various services and posts.
   3) Schedule of Examination shall be as follows :
      a) Floating of advertisement : March - April
      b) Preliminary Examination (Objective Type) : May - June
      c) Publication of Result of Preliminary Examination : July
      d) Physical Efficiency Test for the candidates who choose Mizoram Police Service : July - August
      e) Main Examination (Conventional Type) : August - September
      f) Publication of Written Result : October - November
      g) Medical Examination : November - December
      h) Personal Interview and Publication of Final Result : December

(iii) The dates on which and the place at which the examination shall be held shall be fixed by the Commission.

(iv) A candidate seeking admission to the examination shall apply to the Commission in the form prescribed by the Commission. Option for the services shall be indicated by the applicant in the application form in order of preference. Option once exercised shall be final.

Provided that if a candidate does not give option for any services, it will be assumed that he has no specific preference for those services and the Commission shall have the right to allot any of the services.

(v) The candidate shall be allowed to drop any of the services which he does not like to opt. However, the option shall not bestow on the candidate a claim for appointment to the service he opted. Recommendation for appointment shall be made on merit-cum-option by the Commission.

(vi) All the successful candidates in the written examination shall have to undergo Medical Examinations as contained in the Schedule-II (A). Candidates opting MPS shall also undergo Physical Tests as contained in Schedule-II (B). Both Medical Examinations and Physical Tests shall be conducted before personal interview is held.

Provided that the Medical Examinations in respect of persons with disabilities will have to be conducted separately taking into account the nature of disabilities, in accordance with the provisions of "The persons with Disabilities (Equal opportunities, Protection of Rights and full participation) Act, 1995".

(vii) In the manner laid down under Schedule-II (B) appended to these regulations, those who are not physically fit and do not pass physical tests shall be disqualified for appointment to the Mizoram Police Service irrespective of his option for the said service.

(viii) Those candidates who are found medically unfit in the test shall be disqualified for appointment and shall not appear in the personal interview.

(ix) The Commission shall prepare a list of successful candidates in the written examination and publish the same through media and intimate to the successful candidates.

(x) The Commission shall send a list of selected candidates service-wise for appointment to the concerned cadre controlling authorities. The lists shall be prepared in order of merit. If two or more candidates opting similar service obtained equal marks, the Commission shall arrange them in the order of their age, i.e. higher age will come earlier than lower age. In case there are more than one candidates having the same age, the selection shall be made in alphabetical order of the names.

(xi) For filling up the posts within the reserved quota of 3 per cent for persons with disabilities, the candidates shall appear in the same combined competitive examination and no separate examination shall be conducted for filling up the vacancies. The Commission shall prepare separate lists of successful candidates against the vacancies and send them to the concerned cadre controlling authorities. The cadre controlling authorities shall, at the time of giving appointment, determine the seniority of members of the service recruited under this quota.

4. CONDITIONS OF ELIGIBILITY : In order to be eligible to compete at the examinations, a candidate must satisfy the following conditions, namely :-

(i) He must be a citizen of India as defined in Article 5-7 of the Constitution.

(ii) He must be a permanent resident of the state of Mizoram.

Provided that a candidate will also be eligible if his parents or any of his ancestors in his direct lineage are the permanent residents of the State, with proper documentary proof like enrolment in Electoral Roll and Birth Certificate.

(iii) He must have attained the age of 21 years but must not have exceeded the age of 35 years on the first day of the month in which the examination is held. (This prescribed limitation of age will supersede the age limit prescribed in the concerned Service Rules or Examination Regulations of the respective Services, i.e Mizoram Civil Service, Mizoram Police Service and Mizoram Finance & Accounts Service).

Provided that the upper age limit may be relaxable upto a maximum of 5 years in respect of candidate belonging to the Scheduled Caste/Scheduled Tribe.

Provided further that Physical handicapped persons belonging to Schedule Castes and Scheduled Tribes will be eligible for age relaxation of ten years over and above the age relaxation of 5 years admissible to them as Scheduled Caste/Scheduled Tribe.

(iv) A candidate must hold at least a degree of any of the Universities incorporated by an Act of the Parliament or State Legislature in India or other Educational Institutions established by an Act of Parliament or declared to be deemed Universities under section 3 of the University Grants Commission Act, 1956, or foreign Universities approved by the Central Government.

Provided that persons whose final examination for a degree of recognized Universities have been held and the results are yet to be declared in due course shall be allowed to appear in the written examination. However, such candidates shall be required to produce proof of passing the requisite examination in the personal interview, failing which such candidates shall be disqualified for inclusion in the final select list.

(v) Working Knowledge of Mizo Language shall be compulsory.

(vi) A candidate must pay the fees prescribed by the Commission.

5. DISQUALIFICATION FOR ADMISSION: Any attempt on the part of a candidate to obtain support for his candidature by any means will disqualify him for admission to the examination and the decision of the Commission as to the eligibility or otherwise of a candidate for admission to the examination shall be final.

6. APPOINTMENT FROM THE LIST: Subject to the provision of regulations 4, 7 and 8, candidates will be considered for appointment to the available vacancies in the order in which their names appear in the list and with reference to their option.

7. DISCIPLINARY ACTION: A candidate who is or has been declared by the Commission to be guilty of -

(i) Obtaining support for his candidature by any means, or

(ii) Impersonating, or

(iii) Procuring impersonation by any person, or

(iv) Submitting fabricated document(s) which have been tampered with, or
(v) Making statement(s) which are incorrect or false or suppressing material information, or
(vi) Resorting to any other irregular or improper means in connection with his candidature for the examination, or
(vii) Using unfair means during the examination, or
(viii) Bring in any form of communication system like cellular phones etc. inside the examination hall, or
(ix) Writing irrelevant matter including obscene language or pornographic matter in the answer script (s), or
(x) Misbehaving in any other manner in the examination shall during examination or
(xi) Harassing or inflicting bodily harm to the staff employed by the Commission for the conduct of the examination, shall be liable-
(a) to be disqualified by the Commission or the examination for which he is a candidate, or
(b) to be debarred either permanently or for a specific period-
(i) by the Commission from any examination or selection held by them,
(ii) by the Government from any employment under it, and
(c) to disciplinary action under appropriate rules if the candidate is already in service under the Government

8. INCLUSION IN THE LIST CONFERS NO RIGHT TO APPOINTMENT:

The inclusion of a candidate's name in the list confers no right to appointment unless the Government, after such enquiry as may be considered necessary is satisfied, for appointment to the Service.

9. PRELIMINARY EXAMINATION, MAIN EXAMINATION AND PERSONAL INTERVIEW:

The Commission shall conduct Preliminary Examination, Main Examination and Personal Interview as shown below:

1) Preliminary Examination (Objective Type) for selection of candidates for Main Examination. The Preliminary Examination will consist of two papers carrying 200 marks each of 2 (two) hrs duration as per the syllabus listed at schedule 1. Only those candidates who are declared by the Commission to have qualified in the Preliminary Examination will be eligible for admission to the Main Examination for that year.

2) Main Examination (Written and Interview) for selection of candidates for various services and posts.
(i) The Main Examination shall comprise of written examination and personal interview. The written examination will consist of four compulsory papers carrying 100 marks each and two optional subjects of two papers each as listed under regulation 10, and each Paper will carry 100 marks.
(ii) Personal Interview will carry 100 marks.
(iii) Written Examination for each paper will be of three hours duration.
(iv) The question papers for the examination will be of conventional essay type and will be set in English (for compulsory and optional subjects) and Mizo (for Mizo papers only).
(v) The Commission shall adopt the system of normalization of marks on the basis of the norms adopted by the Union Public Service Commission.
(vi) A candidate must write the answer papers in his own hand, and under no circumstances will he be allowed to take the help of a scribe to write the answer papers for him, except in case of a blind candidate.
(vii) Disabled candidates specially blind are allowed to engage scribe of his own expenses if necessary.
(viii) Answer script of the candidates will not be evaluated who have not appeared any of the compulsory or optional papers.

10. COMPULSORY AND OPTIONAL SUBJECTS WILL BE AS FOLLOWS:

A. Compulsory Subjects:
- (i) General English
- (ii) General Essay
- (iii) General Studies I
- (iv) General Studies II

B. Optional Subjects: (Paper I & II)
- (i) Agriculture
- (ii) Animal Husbandry & Veterinary Science.
- (iii) Anthropology
- (iv) Botany
- (v) Chemistry
- (vi) Civil Engineering
- (vii) Commerce & Accountancy
- (viii) Economics
- (ix) Education
- (x) Electrical Engineering
- (xi) English
- (xii) Forestry
- (xiii) Geography
- (xiv) Geology
- (xv) History
- (xvi) Home Science
- (xvii) Law
- (xviii) Management
- (xix) Mathematics
- (xx) Mechanical Engineering
- (xxi) Medical Science
- (xxii) Mizo Elective
- (xxiii) Philosophy
- (xxiv) Physics
- (xxv) Political Science& International Relations
- (xxvi) Psychology
- (xxvii) Public Administration
- (xxviii) Sociology
- (xxix) Statistics
- (xxx) Zoology

11. If necessary Syllabi for Combined Competitive Examination will be revised every 5 years.

12. BAR TO COMBINATION OF SUBJECTS: Notwithstanding anything contained in Regulations 11 and 12, a candidate shall not be allowed to offer the following combinations of subjects, namely:-
- (i) Agriculture and Animal Husbandry & Veterinary Science.
- (ii) Animal Husbandry & Veterinary Science and Medical Science.
- (iii) Anthropology and Sociology.
- (iv) Education and Psychology.
- (v) Mathematics and Statistics.
- (vi) Mizo and English.
- (vii) Of the Engineering subjects viz., Civil Engineering, Electrical Engineering, and Mechanical Engineering-not more than one subject.

(viii) Political Science & International Relations and Public Administration.
(ix) Commerce & Accountncy and Management.

13. INTERPRETATIONS: If any question arises as to the interpretation of these regulations, it shall be decided by the Government in consultation with the Commission.

14. REPEAL & SAVINGS:

(1) The Mizoram Civil Service (Competitive Examination) Regulations, 2007 notified in the Mizoram Gazette Extraordinary Issue No.204 dt 7.8.2007, (2) the Mizoram Police Service (Competitive Examination) Regulations, 2003 published in the Mizoram Gazette Extraordinary Issue No.68 dt 12.3.2003, and (3) the syllabus for competitive Examination for direct recruitment to the Junior Grade of Mizoram Finance & Accounts Service SCHEDULE-III-A and Annexure-II under SCHEDULE-III-B appended to the Mizoram Finance & Accounts Service Rules, 2008 published in the Mizoram Gazette Extraordinary Issue No.407 dt 6.10.2008 and (4) the syllabus for competitive examination for direct recruitment to the Junior Grade of Mizoram Information Service SCHEDULE-III appended to the Mizoram Information Service rules, 2007 published in the Mizoram Gazette Extraordinary Issue No.234 dt 7.9.2007 are hereby repealed with the commencement of these regulations.

Notwithstanding such repeal, any order(s) made or action taken under any provision of the rules repealed or under any general orders ancillary thereto shall be deemed to have been validly made or taken under the corresponding provisions of these rules.

By orders, etc

Secretary to the Govt. of Mizoram,
Department of Personnel & Administrative Reforms

SCHEDULE - I

SCHEME AND SYLLABUS FOR THE PRELIMINARY AND MAIN EXAMINATIONS.

A. PRELIMINARY EXAMINATION

The Examination will consist of 2 (two) Papers of Objective Types (Multiple Choice Questions and negative marking) which will carry a maximum of 400 marks of 2 hours durations each.

SYLLABUS FOR PRELIMINARY EXAMINATION

Paper I
Maximum Marks - 200 marks
Duration : Two hrs.

- 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-that do not require subject specialization
- General science.
- General Awareness on Mizo Society, its culture and heritage.

Paper II
Maximum Marks - 200 marks
Duration : Two hrs

- 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)
- English language comprehension skills (Class X level)
- Questions relating to English Language Comprehension skills of Class X level (last item in the Syllabus of Paper-II) will be tested through passages from English language only without providing Hindi translation thereof in the question paper.
- The questions will be of multiple choice, objective type.

B. MAIN EXAMINATION

Aim of Written 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 scope of the syllabus for the optional subject papers for the examination is broadly of the honours degree level i.e. a level higher than the bachelor's degree and lower than the master's degree. In the case of Engineering and Law, the level corresponds to the bachelor's degree.

COMPULSORY SUBJECTS

1. General English

The aim of the paper is to test the candidate's 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) Précis Writing
(iii) Usage and Vocabulary
(iv) Short Essay

Note 1 : The Paper in English will be of Matriculation or equivalent standard.

Note 2 : The candidates will have to answer the English and Mizo Language papers in English and Mizo respectively (except where translation is involved).

2. General Essay

Candidates will be required to write an essay on a specific topic. The choice of subjects will be given. 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.

3. General Studies (I&II)

General Guidelines:

The nature and standard of questions in the General Studies papers will be such that a well-educated 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.

GENERAL STUDIES
PAPER – I

1. History of Modern India and Indian Culture

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

2. Geography of India

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

3. Constitution of India and Indian Polity

This part will include questions on the C onstitution of India as well as all constitutional, legal, administrative and other issues emerging from the politico-administrative system prevalent in the country.

4. Current National Issues and Topics of Social Relevance

This part is intended to test the candidate's awareness of current national issues and topics of social relevance in present-day India, such as the following:

(i) The Indian economy and issues relating to planning, mobilization of resources, growth, development and employment.

(ii) Issues arising from the social and economic exclusion of large sections from the benefits of development.
(iii) Other issues relating to the development and management of human resource.
(iv) Health issues including the management of Public Health, Health education and ethical concerns regarding health-care, medical research and pharmaceuticals.
(v) Law enforcement, internal security and related issues such as the preservation of communal harmony.
(vi) Issues relating to good governance and accountability to the citizens including the maintenance of human rights, and of probity in public life.
(vii) Environmental issues, ecological preservation, conservation of natural resources and national heritage.

GENERAL STUDIES
PAPER – II

1. India and the World

This part will include questions to test candidate's awareness of India's relationship with the world in various spheres such as the following:-

Foreign Affairs with special emphasis on India's relations with neighbouring countries and in the region.
Security and defence related matters.
Nuclear policy, issues, and conflicts.
The Indian Diaspora and its contribution to India and the world.

2. India's Economic Interaction with the World

In this part, questions will be on economic and trade issues such as foreign trade, foreign investment; economic and diplomacy issues relating to oil, gas and energy flows; the role and functions of I.M.F., World Bank, W.T.O., WIPO etc. which influence India's economic interaction with other countries and international institutions.

3. Developments in the Field of Science & Technology, IT and space

In this part, questions will test the candidate's awareness of the developments in the field of science and technology, information technology, space and basic ideas about computers, robotics, nanotechnology, biotechnology and related issues regarding intellectual property rights.

4. International Affairs and Institutions

This part will include questions on important events in world affairs and on international institutions.

5. Statistical analysis, graphs and diagrams

This part will test the candidate's ability to draw conclusions from information presented in statistical, graphical or diagrammatical form and to interpret them.

OPTIONAL SUBJECTS

Total number of questions in the question papers of optional subjects will be eight. All questions will carry equal marks. Each paper will be divided into two parts, viz. Part A and Part B, each part containing four questions. Out of eight questions candidates are required to answer any five questions taking at least two questions each from Part A and Part B.

AGRICULTURE
PAPER – I
PART - A

Unit I Ecology and its relevance to man, natural resources, their sustainable management and conservation. Physical and social environment as factors of crop distribution and production. Agro ecology; cropping pattern as indicators of environments. Environmental pollution and associated hazards to crops, animals and humans. Climate change – International conventions and global initiatives. Green house effect and global warming. Advance tools for ecosystem analysis – Remote sensing (RS) and Geographic Information Systems (GIS).

Unit II Cropping patterns in different agro-climatic zones of the country. Impact of high-yielding and short-duration varieties on shifts in cropping patterns. Concepts of various cropping and farming systems. Organic and Precision farming. Package of practices for production of important cereals, pulses, oil seeds, fibres, sugar, commercial and fodder crops.

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

Unit III Farm management, scope, importance and characteristics, farm planning. Optimum resource use and budgeting. Economics of different types of farming systems. Marketing management – strategies for development, market intelligence. Price fluctuations and their cost; role of co-operatives in agricultural economy; types and systems of farming and factors affecting them. Agricultural price policy. Crop Insurance.

Unit IV 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. Training programmes for extension workers. Role of Krishi Vigyan Kendra's (KVK) in dissemination of Agricultural technologies. Non Government Organization (NGO) and self-help group approach for rural development.

PART - B

Unit I Important features and scope of various types of forestry plantations such as social forestry, agro-forestry, and natural forests. Propagation of forest plants. Forest products. Agro forestry and value addition. Conservation of forest flora and fauna.

Unit II Soil- physical, chemical and biological properties. Processes and factors of soil formation. Soils of India. Mineral and organic constituents of soils and their role in maintaining soil productivity. Essential plant nutrients and other beneficial elements in soils and plants. Principles of soil fertility, soil testing and fertilizer recommendations, integrated nutrient management. Biofertilizers. Losses of nitrogen in soil, nitrogen-use efficiency in submerged rice soils, nitrogen fixation in soils. Efficient phosphorus and potassium use. Problem soils and their reclamation. Soil factors affecting greenhouse gas emission.

Unit III Soil conservation, integrated watershed management. Soil erosion and its management. Dry land agriculture and its problems. Technology for stabilizing agriculture production in rain fed areas.

Unit IV Water-use efficiency in relation to crop production, criteria for scheduling irrigations, ways and means of reducing run-off losses of irrigation water. Rainwater harvesting. Drip and sprinkler irrigation. Drainage of waterlogged soils, quality of irrigation water, effect of industrial effluents on soil and water pollution. Irrigation projects in India.

AGRICULTURE
PAPER – II
PART - A

Unit I Cell structure, function and cell cycle. Synthesis, structure and function of genetic material. Laws of heredity. Chromosome structure, chromosomal aberrations, linkage and cross-over, and their significance in recombination breeding. Polyploidy, euploids and aneuploids. Mutations - and their role in crop improvement. Heritability, sterility and incompatibility, classification and their application in crop improvement. Cytoplasmic inheritance, sex-linked, sex-influenced and sex-limited characters.

Unit II History of plant breeding. Modes of reproduction, selfing and crossing techniques. Origin, evolution and domestication of crop plants, centre of origin, law of homologous series, crop genetic resources- conservation and utilization. Application of principles of plant breeding, improvement of crop plants. Molecular markers and their application in plant improvement. Pure-line selection, pedigree, mass and recurrent selections, combining ability, its significance in plant breeding. Heterosis and its exploitation. Somatic hybridization. Breeding for disease and pest resistance. Role of interspecific and intergeneric hybridization. Role of genetic engineering and biotechnology in crop improvement. Genetically modified crop plants.

Unit III Seed production and processing technologies. Seed 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.

Principles of Plant Physiology with reference to plant nutrition, absorption, translocation and metabolism of nutrients. Soil - water- plant relationship.

Unit IV Enzymes and plant pigments; photosynthesis- modern concepts and factors affecting the process, aerobic and anaerobic respiration; C_3, C_4 and CAM mechanisms. Carbohydrate, protein and fat metabolism. Growth and development; photoperiodism and vernalilzation. Plant growth substances and their role in crop production. Physiology of seed development and germination; dormancy. Stress physiology – draught, salt and water stress.

PART - B

Unit I Major fruits, plantation crops, vegetables, spices and flower crops. Package practices of major horticultural crops. Protected cultivation and high tech horticulture. Post harvest technology and value addition of fruits and vegetables. Landscaping and commercial floriculture. Medicinal and aromatic plants. Role of fruits and vegetables in human nutrition.

Unit II Diagnosis of pests and diseases of field crops, vegetables, orchard and plantation crops and their economic importance. Classification of pests and diseases and their management. Integrated pest and disease management. Storage pests and their management. Biological control of pests and diseases. Epidemiology and forecasting of major crop pests and diseases. Plant quarantine measures. Pesticides, their formulation and modes of action.

Unit III Food production and consumption trends in India. Food security and growing population – vision 2020. Reasons for grain surplus. National and international food policies. Production, procurement, distribution constraints. Availability of food grains, per capita expenditure on food. Trends in poverty, Public Distribution System and Below Poverty Line population, Targeted Public Distribution System (PDS), policy implementation in context to globalization.

Unit IV Processing constraints. Relation of food production to National Dietary Guidelines and food consumption pattern. Food based dietary approaches to eliminate hunger. Nutrient deficiency – Micro nutrient deficiency : Protein Energy Malnutrition or Protein Calorie Malnutrition (PEM or PCM), Micro nutrient deficiency and HRD in context of work capacity of women and children. Food grain productivity and food security.

ANIMAL HUSBANDRY AND VETERINARY SCIENCE
PAPER – I
SECTION A

Animal Nutrition:

Unit I Partitioning of food energy within the animal. Direct and indirect calorimetry. Carbon – nitrogen balance and comparative slaughter methods. Systems for expressing energy value of foods in ruminants, pigs and poultry. Energy requirements for maintenance, growth, pregnancy, lactation, egg, wool, and meat production.

Latest advances in protein nutrition. Energy protein interrelationships. Evaluation of protein quality. Use of NPN compounds in ruminant diets. Protein requirements for maintenance, growth, pregnancy, lactation, egg, wool and meat production.

Major and trace minerals - Their sources, physiological functions and deficiency symptoms. Toxic minerals. Mineral interactions. Role of fat-soluble and water – soluble vitamins in the body, their sources and deficiency symptoms.

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.

Unit II 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.

Advances in ruminant nutrition. Nutrient requirements. Balanced rations. Feeding of calves, pregnant, work animals and breeding bulls. Strategies for feeding mulch animals during different stages of lactation cycle. Effect of feeding on milk composition. Feeding of goats for meat and milk production. Feeding of sheep for meat and wool production.

Swine Nutrition. Nutrient requirements. Creep, starter, grower and finisher rations. Feeding of pigs for lean meat production. Low cost rations for swine.

Poultry nutrition. Special features of poultry nutrition. Nutrient requirements for meat and egg production. Formulation of rations for different classes of layers and broilers.

Animal Physiology:

UnitII I 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.

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 and pulmonary circulation, Blood-Brain barrier- Cerebrospinal fluid- circulation in birds.

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

Excretion-Structure and function of kidney-formation of urine-methods of studying renal function-renal regulation of acid-base balance: physiological constituents of urine-renal failure-passive venous congestion-Urinary secretion in chicken-Sweat glands and their function. Bio-chemical test for urinary dysfunction.

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

Growth and Animal Production- Prenatal and postnatal growth, maturation, growth curves, measures of growth, factors affecting growth, conformation, body composition, meat quality.

Physiology of Milk Production, Reproduction and Digestion- Current status of hormonal control of mammary development, milk secretion and milk ejection, Male and Female reproductive organs, their components and functions. Digestive organs and their functions.

Environmental Physiology- Physiological relations and their regulation; mechanisms of adaptation, environmental factors and regulatory mechanisms involved in animal behaviour, climatology – various parameters and their importance. Animal ecology. Physiology of behaviour. Effect of stress on health and production.

Importance of climate in animal health-effect of environment on animal function and performance - relationship between industrialization and animal agriculture.

Stress, strain and productivity in relation to animal habitation.

Unit IV **Animal Reproduction:**

Semen quality- Preservation and Artificial Insemination- Components of semen, composition of spermatozoa, 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, goats, swine and poultry. Detection of oestrus and time of insemination for better conception. Anoestrus and repeat breeding. Multiple Ovulation and Embryo Transfer Technology (MOET). Dystocia and Obstetrical operations.

SECTION B

Livestock Production and Management:

Unit I Commercial Dairy Farming- Comparison of dairy farming in India with advanced countries. Dairying under mixed farming and as specialized farming, economic dairy farming. Starting of a dairy farm, Capital and land requirement, organization of the dairy farm. 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 rations for dairy cattle; supply of greens throughout the year, feed and fodder requirements of Dairy Farm. Feeding regimes for young stock and bulls, heifers and breeding animals; new trends in feeding young and adult stock; Feeding records.

Commercial meat, egg and wool production- Development of practical and economic rations for sheep, goats, pigs, rabbits and poultry. Supply of greens, fodder, feeding regimes for young and mature stock. New trends in enhancing production and management. Capital and land requirements and socio- economic concept.

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

Animal housing requirements for specific categories of domestic animals viz. pregnant cows and sows, milking cows, broiler birds.

Genetics and Animal Breeding:

Unit II History of animal genetics. 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; Cytoplasmic inheritance. 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. Transgenesis.

Unit III 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 of path coefficient; Inbreeding, methods of estimating inbreeding coefficient, systems of inbreeding, Effective population size; Breeding value, estimation 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.

Breeding Systems- Breeds of livestock and Poultry. 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, out breeding, upgrading, cross-breeding and synthesis of breeds; Crossing of inbred lines for commercial production; Selection for general and specific combining ability; Breeding for threshold characters. Sire index.

Unit IV **Extension:**

Basic philosophy, objectives, concept and principles of extension. Different Methods adopted to educate farmers under rural conditions. Generation of technology, its transfer and feedback. Problems and constraints in transfer of technology. Animal husbandry programmes for rural development.

ANIMAL HUSBANDRY AND VETERINARY SCIENCE
PAPER – II
SECTION A

Anatomy and Pharmacology :

Unit I Histology and Histological Techniques: Paraffin embedding technique of tissue processing and H.E. staining - Freezing microtomy- Microscopy-Bright field microscope and electron microscope. Cytology-structure of cell, organells and inclusions; cell division-cell types- Tissues and their classification-embryonic and adult tissues-Comparative histology of organs-Vascular. Nervous, digestive, respiratory, musculo- skeletal and urogenital systems- Endocrine glands -Integuments-sense organs.

Embryology – Embryology of vertebrates with special reference to aves and domestic mammals gametogenesis-fertilization-germ layers- foetal membranes and placentation-types of placenta in

domestic mammals-Teratology-twins and twinning- organogenesis -germ layer derivatives-endodermal, mesodermal and ectodermal derivates.

Bovine Anatomy- Regional Anatomy: Paranasal sinuses of OX- surface anatomy of salivary glands. Regional anatomy of infraorbital, maxillary, mandibuloalveolar, mental and cornual nerve block. Regional anatomy of paravertebral nerves, pudendal nerve, median ulnar and radial nerves-tibial, 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 and their application in the biomechanics of mammalian body.

Anatomy of Fowl- Musculo-skeletal system-functional anatomy in relation to respiration and flying, digestion and egg production.

Unit II Pharmacology and therapeutic 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. Autacoids. Antimicrobials and principles of chemotherapy in microbial infections. Use of hormones in therapeutics- chemotherapy of parasitic infections. Drug and economic concerns in the Edible tissues of animals- chemotherapy of Neoplastic diseases. Toxicity due to insecticides, plants, metals, non-metals, zootoxins and mycotoxins.

Animal Diseases:

Unit III Etiology, epidemiology pathogenesis, symptoms, post-mortem lesions, diagnosis, and control of infectious diseases of cattle, sheep and goat, horses, pigs and poultry.
Etiology, epidemiology, symptoms, diagnosis, treatment of production diseases of cattle, horse, pig and poultry.

Deficiency diseases of domestic animals and birds.

Diagnosis and treatment of non-specific conditions like impaction, Bloat, Diarrhoea, Indigestion, dehydration, stroke, poisoning.

Unit IV Diagnosis and treatment of neurological disorders.
Principles and methods of immunization of animals against specific diseases- herd immunity-disease free zones- 'zero' disease concept- chemoprophylaxis.

Anaesthesia- local, regional and general-preanesthetic medication. Symptoms and surgical interference in fractures and dislocation. Hernia, choking abomasal displacement- Caesarian operations. Rumenotomy-Castrations.

Disease investigation techniques.- Materials for laboratory investigation- Establishment of Animal Health Centers- Disease free zone-

SECTION B

Unit I Veterinary Public Health:
Zoonoses. - Classification, definition, role of animals and birds in prevalence and transmission of zoonotic diseases- occupational zoonotic diseases.

Epidemiology- Principle, 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. OIE regulations, WTO, sanitary and phytosanitary measures.

Veterinary Jurisprudence- Rules and Regulations for improvement of animal quality and prevention of animal diseases - State and central rules for prevention of animal and animal product borne diseases- S P C A- Veterolegal cases- Certificates -Materials and Methods of collection of samples for veterolegal investigation.

Veterinary Hygiene with reference to water, air and habitation - Assessment of pollution of water, air and soil.

Unit II **Milk and Milk Products Technology:**

Market Milk: Quality, testing and grading of raw milk. Processing, packaging, storing, distribution, marketing, defects and their control. Preparation 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.

Milk Products Technology.- Selection of raw materials, processing, storing , distributing and marketing milk products such as Cream, Butter, Ghee, Khoa, Channa, Cheese, condensed, evaporated, dried milk and baby food, Ice cream and Kulfi; by-products, whey products, butter milk, lactose and casein. Testing, grading, judging milk products- BIS and Agmark specifications, legal standards, quality control and nutritive properties. Packaging, processing and operational control. Costing of dairy products.

Unit III **Meat Hygiene.**

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

Hygienic methods of handling production of meat- Spoilage of meat and control measures- Post - slaughter physicochemical changes in meat and factors that influence them- Quality improvement methods – Adulteration of meat and detection - Regulatory provisions in Meat trade and Industry.

Unit IV **Meat Technology.**

Physical and chemical characteristics of meat- Meat emulsions- Methods of preservation of meat- Curing, canning, irradiation, packaging of meat and meat products, processing and formulations.

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

Poultry Products Technology- Chemical composition and nutritive value of poultry meat, pre - slaughter care and management. Slaughtering techniques, inspection, preservation of poultry meat and products. Legal and BIS standards.

Structure, composition and nutritive value of eggs. Microbial spoilage. Preservation and maintenance. Marketing of poultry meat, eggs and products. Value added meat products.

Rabbit/Fur Animal farming - Rabbit meat production. Disposal and utilization of fur and wool and recycling of waste by products. Grading of wool.

ANTHROPOLOGY
PAPER – I
SECTION -A

1. (a) Meaning, scope and development of Anthropology.
(b) Relationships with other disciplines: Social Sciences, Behavioural Sciences, Life Sciences, Medical Sciences, Earth Sciences and Humanities.
(c) Main branches of Anthropology, their scope and relevance:
(i) Social- cultural Anthropology.
(ii) Biological Anthropology.
(iii) Archaeological Anthropology.
(iv) Linguistic Anthropology.
(d) Human Evolution and emergence of Man:
(a) Biological and Cultural factors in human evolution.
(b) Theories of Organic Evolution (Pre- Darwinian, Darwinian and Post-Darwinian).
(c) 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, and mosaic evolution).

II. (a) Characteristics of Primates; Evolutionary Trend and Primate Taxonomy; Primate Adaptations; (Arboreal and Terrestrial) Primate Taxonomy; Primate Behaviour; Tertiary and Quaternary fossil primates; Living Major Primates; Comparative Anatomy of Man and Apes; Skeletal changes due to erect posture and its implications.
(b) Phylogenetic status, characteristics and geographical distribution of the following:
(a) Plio-pleistocene hominids in South and East Africa - Australopithecines.
(b) *Homo erectus: Africa* (*Paranthropus*), Europe (*Homo erectus heidelbergensis*), Asia (*Homo erectus javanicus*, *Homo erectus pekinensis*).
(c) Neanderthal Man- La-Chapelle-aux-saints (Classical type), Mt. Carmel (Progressive type).
(d) Rhodesian man.
(e) *Homo sapiens* — Cromagnon, Grimaldi and Chancelede.
(c) The biological basis of life: The Cell, DNA structure and replication, Protein Synthesis, Gene, Mutation, Chromosomes, and Cell Division.
(d) (i) Principles of Prehistoric Archaeology. Chronology: Relative and Absolute Dating methods.
(ii) Cultural Evolution- Broad Outlines of Prehistoric cultures:
(1) Paleolithic (2) Mesolithic (3) Neolithic (4) Chalcolithic
(5) Copper-Bronze Age (6) Iron Age

III (a) The Nature of Culture: The concept and characteristics of culture and civilization; Ethnocentrism vis-á-vis cultural Relativism.
(b) The Nature of Society: Concept of Society; Society and Culture; Social Institutions; Social groups; and Social stratification.
(c) Marriage: Definition and universality; Laws of marriage (endogamy, exogamy, hypergamy, hypogamy, incest taboo); Types of marriage (monogamy, polygamy, polyandry, group marriage). Functions of marriage; Marriage regulations (preferential, prescriptive and proscriptive); Marriage payments (bride wealth and dowry).
(d) Family: Definition and universality; Family, household and domestic groups; functions of family; Types of family (from the perspectives of structure, blood relation, marriage, residence and succession); Impact of urbanization, industrialization and feminist movements on family.

(e) Kinship: Consanguinity and Affinity; Principles and types of descent (Unilineal, Double, Bilateral, Ambilineal); Forms of descent groups (lineage, clan, phratry, moiety and kindred); Kinship terminology (descriptive and classificatory); Descent, Filiation and Complimentary Filiation; Descent and Alliance.

IV (a) Economic organization: Meaning, scope and relevance of economic anthropology; Formalist and Substantivist debate; Principles governing production, distribution and exchange (reciprocity, redistribution and market), in communities, subsisting on hunting and gathering, fishing, swiddening, pastoralism, horticulture, and agriculture; globalization and indigenous economic systems.

(b) Political organization and Social Control: Band, tribe, chiefdom, kingdom and state; concepts of power, authority and legitimacy; social control, law and justice in simple societies.

(c) Religion: Anthropological approaches to the study of religion (evolutionary, psychological and functional); monotheism and polytheism; sacred and profane; myths and rituals; forms of religion in tribal and peasant societies (animism, animatism, fetishism, naturism and totemism); religion, magic and science distinguished; magico-religious functionaries (priest, shaman, medicine man, sorcerer and witch).

SECTION - B

I. Anthropological theories:

(a) Classical evolutionism (Tylor, Morgan and Frazer)
(b) Diffusionism (British, German and American)
(c) Functionalism (Malinowski); Structural-functionalism (Radcliffe-Brown)
(d) Structuralism (L'evi - Strauss and E. Leach)
(e) Culture and personality (Benedict, Mead, Linton, Kardiner and Cora - du Bois).
(f) Neo - evolutionism (Childe, White, Steward, Sahlins and Service)
(g) Cultural materialism (Harris)

II Research methods in anthropology:

(a) Fieldwork tradition in anthropology
(b) Distinction between technique, method and methodology
(c) Tools of data collection: observation, interview, schedules, questionnaire, Case study, genealogy, life-history, oral history, secondary sources of information, participatory methods.
(d) Analysis, interpretation and presentation of data.

III (a) Human Genetics – Methods and Application: Methods for study of genetic principles in man-family study (pedigree analysis, twin study, foster child, co-twin method, cytogenetic method, chromosomal and karyo-type analysis), biochemical methods, immunological methods, D.N.A. technology and recombinant technologies.

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

(c) 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.

(d) Chromosomes and chromosomal aberrations in man, methodology.
  (i) Numerical and structural aberrations (disorders).
  (ii) Sex chromosomal aberrations – Klinefelter (XXY), Turner (XO), Super female (XXX), intersex and other syndromic disorders.
  (iii) Autosomal aberrations – Down syndrome, Patau, Edward and Cri-du-chat syndromes.

(iv) Genetic imprints in human disease, genetic screening, genetic counselling, human DNA profiling, gene mapping and genome study.

IV. (a) Concept of human growth and development: stages of growth - pre-natal, natal, infant, childhood, adolescence, maturity, senescence.
(b) Factors affecting growth and development genetic, environmental, biochemical, nutritional, cultural and socio-economic.
(c) Ageing and senescence. Theories and observations - biological and chronological longevity. Human physique and somatotypes. Methodologies for growth studies.
(d) Relevance of menarche, menopause and other bioevents to fertility. Fertility patterns and differentials.
(e) Biological and socio-ecological factors influencing fecundity, fertility, natality and mortality.
(f) Applications of Anthropology: Anthropology of sports, Nutritional anthropology, Anthropology in designing of defence and other equipments, Forensic Anthropology, Methods and principles of personal identification and reconstruction, Applied human genetics – Paternity diagnosis, genetic counselling and eugenics, DNA technology in diseases and medicine, serogenetics and cytogenetics in reproductive biology.

ANTHROPOLOGY
PAPER – II
SECTION - A

I (a) Evolution of the Indian Culture and Civilization — Prehistoric (Palaeolithic, Mesolithic, Neolithic and Neolithic - Chalcolithic). Protohistoric (Indus Civilization): Pre-Harappan, Harappan and post- Harappan cultures. Contributions of tribal cultures to Indian civilization.
(b) Palaeo – anthropological evidences from India with special reference to Siwaliks and Narmada basin (*Ramapithecus*, *Sivapithecus* and *Narmada Man*).
(c) Ethno-archaeology in India: The concept of ethno-archaeology; Survivals and Parallels among the hunting, foraging, fishing, pastoral and peasant communities including arts and crafts producing communities.

II (a) Emergence and growth of anthropology in India; Contributions of Indian anthropologists to tribal and caste studies.
(b) Demographic profile of India — Ethnic and linguistic elements in the Indian population and their distribution. Indian population - factors influencing its structure and growth.

III (a) The structure and nature of traditional Indian social system - Varnashram, Purushartha, Karma, Rina and Rebirth.
(b) Caste system in India- structure and characteristics, Varna and caste, Theories of origin of caste system, Dominant caste, Caste mobility, Future of caste system, Jajmani system, Tribe-caste continuum.
(c) Sacred Complex and Nature- Man- Spirit Complex.

IV (a) Indian Village: Significance of village study in India; Indian village as a social system; Traditional and changing patterns of settlement and inter-caste relations; Agrarian relations in Indian villages; Impact of globalization on Indian villages.
(b) Linguistic and religious minorities and their social, political and economic status.
(c) Indigenous and exogenous processes of socio-cultural change in Indian society: Sanskritization, Westernization, Modernization; Inter-play of little and great traditions; Panchayati raj and social change; Media and social change.

SECTION - B

I (a) Tribal situation in India – Bio-genetic variability, linguistic and socio-economic characteristics of tribal populations and their distribution.
(b) Problems of the tribal Communities — land alienation, poverty, indebtedness, low literacy, poor educational facilities, unemployment, underemployment, health and nutrition.
(c) Developmental projects and their impact on tribal displacement and problems of rehabilitation. Development of forest policy and tribals. Impact of urbanization and industrialization on tribal populations.

II. (a) Problems of exploitation and deprivation of Scheduled Castes, Scheduled Tribes and Other Backward Classes. Constitutional safeguards for Scheduled Tribes and Scheduled Castes.
(b) Social change and contemporary tribal societies: Impact of modern democratic institutions, development programmes and welfare measures on tribals and weaker sections.
(c) The concept of ethnicity; Ethnic conflicts and political developments; Unrest among tribal communities; Regionalism and demand for autonomy; Pseudo-tribalism; Social change among the tribes during colonial and post-Independent India.

III (a) Impact of Hinduism, Buddhism, Christianity, Islam and other religions on Indian Society tribal societies.
(b) Tribe and nation state — a comparative study of tribal communities in India and other countries.
(c) History of administration of tribal areas, tribal policies, plans, programmes of tribal development and their implementation. The concept of PTGs (Primitive Tribal Groups), their distribution, special programmes for their development. Role of N.G.O.s in tribal development.

IV (a) Role of anthropology in tribal and rural development.
(b) Contributions of anthropology to the understanding of regionalism, communalism, and ethnic and political movements.

BOTANY
PAPER – I
PART-A

Unit I Microbiology and Plant Pathology:

Structure and reproduction/multiplication of viruses, viroids, bacteriophage, bacteria, fungi and mycoplasma; Applications of microbiology in agriculture, industry, medicine and in control of soil and water pollution; Prion and Prion hypothesis, conjugation.

General account of crop diseases caused by viruses, bacteria, mycoplasma, fungi and nematodes; Modes of infection and dissemination; Molecular basis of infection and disease resistance/defence; Physiology of parasitism and control measures; Fungal toxins; Modelling and disease forecasting; Plant quarantine.

Unit II Cryptogams and Phanerogram:

Algae, cyanobacteria, fungi, lichens, bryophytes, pteridophytes - structure and reproduction from evolutionary viewpoint; Distribution of Cryptogams in India and their ecological and economic importance.

Gymnosperms: Concept of Progymnosperms; Classification and distribution of gymnosperms; Salient features of Cycadales, Ginkgoales, Coniferales and Gnetales, their structure and reproduction; General account of Cycadofilicales, Bennettitales and Cordaitales; Geological time scale; Type of fossils and their study techniques.

Unit III Plant Systematics

Angiosperms: Systematics, anatomy, embryology, palynology and phylogeny.
Taxonomic hierarchy; International Code of Botanical Nomenclature; Numerical taxonomy and chemotaxonomy; Evidence from anatomy, embryology and palynology.

Unit IV Families of Angiosperms

Origin and evolution of angiosperms; Natural, phylogenetic and modern systems of classification comparative account; Study of angiospermic families – Mangnoliaceae, Ranunculaceae, Brassicaceae, Rosaceae, Fabaceae, Euphorbiaceae, Malvaceae, Dipterocarpaceae, Apiaceae, Asclepiadaceae, Verbenaceae, Solanaceae, Rubiaceae, Cucurbitaceae, Asteraceae, Poaceae, Arecaceae, Liliaceae, Musaceae and Orchidaceae.

PART - B

Unit I Plant Development :

Development of male and female gametophytes, pollination, fertilization; Endosperm - its development and function; Patterns of embryo development; Polyembryony and apomixes; Applications of palynology; Experimental embryology including pollen storage.

Unit II Economic Botany :

Domestication and introduction of plants; Origin of cultivated plants; Vavilov's centres of origin; Plants as sources for food, fodder, fibre, spices, beverages, edible oils, drugs, narcotics, insecticides, timber, gums, resins and dyes, latex, cellulose, starch and its products; Perfumery; Importance of Ethnobotany in Indian context; Energy plantations; Botanical Gardens and Herbaria.

Unit III Morphogenesis:

Totipotency, polarity, symmetry and differentiation; Cell, tissue, organ and protoplast culture; Somatic hybrids and Cybrids; Micropropagation; Somaclonal variation and its applications; Pollen haploids, embryo rescue methods and their applications.

Unit IV Plant Anatormy

Stomata and their types; Glandular and non-glandular trichomes; Unusual secondary growth; Anatomy of C3 and C4 plants; Xylem and phloem differentiation; Wood anatomy.

BOTANY
PAPER – II
PART - A

Unit I Cell Biology:

Techniques of cell biology; Prokaryotic and eukaryotic cells - structural and ultrastructural details; Structure and function of extracellular matrix (cell wall), membranes-cell adhesion, membrane transport and vesicular transport; Structure and function of cell organelles (chloroplasts, mitochondria, ER, dictyosomes ribosomes, endosomes, lysosomes, peroxisomes); Cytoskeleton and microtubules; Nucleus, nucleolus, nuclear pore complex; Chromatin and nucleosome; Cell signalling and cell receptors; Signal transduction; Mitosis and meiosis; Molecular basis of cell cycle; Numerical and structural variations in chromosomes and their significance; Chromatin organization and packaging of genome; Polytene chromosomes; B-chromosomes – structure, behaviour and significance.

Unit II Genetics, Molecular Biology and Evolution:

Development of genetics; Gene versus allele concepts (Pseudo-alleles); Quantitative genetics and multiple factors; Incomplete dominance, polygenic inheritance, multiple alleles; Linkage and crossing over; Methods of gene mapping, including molecular maps (idea of mapping function); Sex chromosomes and sex-linked inheritance, sex determination and molecular basis of sex differentiation; Mutations (biochemical and molecular basis); Cytoplasmic inheritance and male sterility

Structure of nucleic acids and proteins; Genetic code protein synthesis regulation of gene expression; Gene silencing; Multigene families; Organic evolution – evidences, mechanism and theories. Role of RNA in origin and evolution.

Unit III Ecology

Concept of ecosystem; Ecological factors; Concepts and dynamics of community; Plant succession; Concept of biosphere; Ecosystems; Conservation; Pollution and its control (including phytoremediation); Plant indicators; Environment (Protection) Act. Forest types of India - Ecological and economic importance of forests, afforestation, deforestation and social forestry;

Unit IV Environment and Conservation

Endangered plants, endemism, IUCN categories, Red Data Books; Biodiversity and its conservation; Protected Area Network; Convention on Biological Diversity; Farmers' Rights and Intellectual Property Rights; Concept of Sustainable Development; Biogeochemical cycles; Global warming and climatic change; Invasive species; Environmental Impact Assessment; Phytogeographical regions of India.

PART - B

Unit I Plant Breeding and Biotechnology :

Methods of plant breeding – introduction, selection and hybridization (pedigree, backcross, mass selection, bulk method); Mutation, polyploidy, male sterility and heterosis breeding; Use of apomixes in plant breeding; DNA sequencing; Genetic engineering – methods of transfer of genes; Transgenic crops and biosafety aspects; Development and use of molecular markers in plant breeding; Tools and techniques - probe, southern blotting, DNA fingerprinting, PCR and FISH.

Unit II Biostatistics:

Standard deviation and coefficient of variation (CV); Tests of significance (Z-test, t-test and chi-square test); Probability and distributions (normal, binomial and Poisson); Correlation and regression.

Unit III Plant Physiology :

Water relations, mineral nutrition and ion transport, mineral deficiencies; Photosynthesis – photochemical reactions; photophosphorylation and carbon fixation pathways; C3, C4 and CAM pathways; Mechanism of phloem transport; Plant movements; Photoperiodism and flowering, vernalization, senescence; Growth substances – their chemical nature, role and applications in agri-horticulture; Growth indices, growth movements; Stress physiology (heat, water, salinity, metal); Fruit and seed physiology; Dormancy, storage and germination of seed; Fruit ripening – its molecular basis and manipulation.

Unit IV Biochemistry :

Respiration (anaerobic and aerobic, including fermentation) – electron transport chain and oxidative phosphorylation; Photorespiration; Chemiosmotic theory and ATP synthesis; Lipid metabolism; Nitrogen fixation and nitrogen metabolism; Enzymes, coenzymes; Energy transfer and energy conservation; secondary metabolites; Pigments as photoreceptors (plastidial pigments and phytochrome);

CHEMISTRY
PAPER - I
PART - A

Unit I

Solid State Chemistry :

Classification of solids, Seven crystal systems, elements of symmetry in crystals, space lattice and unit cell, classification of crystals on the basis of bond types, Ionic solids, metallic solids and molecular solids. The close Packing of spheres, Hexagonal close packing, cubic close packing and body centered cubic packing, coordination number and radius ratio effects. Bragg's Law of X-ray diffraction, powder pattern method, crystal structure of NaCl, KCl, ZnS, CsCl, and CaF_2

Phase Equilibria :

Phases, components, degrees of freedom, phase diagram of one and two component systems, Nernst distribution Law, applications of distribution law.

Unit II

The Gaseous State and Transport Phenomenon:

Equation of State for real gases, intermolecular interactions and critical phenomena and liquefaction of gases, Maxwell's distribution law of molecular velocities, evaluation of average rms; most probable velocity and average kinetic energy from Maxwell equation. Degrees of freedom, principle of equipartition of energy and molecular basis of heat capacity

Thermodynamics:

Work, heat and internal energy; first law of thermodynamics.

Second law of thermodynamics; entropy as a state function, entropy changes in various processes, entropy–reversibility and irreversibility, Free energy functions; Thermodynamic equation of state; Maxwell relations; Temperature, volume and pressure dependence of U, H, A, G, C_p and C_v, á and â; J-T effect and inversion temperature; criteria for equilibrium, relation between equilibrium constant and thermodynamic quantities; Nernst heat theorem, introductory idea of third law of thermodynamics.

Unit III

Surface Chemistry :

Stability and origin of charge on colloids, electrokinetic potential. Physical and chemical adsorption, various types of adsorption isotherms, homogeneous and heterogeneous catalysis, Enzyme catalysis (Michelis-Menton) equation.

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: Polarography, amperometry, ion selective electrodes and their uses.

Unit IV

Chemical Kinetics:

Differential and integral rate equations for zeroth, first, second and fractional order reactions;

Rate equations involving reverse, parallel, consecutive and chain reactions; branching chain and explosions; effect of temperature and pressure on rate constant; Study of fast reactions by stop-flow and relaxation methods; Collisions and transition state theories.

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

PART - B

Unit I

Atomic Structure:
Bohr Model and its limitations, DeBroglie Equation, Heisenberg's uncertainty principle, Quantum mechanical operators and the Schrodinger wave equation (time dependent), physical significance of wave function and its characteristics (normalised, orthogonal), Radial distribution and shapes of s, p, d and f orbitals. Particle in One Dimensional Box, Quantization of electronic energies (Qualitative treatment of hydrogen atom). Pauli's exclusion principle, Hund's rule of maximum multiplicity, Aufban principle, Electronic configuration of atoms, Long form of periodic table including Translawrencium elements. Periodicity in properties of the elements such as atomic and ionic radii, ionization potential, electron affinity, electronegativity and hydration energy.

Nuclear and Radiation Chemistry :
Structure of nucleus (Shell Model), Nuclear forces, nuclear stability - N/P ratio, nuclear binding energy, Detection and measurement of radioactivity, Artificial transmutation of elements and nuclear reactions, nuclear fission and fusion, Radioactive isotopes and their applications, Radio carbon dating, Units of radioactivity.

Unit II

Chemical Bonding:
Ionic bond, characteristics 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 (Heitier - London and Pauling-Slater-theories), Hybridization, VSEPR Theory and shapes of simple inorganic molecules, Molecular Orbital theory, Bonding, Non-bonding Molecular orbitals, Molecular orbital energy. Lever diagrams for Homo and Hetero nuclear diatomic molecules. Bond order and Bond length and bond strength. Sigma and pi-bonds, Hydrogen bond.

Bio-inorganic Chemistry:
Essential and trace elements in biological processes, metallaporphyrins with special reference to Haemoglobin and Myoglobin, Biological role of alkali and alkaline earth metal ions with special reference to Ca^{2+}.

Unit III

Chemistry of s- and p- Block Elements :
General properties of s- and p- block elements, chemical reactivity of elements and group trends. Chemical behaviour with respect to their hybrids, halides and oxides.

Chemistry of Transition elements :
General characteristics, variable oxidation states, complex formation, colour, magnetic and catalytic properties. Comparative study of 4d and 5d transition elements with 3d analogues with respect to their ionic radii, oxidation states and magnetic properties.

Unit IV

Chemistry of Lanthanides and Actinides :
Lanthanide contraction, oxidation states, Principles of separation of Lanthanides and Actinides, magnetic and spectral properties of their compounds.

Coordination Chemistry :
Preparation, properties and uses of the following :

Inorganic Compounds : Heavy water, Boric acid, diborane, hydrazine, hydroxylamine, Potassium dichromate, Potassium Permanganate, Ce(IV) Sulphate, and Ti (III) Sulphate.

Polymers : Molecular weight of polymers by sedimentation, light scattering, viscosity and osmotic pressure. Number average and weight average molecular weights, elasticity and crystallinity of polymers.

Borazines : Silicates and silicones and Phosphonitrilic halide polymers.

CHEMISTRY
PAPER-II
PART - A

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

Reactions and Rearrangements : (a) Pinacol-pinacolune, Hoffmann, Beckmann, Baeyer Villiger, Favorskii, Fries, Claisen, Cope, Stevens and Wagner-Meerwein rearrangements. (b) Aldol condensation, Claisen condensation, Dieckmann, Wolff-Kishner, Cannizzaro and von Ritcher reactions; Stobbe, benzoin and acyloin condensations; Fischer indole synthesis, Skraup synthesis, Bischler-Napieralski, Sandmeyer, Reimer-Tiemann and reformatsky reactions.

Unit II
(i) **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.
(ii) **Reactive intermediates :** Generation, geometry, stability and reactions of carbonium and carbonium ions, carbanions, free radicals, carbenes, benzynes and niternes.
(iii) **Substitution reactions :** SN1, SN2, SNi, SN1/, SN2/, SNi/ and SRN1 mechanisms; neighbouring group participation; electrophilic and nucleophilic reactions of aromatic compound including simple heterocyclic compounds¡-pyrrole, furan thiophene and indole.
(iv) **Elimination reactions :** E1, E2 and E1cb mechanism; orientation in E2 reactions-Saytzeff and Hoffmann; pyrolytic syn elimination¡-acetate pyrolysis, Chugaev and Cope eliminations.
(v) **Addition reactions :** Electrophilic addition to C=C and C=C; nucleophilic addition to C=O, C=N, conjugated olefins and carbonyls.

Unit III **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.

Unit IV **Preparation and Properties of Polymers:** Organic polymerspolythene, polystyrene, polyninyl chloride, Teflon, nylon, terylene, synthetic and natural rubber.(ii) Biopolymers; Structure of proteins, DNA and RNA.

PART - B

Unit I **Synthetic uses of reagents :** OsO4, HIO4, CrO3, Pb(OAc)4, SeO2, NBS, B2H6, Na-Liquid NH3, LiA1H4 NaBH4 n-BuLi, MCPBA.

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

Unit III **Spectroscopy:** Principle and applications in structure elucidation:

(i) Rotational-Diatomic molecules; isotopic substitution and rotational constants.
(ii) Vibrational -Diatomic molecules, linear triatomic molecules, specific frequencies of functional groups in polyatomic molecules.
(iii) Raman Spectre: Raman Effect, stokes and antistokes lines and their intensity difference, Rules of Mutual exclusion.

Unit IV (i) Electronic: Singlet and triplet states. N¡V>¡Vƒá* and ƒá>* transitions; application toƒá conjugated double bonds and conjugated carbonyls Woodward-Fieser rules; Charge transfer spectra.
(ii) Nuclear Magnetic Resonance (1HNMR) : Basic principle; chemical shift and spin interaction and coupling constants.
(iii) Mass Spectrometry : Parent peak, base peak, metastable peak, McLafferty rearrangement. ƒnƒÑmolecules;

CIVIL ENGINEERING
PAPER – I
SECTION A

UNIT 1. Engineering Mechanics, Strength of Materials and Structural Analysis:

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, 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.

Kinematics and Kinetics:

Kinematics in Cartesian Co-ordinates, motion under uniform and non-uniform acceleration, motion under gravity. Kinetics of particle: Momentum and Energy principles, collision of elastic bodies, rotation of rigid bodies.

UNIT II Strength of Materials:

Simple Stress and Strain, Elastic constants, axially loaded compression members, Shear force and bending moment, theory of simple bending, Shear Stress distribution across cross sections, Beams of uniform strength.

Deflection of beams: Macaulay's method, Mohr's Moment area method, Conjugate beam method, unit load method. Torsion of Shafts, Elastic stability of columns, Euler's Rankine's and Secant formulae.

UNIT III Structural Analysis:

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

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.
Arches: Three hinged, two hinged and fixed arches, rib shortening and temperature effects.
Matrix methods of analysis: Force method and displacement method of analysis of indeterminate beams and rigid frames.
Plastic Analysis of beams and frames: Theory of plastic bending, plastic analysis, statical method, Mechanism method.
Unsymmetrical bending: Moment of inertia, product of inertia, position of Neutral Axis and Principle axes, calculation of bending stresses.

UNIT IV Design of Structures: Steel, Concrete and Masonry Structures:
Structural Steel Design:
Structural Steel: Factors of safety and load factors. Riveted, bolted and welded joints and connections. Design of tension and compression member, beams of built up section, riveted and welded plate girders, gantry girders, stanchions with battens and lacings.
Design of Concrete and Masonry Structures:
Concept of mix design. Reinforced Concrete: Working Stress and Limit State method of design– Recommendations of I.S. 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,
Cantilever and Counter fort type retaining walls.
Water tanks: Design requirements for Rectangular and circular tanks resting on ground.
Prestressed concrete: Methods and systems of prestressing, anchorages, Analysis and design of sections for flexure based on working stress, loss of prestress.
Design of brick masonry as per I.S. Codes

SECTION B

UNIT I Fluid Mechanics, Open Channel Flow and Hydraulic Machines:

1.1 Fluid Mechanics:
Fluid properties and their role in fluid motion, fluid statics including forces acting on plane and curved surfaces.
Kinematics and Dynamics of Fluid flow: Velocity and accelerations, stream lines, equation of continuity, irrotational and rotational flow, velocity potential and stream functions.
Continuity, momentum and energy equation, Navier-Stokes equation, Euler's equation of motion, application to fluid flow problems, pipe flow, sluice gates, weirs.

1.2 Dimensional Analysis and Similitude:
Buckingham's Pi-theorem, dimensionless parameters.

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

UNIT II Boundary layer:
Laminar and turbulent boundary layer on a flat plate, laminar sub layer, smooth and rough boundaries, drag and lift.
Turbulent flow through pipes: Characteristics of turbulent flow, velocity distribution and variation of pipe friction factor, hydraulic grade line and total energy line.
Open channel flow:
Uniform and non-uniform flows, momentum and energy correction factors, specific energy and specific force, critical depth, rapidly varied flow, hydraulic jump, gradually varied flow, classification of surface profiles, control section, step method of integration of varied flow equation.

UNIT III Hydraulic Machines and Hydropower:

Hydraulic turbines, types classification, Choice of turbines, performance parameters, controls, characteristics, specific speed.

Principles of hydropower development.

UNIT IV Geotechnical Engineering:

Soil Type and structure – gradation and particle size distribution – consistency limits.

Water in soil – capillary and structural – effective stress and pore water pressure – permeability concept – field and laboratory determination of permeability – Seepage pressure – quick sand conditions – Shear strength determination – Mohr Coulomb concept.

Compaction of soil – Laboratory and field tests.

Compressibility and consolidation concept – consolidation theory – consolidation settlement analysis.

Earth pressure theory and analysis for retaining walls, Application for sheet piles and Braced excavation.

Bearing capacity of soil – approaches for analysis – Field tests – settlement analysis – stability of slope of earth walk.

Subsurface exploration of soils – methods

Foundation – Type and selection criteria for foundation of structures – Design criteria for foundation – Analysis of distribution of stress for footings and pile – pile group action-pile load test.

Ground improvement techniques.

CIVIL ENGINEERING
PAPER - II
SECTION A

UNIT I Construction Technology, Equipment, Planning and Management:

1.1 Construction Technology:

Engineering Materials:

Physical properties of construction materials with respect to their use in construction - Stones, Bricks and Tiles; Lime, Cement, different types of Mortars and Concrete.

Specific use of ferro cement, fibre reinforced C.C, High strength concrete.

Timber, properties and defects - common preservation treatments.

Use and selection of materials for specific use like Low Cost Housing, Mass Housing, High Rise Buildings.

1.2 Construction:

Masonry principles using Brick, stone, Blocks – construction detailing and strength characteristics.

Types of plastering, pointing, flooring, roofing and construction features.

Common repairs in buildings.

Principles of functional planning of building for residents and specific use - Building code provisions.

Basic principles of detailed and approximate estimating - specification writing and rate analysis – principles of valuation of real property.

Machinery for earthwork, concreting and their specific uses – Factors affecting selection of equipments – operating cost of Equipments.

UNIT II Construction Planning and Management:

Construction activity – schedules- organization for construction industry – Quality assurance principles.

Use of Basic principles of network – analysis in form of CPM and PERT – their use in construction monitoring, Cost optimization and resource allocation.

Basic principles of Economic analysis and methods.

Project profitability – Basic principles of Boot approach to financial planning – simple toll fixation criterions.

UNIT III Surveying and Transportation Engineering

Surveying:

Common methods and instruments for distance and angle measurement for CE work – their use in plane table, traverse survey, levelling work, triangulation, contouring and topographical map. Basic principles of photogrammetry and remote sensing.

UNIT IV Railway Engineering:

Permanent way – components, types and their functions – Functions and Design constituents of turn and crossings – Necessity of geometric design of track – Design of station and yards.

Highway Engineering:

Principles of Highway alignments – classification and geometrical design elements and standards for Roads.

Pavement structure for flexible and rigid pavements - Design principles and methodology of pavements.

Typical construction methods and standards of materials for stabilized soil, WBM, Bituminous works and CC roads.

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

Pavement distresses and strengthening by overlays.

Traffic surveys and their applications in traffic planning - Typical design features for channelized, intersection, rotary etc – signal designs – standard Traffic signs and markings.

SECTION B

UNIT I Hydrology, Water Resources and Engineering:

Hydrology:

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

Ground water flow:

Specific yield, storage coefficient, coefficient of permeability, confined and unconfined equifers, aquifers, aquitards, radial flow into a well under confined and unconfined conditions.

Water Resources Engineering:

Ground and surface water resource, single and multipurpose projects, storage capacity of reservoirs, reservoir losses, reservoir sedimentation.

UNIT II Irrigation Engineering:

(i) Water requirements of crops: consumptive use, duty and delta, irrigation methods and their efficiencies.

(ii) 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.

(iii) Water logging: causes and control, salinity.

(iv) Canal structures: Design of, head regulators, canal falls, aqueducts, metering flumes and canal outlets.

(v) Diversion headwork: Principles and design of weirs of permeable and impermeable foundation, Khosla's theory, energy dissipation.

(vi) Storage works: Types of dams, design, principles of rigid gravity, stability analysis.

(vii) Spillways: Spillway types, energy dissipation.

(viii) River training: Objectives of river training, methods of river training.

UNIT III Environmental Engineering:

Water Supply: Predicting demand for water, impurities, of water and their significance, physical, chemical and bacteriological analysis, waterborne diseases, standards for potable water.
Intake of water: Water treatment: principles of coagulation, flocculation and sedimentation; slow-; rapid-, pressure-, filters; chlorination, softening, removal of taste, odour and salinity.
Sewerage systems: Domestic and industrial wastes, storm sewage–separate and combined systems, flow through sewers, design of sewers.
Sewage characterization: BOD, COD, solids, dissolved oxygen, nitrogen and TOC. Standards of disposal in normal watercourse and on land.
Sewage treatment: Working principles, units, chambers, sedimentation tanks, trickling filters, oxidation ponds, activated sludge process, septic tank, disposal of sludge, recycling of wastewater.
Solid waste: Collection and disposal in rural and urban contexts, management of long-term ill effects.

UNIT IV Environmental pollution:

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

COMMERCE & ACCOUNTANCY
PAPER – I
(Accounting and Finance)

PART - A
Accounting, Taxation & Auditing

Unit I Financial Accounting

Accounting as a Financial Information System; Impact of Behavioural Sciences. Accounting Standards e.g. Accounting for Depreciation, Inventories, Fixed Assets, Contingencies, Foreign Exchange Transactions, Investments and Government Grants, Cash Flow Statement, Funds Flow Statements, Earnings Per Share.
Issues of shares; (Pro-rata Allotment); Forfeiture of Shares; Re-issue of Shares;
Preparation and Presentation of Company Final Accounts.
Amalgamation, Absorption and Reconstruction of Companies.

Unit II Cost Accounting

Nature and Functions of Cost Accounting. Installation of Cost Accounting System. Cost Concepts related to Income Measurement, Profit Planning, Cost Control and Decision Making.
Methods of Costing: Job Costing, Process Costing, Activity Based Costing.
Volume – cost – Profit Relationship as a tool of Profit Planning.
Preparation of Cost Sheet.

Unit III Taxation :

Income Tax: Definitions; Basis of Charge; Incomes which do not form Part of Total Income. Simple problems of Computation of Income (of Individuals only) under Various Heads, i.e., Salaries, Income from House Property, Profits and Gains from Business or Profession, Income of other Persons included in Assessee's Total Income .
Set - Off and Carry Forward of Loss.
Deductions from Gross Total Income.
Salient Features/Provisions Related to VAT and Services Tax.

Unit IV Auditing

Audit: Meaning, Objectives, Classification of Audit.
Audit Programme: Preparation, Advantages and Disadvantages.
Internal Control, Internal Check and Internal Audit.
Appointment, Removal, Remuneration, Powers and Duties of Company Auditor.
Audit of Non-Profit Organisations and Charitable Societies/Trsuts/Organisations.

PART - B
Financial Management, Financial Institutions and Markets

Unit I Finance Function: Nature, Scope and Objectives of Financial Management: Risk and Return Relationship.
Tools of Financial Analysis: Ratio Analysis, Funds-Flow and Cash-Flow Statement.
Capital Budgeting Decisions: Process, Procedures and Appraisal Methods. Risk and Uncertainty Analysis and Methods.

Unit II Financing Decisions: Theories of Capital Structure - Net Income (NI) Approach, Net Operating Income (NOI) Approach, MM Approach and Traditional Approach. Designing of Capital structure: Types of Leverages (Operating, Financial and Combined), EBIT- EPS Analysis, and other Factors.
Working Capital Management: Planning of Working Capital. Determinants of Working Capital. Components of Working Capital - Cash, Inventory and Receivables.

Unit III Indian Financial System: An Overview - The Indian Financial System on the eve of Planning and in the post 1950 period; Structure of Indian Financial System and its impact on Economic Development.
Money Markets: Participants, Structure and Instruments. Commercial Banks. Reforms in Banking sector. Monetary and Credit Policy of RBI. RBI as a Regulator.
Capital Market: Primary and Secondary Market. Financial Market Instruments and Innovative Debt Instruments; SEBI as a Regulator.

Unit IV Financial Services: Mutual Funds, Venture Capital, Credit Rating Agencies, Insurance and IRDA. Development Banks and other Non-Banking Financial Institutions: SIDBI; IFCI; NABARD; LIC; EXIM Banks - Their evolution and growth.

COMMERCE & ACCOUNTANCY

PAPER – II
(Organisation Theory and Behaviour, Human Resource Management and Industrial Relations)

PART - A
Organisation Theory and Behaviour

Organisation Theory:

Unit I Evolution of Organisation Theory: Classical, Neo-classical and Systems Approach.
Nature and Concept of Organisation; External Environment of Organizations -Technological, Social, Political, Economical and Legal; Organizational Goals - Primary and Secondary goals, Single and Multiple Goals; Management by Objectives.

Organising: Principles of Organisation; Departmentation; Staffing : Nature and Importance; Process of Recruitment and Selection.

Unit II Modern Concepts of Organisation Theory: Organisational Design, Organisational Structure. Designing Organizational structures–Authority and Control; Line and Staff Functions, Specialization and Coordination. Types of Organization Structure –Functional. Matrix Structure, Project Structure. Nature and Basis of Power , Sources of Power, Power Structure and Politics. Impact of Information Technology on Organizational Design and Structure.

Organisation Behaviour:

Unit III Meaning and Concept; Individual in organizations: Personality, Theories, and Determinants; Perception - Meaning and Process.
Motivation: Concepts, Theories (Maslow, Herzberg) and Applications. Leadership-Theories and Styles.

Unit IV Management of Conflicts in Organizations. Transactional Analysis, Organizational Effectiveness, Management of Change.
Directing: Meaning and Nature; Communication: nature and Process, Barriers to Communication.

PART - B
Human Resources Management and Industrial Relations

Human Resources Management (HRM):

Unit I Meaning, Nature and Scope of HRM, Human Resource Planning, Job Analysis, Job Description, Job Specification, Recruitment Process, Selection Process, Orientation and Placement, Training and Development Process,

Unit II Performance Appraisal and 360° Feed Back, Salary and Wage Administration, Job Evaluation, Employee Welfare, Promotions, Transfers and Separations. Compensation.

Industrial Relations (IR):

Unit III Meaning, Nature, Importance and Scope of IR, Formation of Trade Unions, Trade Union Legislation, Trade Union Movement in India. Recognition of Trade Unions, Problems of Trade Unions in India. Impact of Liberalization on Trade Union Movement. Nature of Industrial Disputes: Strikes and Lockouts , Causes of Disputes, Prevention and Settlement of Disputes.

Unit IV Worker's Participation in Management: Philosophy, Rationale, Present Day Status and Future Prospects.
Salient features of Minimum Wages Act, 1984: Enforcement and Objectives of the Act; Fixation, Revision and Payment of Minimum Wages.
The Consumer Protection Act, 1986: Salient Features, Definitions of Consumer; Grievance Redressal Machinery; RTI and its applications.

ECONOMICS
PAPER – I
PART - A

Advanced Micro Economics:

Unit I
(a) Marshallian and Walrasiam Approaches to Price determination, Consumer's Behaviour
(b) Alternative Distribution Theories: Ricardo, Kaldor, Kaleski

Unit II
(a) Markets Structure: Monopolistic Competition, Duopoly, Oligopoly, perfect competition.
(b) Modern Welfare Criteria: Pareto Hicks & Scitovsky, Arrow's Impossibility Theorem, A.K. Sen's Social Welfare Function.

Advanced Macro Economics:

Unit II Approaches to Employment Income and Interest Rate determination: Classical, Keynes (IS-LM) curve.

Unit IV Neo classical synthesis New classical Theories of Interest Rate determination and Interest Rate Structure.

PART - B

Unit I Money - Banking and Finance:

(a) Demand for and Supply of Money: Money Multiplier Quantity Theory of Money (Fisher, Pigoue and Friedman) and Keyne's Theory on Demand for Money, Goals and Instruments of Monetary Control. Role and functions of Commercial Banks and Credit creation by Commercial Banks. Role of Central Bank in Controlling Money and Credit determination of growth rate of money supply.
(b) Public Finance and its Role in Market Economy: Meaning and scope of Public Finance, Public v/s Private Finance. Sources of Govt. revenue, forms of Taxes and Subsidies, their incidence and effects. Limits to taxation, loans, crowding-out effects and limits to borrowings. Public Expenditure and its effects.

Unit II International Economics:

(a) Old and New Theories of International Trade
(i) Comparative Advantage
(ii) Terms of Trade and Offer Curve.
(iii) Product Cycle and Strategic Trade Theories.
(iv) Trade as an engine of growth" and theories of under development in an open economy.
(b) Forms of Protection: Tariff and quota.
(c) Balance of Payments Adjustments: Alternative Approaches.
(i) Price versus income, income adjustments under fixed exchange rates,
(ii) Theories of Policy Mix
(iii) Exchange rate adjustments under capital mobility
(iv) Floating Rates and their Implications for Developing Countries: Currency Boards.
(v) Trade Policy and Developing Countries.
(vi) BOP, adjustments and Policy Coordination in open economy macro-model.
(vii) Speculative attacks
(viii) Trade Blocks and Monetary Unions.
(ix) WTO: TRIMS, TRIPS, Domestic Measures, Different Rounds of WTO talks.

Growth and Development:

Unit III (a) (i) Theories of growth: Harrod's model,
(ii) Lewis model of development with surplus labour
(iii) Balanced and Unbalanced growth,
(iv) Human Capital and Economic Growth.
(v) Research and Development and Economic Growth

(b) Process of Economic Development of Less developed countries: Theories of Economic Transition Myrdal and Kuznets, Collin-Clark, Lewis on economic development and structural change: Role of Agriculture in Economic Development of less developed countries.

Unit IV (a) Economic development and International Trade and Investment, Role of Multinationals.
(b) Planning and Economic Development: changing role of Markets and Planning, Private-Public Partnership
(c) Welfare indicators and measures of growth – Human Development Indices. The basic needs approach.
(d) Development and Environmental Sustainability – Renewable and Non Renewable Resources, Environmental Degradation, Intergenerational equity development. Environment and Economy linkage.

ECONOMICS
PAPER – II
PART - A

Unit I Indian Economy in Pre-Independence Era:

Land System and its changes, Commercialization of agriculture, Drain theory, Laissez faire theory and critique. Manufacture and Transport: Jute, Cotton, Railways, Money and Credit.

Indian Economy after Independence: The Pre Liberalization Era:

Unit II (i) Contribution of Vakil, Gadgil and V.K.R.V. Rao.
(ii) Agriculture: Land Reforms and land tenure system, Green Revolution and capital formation in agriculture,

Unit III (i) Industry : Trends in composition and growth, Role of public and private sector, Small scale and cottage industries.

Unit IV (i) National and Per capita income: patterns, trends, aggregate and Sectoral composition and changes their in.
(ii) Broad factors determining National Income and distribution, Measures of poverty, Trends in poverty and inequality.

PART - B

Indian Economy after Independence: The Pre Liberalization Era: The Post Liberalization Era:

Unit I (i) New Economic Reform 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.

Unit II (i) New Economic Policy and Trade: Intellectual property rights: Implications of TRIPS, TRIMS, GATS and new EXIM policy.
(ii) New Exchange Rate Regime: Partial and full convertibility, Capital account convertibility.

Unit III (i) New Economic Policy and Public Finance: Fiscal Responsibility Act, Twelfth Finance Commission and Fiscal Federalism and Fiscal Consolidation.
(ii) New Economic Policy and Monetary system. Role of RBI under the new regime.

Unit IV (i) Planning: From central Planning to indicative planning, Relation between planning and markets for growth and decentralized planning: 73rd and 74th Constitutional amendments.
(ii) New Economic Policy and Employment: Employment and poverty, Rural wages, Employment Generation, Poverty alleviation schemes, New Rural, Employment Guarantee Scheme.

EDUCATION

PAPER-I
SECTION A

FOUNDATIONS OF EDUCATION AND PEDAGOGY

Unit I Psychological Foundation of Education:
Definition of Psychology, relationship between Psychology and Education, nature, scope and methods of Educational Psychology. Physiological basis of human/mental life, functions of the human nervous system and the endocrine system. Meaning of development, areas of development, fundamentals of Piagetian Development Psychology. Concept and theories of Individual differences, theories of intelligence, creativity. Mental health and mental hygiene, Personality-Freudian Theory of personality. Learning; theories, factors affecting learning. Theories of learning, transfer of learning. Adolescence-psychological characteristics and problems of adolescents.

Unit II Philosophical Foundations of Education:
Concept and scope of Education, aims of Education, functions of Education. Role of Philosophy in Education -(a) Relationship between Education and Philosophy, (b) Some major schools of Philosophy: Idealism, Naturalism, Realism and Pragmatism-their contribution to present day education, (c) Emergence of educational thoughts through the works of great educators-M.K. Gandhi, Rousseau, Froebel, Dewey and Tagore (Relevance of each philosophy in Education). Freedom and discipline. Components of education and their mutual relationship.

Unit III Sociological Foundation of Education:
Nature and scope of Educational Sociology. Education as an instrument of social change. Social Groups. Culture-concept and components of culture. Current social problems relating to Education in India.

Unit IV Pedagogy:
Science of teaching-relations between teaching and learning. Factors affecting teaching, levels of teaching, general principles of teaching, maxims of teaching. Observations and classroom behaviour: Flander's Interaction Analysis, characteristics of good teacher behaviour, difference between traditional and micro-teaching. Factors affecting perception, attention and attitude. Teaching methods, functions of a teacher.

SECTION B
DEVELOPMENT, ISSUES AND TRENDS IN INDIAN EDUCATION

Unit I **Development of Education in Ancient and Medieval India:**
Education in Ancient India: Vedic and Brahmanic Period, Buddhist Education. Education in Medieval India

Unit II **Development of Education in British India and Independent India:**
Education in British India, Indigenous Education in India at the beginning of the 18th century. Growth of modern systems of education up to 1947 AD. The Charter Act 1813, Downward Filtration Theory, Adam's Report 1829, Macaulay's Minutes 1935, Wood's Education Despatch 1854, Hunter Commission 1882, Lord Curzon's Policy 1902 (University Education Commission of 1902), Movement for Compulsory Education-Gokhale's Bill 1913 (Govt. of India Resolution on Educational Policy 1913), Sadler's Commission 1917 (Calcutta University Education Commission 1917), Hartog Committee Report 1929. Development of Indian Education during the post-independence period with special reference to major recommendations of University Education Commission 1948-49, Secondary Education Commission 1952-53, Kothari Education Commission 1964-66, National Policy on Education 1986 and its revised formulation of 1992.

Unit III **Issues in India Education:**
Aims and objectives of Elementary Education. Aims and objectives of Secondary Education, general and vocational education, role of DIET, NCERT, SCERT, NIEPA, CBSE, etc. Higher Education-general and technical. Role of UGC, AIU, AICTE, ICSSR, CSIR, ICAR, NCTE. Types of Universities and equivalent institutes of higher learning.

Unit IV **Modern Trends in Indian Education:**
Non-formal education, adult education. National Adult Education Programme (NAEP-1978), Mass Programme for Functional Literacy (MPFL-1986), National Literacy Mission (NOM-1988), Total Literacy Campaign (TCL), Post Literacy Campaign (PLC), Jana Shikshan Nilyan (JSN). Continuing Education, uses of mass-media in non-formal and continuing education. Population education, sex education, value oriented education, work experience & SUPW, environmental education, women empowerment through education, education of minority communities.

EDUCATION
PAPER-II
SECTION A

RESEARCH METHODOLOGY, STATISTICS AND EVALUATION IN EDUCATION

Unit I **Fundamentals of Educational Research :**
Concept, meaning and nature of educational research, types of research. Hypothesis -concept and types, characteristics of a good hypothesis.

Unit II **Conduct of Educational Research:**
Sampling-concept and sampling designs/techniques, tools of data collection, report writing.

Unit III **Statistics in Education:**
Meaning, nature, scope and significance of educational statistics, sources and use of educational statistics. Difference between statistics and parameter, significance of statistics. Measures of central tendency, measures of variability, normal distribution- normal probability curve. Concept of variable, types of data, the need and uses of graphical presentation of data, bivariate distribution.

Unit IV Evaluation in Education:
Meaning and nature of educational measurement, evaluation in education. General principles of test construction and standardization.

SECTION B
EDUCATIONAL MANAGEMENT, TECHNOLOGY, GUIDANCE AND CURRICULUM

Unit I Educational Management:
Concept, meaning, nature, need and scope of educational management. Types of educational management. Concept of financial management, managerial behaviour, educational Planning.

Unit II Educational Technology:
Concept and scope of educational technology, communication process. Bloom's Taxonomy of educational objectives. System approach in instructional system designing, programmed learning. Concept and nature of personalized system of instruction.

Unit III Educational Guidance:
The concept of guidance, vocational guidance, educational guidance, counselling.

Unit IV Curriculum Construction:
Curriculum-concept and nature, curriculum construction, curriculum development, curriculum designs.

ELECTRICAL ENGINEERING
PAPER – I
SECTION A

Unit 1 Basics and Circuit Theory:
a) Work, Power, Energy; Ohm's Law; DC circuits; Kirchhoff's Laws; AC circuits, Resonance in R-L- Circuits.
b) Nodal analysis; Mesh analysis; Network theorems; Transient analysis of RL, RC and RLC circuits; 3 phase circuits; Two-port networks.

Unit II Electromagnetic theory:
a) Maxwell' equations; Wave propagation inbounded media; Boundary conditions; Reflection and refraction of plane waves; Distributed parameter circuits.
b) Transmission line: Travelling and Standing waves, impedance matching, smith chart.

Unit III Electrical Machines:
a) DC Machines: Contruction, Working principle, Characteristics and application; Starting and speed control.
b) AC Machines: Single phase and poly phase induction motors, Synchronous motor-Construction, working principle and charecteristics, starting and speed control; FHP motors and stepper motors, Alternators-Basics and Parallel operation.
c) Power and Distribution Transformers: Design, Efficiency and regulation by direct and indirect loading; Types of transformer connections, its installation and maintenance.

Unit IV Electrical Measurements and Instrumentation:
a) Measurement of current, voltage, power, energy, power-factor, resistance, inductance, capacitance and frequency.
b) Multimeters, CRO, digital voltmeter, frequency counter, Q-meter, earth tester, potentiomenter.
c) Transducers: thermocouple, thermistors, LVDT, strain guage, piezo-electric crystal; Use of transducers in measurement of non-electrical quantities, Data acquisition systems.

SECTION B

Unit I Power System:

a) Characteristics and performance of transmission line, Ferranti effect.
b) Steady-state performance of overhead transmission lines and cables; Per unit quantities; Bus admittance and impedance matrices; Symmtrical components;
c) Load flow studies in newton Rapson method, Gauss-Seidel method; transient on transmission line; optimal load frequency control, automatic voltage control.
d) Analysis of symmetrical and unsymmetrical faults; Principle of active and reactive powertransfer and distribution, Reactive power compensation.

Unit II Computer aided power systems:

a) Static VAR systems; Concept of HVDC transmission: FACTS devices sush asSVC & UPFC.
b) Introduction to load dispatch centers (LDC); SCADA systems: Speed control of generators; Tie-line control; Frequency control; Economic dispatch.

Unit III Control Engineering:

a) Block diagram representation; Principles and applications of feedback;
b) Concept of Stability, Time- domain and transform-domain analysis; Routh-Hurwitz criterion; Root Loci; Nyquist criterion, Bode plots.
c) Design of lead-lag compensators; State variable representation; Principles of discrete control systems.

Unit IV Electronics

1. **Analog electronics:**
   a) Characteristics and equivalent circuits of diode, BJT, JFET and MOSFET; Clipping, clamping and rectifier circuits using diodes; Biasing and bias stability, FET amplifiers.
   b) Single andmulti-stage, differential, operational, feedback and power amplifiers; Analysis of amplifier; Frequency response of amplifiers, OPAMP circuits; Filters; Function generation; Wave shapping circuits; Power supplies.

2. **Digital Electronics:**
   a) Boolean algebra; minimization of Boolean functions; Logic gates; Digital IC families; Combinational circuits; Arithmetic circuits; Code converters; Multiplexers; Decoders.
   b) Latches andflip-flops; Counters and shift registers; Comparators; Timers; Multi-vibrators; Sample and hold circuits; ADCs and DACs; Semi-conductor memories; Logic implementation using ROM.

ELECTRICAL ENGINEERING
PAPER – II
SECTION A

Unit I Power Electronics and Electrical Drives:

a) Diodes, Power Transistors, thyristors, triacs, GTOs, MOSFETs, IGBTs-Static characteristics and principle of operation; Triggering circuits; Phase controlled rectifiers; Bridge concerters-fully controlled and half-controlled.
b) Principles of choppers, inverters and cyclo-converters; Basic concepts of speed control of dc and ac motors drives; Applications of variable speed drives.

Unit II Micro-processors and Micro-Computers:

a) Evolution of microprocessor technology, 8085 CPU; Architecture, programming, memory & I/O interfacing, Modes of operation; Power control; interfacing; Typical applications.

b) PC organization; CPU, Instruction set, register set, timing diagram, programming, interrupts, memory interfacing, programmable peripheral devices.

Unit III Analog and Digital Communication:

a) Need for modulation; Normal amplitude modulation; Modulation index; Frequency and phasemodulation; Frequency deviation and modulation index; Pulse amplitude modulation; Pulse width modulation; Pulseposition modulation.

b) Pulse codemodulation; Differential pulse code modulation, Delta modulation; Digitalmodulation and demodulation schemes; interfacing with power line; Descriptionof a typical power line carrier communication system.

Unit IV Fibre Optic Systems:

a) Time divisionmultiplexing; Frequency division Multiplexing; Optical properties of materials; Refractive index; Absorption and emission of light.

b) Optical fibres; Lasers and opto-electronic materials; Fibre optic links.

SECTION B

Unit I Energy Management:

a) Introduction to energy problem; Power scenario of Mizoram State and India;

b) Basics of wind turbine aerodynamics; Wind energy conversions systems and their integration into electrical grid; Power quality issues solar energy: Thermal conversion, photovoltaic conversion.

c) Importance of energy management; Energy conservation opportunities, Energy audit; Energy economics; Discount rate; Payback period; internal rate of return; Life cycle costing, Electricity Act 2003.

Unit II Power System Protection:

a) Principles of circuit breaking; Arc extinction for DC and AC; Arc interruption theories; Duties of switchgear; Various types of circuit breakers and their applications to power systems; Specifications of an impulse voltage wave; Insulation co-ordinations.

b) Principles of overcurrent, differential and distance protection; Concept of solid-state relays; Computer-aided protection; Protection of generators; transformers and transmission lines; Application of DSP to protection.

Unit III Stability :

a) Dynamics of synchronous generators; Small signal stability analysis (Low frequency oscillations)- Analysis of single machine systems, Applications of power system stabilizers; Node elimination technique, numerical solution of swing equation.

b) Transient stability analysis; Dynamic stability analysis; Voltage stability analysis, Static VAR control of load.

Unit IV Signals, Systems and Digital Signal Processing:

a) Representation of continuos-time and discrete-time signals and systems.

b) Fourier transforms; Laplace transforms; Z-transforms; Transfer functions; DFT, FFT processing of analog signals through discrete-time systems.

c) Frequency domain design of digitals filters; Quantization effects in digital filters.

ENGLISH

The syllabus consists of two papers, designed to test a first-hand and critical reading of texts prescribed from the following periods in English Literature : Paper I : 1600-1900 and Paper II : 1900-1990.

There will be two compulsory questions in each paper : a) A short-notes question related to the topics for general study, and b) A critical analysis of UNSEEN passages both in prose and verse.

PAPER-I

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:

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

UNIT I William Shakespeare : **King Lear** and **The Tempest.**
Henrik Ibsen : **A Doll's House.**

UNIT II John Donne. The following poems :
- Canonization;
- Death be not proud;
- The Good Morrow;
- On his Mistress going to bed;
- The Relic;

John Milton : **Paradise Lost,** I, II, IV, IX

UNIT III Alexander Pope. **The Rape of the Lock.**

UNIT IV 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.

Alfred Tennyson : **In Memoriam.**

Section-B

UNIT I Jonathan Swift. **Gulliver's Travels**.
Henry Fielding. **Tom Jones.**
George Eliot. **The Mill on the Floss**.

UNIT II Jane Austen. **Pride and Prejudice.**

UNIT III Charles Dickens. **Hard Times.**
Thomas Hardy. **Tess of the d'Urbervilles**.

UNIT IV Mark Twain. **The Adventures of Huckleberry Finn**.

ENGLISH

The syllabus consists of two papers, designed to test a first-hand and critical reading of texts prescribed from the following periods in English Literature : Paper I : 1600-1900 and Paper II : 1900-1990.

There will be two compulsory questions in each paper : a) A short-notes question related to the topics for general study, and b) A critical analysis of UNSEEN passages both in prose and verse.

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

UNIT I William Butler Yeats. The following poems:
- Easter 1916
- The Second Coming
- A Prayer for my daughter.
- Sailing to Byzantium.
- The Tower.
- Among School Children.
- Leda and the Swan.
- Meru
- Lapis Lazuli
- The Second Coming
- Byzantium.

T.S. Eliot. The following poems :
- The Love Song of J.Alfred Prufrock
- Journey of the Magi.
- Burnt Norton.

UNIT II 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.

Philip Larkin. The following poems :

- Next
- Please
- Deceptions
- Afternoons
- Days
- Mr. Bleaney

UNIT III A.K. Ramanujan. The following poems :

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

UNIT IV John Osborne : **Look Back in Anger.**
Samuel Beckett. **Waiting for Godot.**

(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

UNIT I Joseph Conrad. **Lord Jim**
James Joyce. **Portrait of the Artist as a Young Man.**

UNIT II D.H. Lawrence. **Sons and Lovers.**
E.M. Forster. **A Passage to India.**

UNIT III Virginia Woolf. **Mrs Dalloway.**

UNIT IV Raja Rao. **Kanthapura**.
V.S. Naipal. **A House for Mr. Biswas.**

FORESTRY
PAPER - I
SECTION A

1. Silviculture :

General silvicultural principles; ecological and physiological factors influencing vegetation; natural and artificial regeneration of forests; nursery techniques; seed technology collection, storage, pretreatment and germination; establishment and tendings.

2. Silvicultural Systems. :

Clear fellin, uniform, shelter wood selection, coppice and conversion systems, Management of Silviculture systems of temperate, subtropical, humid tropuical, dry tropical and coastal tropical forests with special reference to plantation silviculture, choice of species, establishment and management of standards, enrichment methods, technical constraints, intensive mechanized methods, aerial seeding, thinning.

3. Silviculture-Mangrove and Cold desert:

Mangrove: Habitat and characteristics, mangrove, plantation-establishment and rehabilitation of degraded mangrove formations; silviculture systems for mangrove; protection of habitats against natural disasters. Cold desert-Characteristics, identification and management of psecies.

4. Silviculture of trees:

Traditional and recent advances in tropical silvicultural research and practices. Silviculture of some of the economically important species in India such as Acacia catechu, Acacia nilotica, Acacia auriculiformis, Albizzia lebbeck, Albizzia procera, Anthocephalus cadamba, Anogeissus latitolia, Azadirachta indica, Bamboo spp, Butea monosperma, Cassia siamea, Casuarina equisetifolia, Cedrus deodara, Chukrasia tabularis, Dalbergia sisoo, Dipterocarpus spp, Emblica officinalis, Eucalyptus spp, Gmelina arborea, Hardwickia binata, Largerstroemia lanceolata, Pinus roxburghii, Populus spp, Pterocarpus marsupium, Prosopis juliflora, Santalum album, Semecarpus anacrdium. Shorea robusta, Salmalia malabaricum, Tectona grandis, Terminalia tomentosa, Tamarindus indica.

SECTION B

1. Agroforestry, Social Forestry, Joint Forest Management and Tribology

Agroforestry - Scope and necessity; role in the life of people and domestic animals and in integrated land use, planning especially related to (i) solil and water conservation; (ii) water recharge; (iii) nutrient availability to crops; (iv) nature and eco-system preservation including ecological balances through pest-predator relationships and (v) Providing opportunities for enhancing biodiversity, medical and other flora and fauna. Agro forestry systems under different agroecological zones; selection of species and role of multipurpose trees and NTFPs, techniques, food fodder and fuel security. Research and Extension needs, Social/Urban Forestry : Objectives, scope and necessity; peoples participation. JFM - Principles of social grouping, stages of tribal NGOs. Tribology: Tribal scene in India; tribes, concept of races, Principles of social grouping, stages of tribal economy education, cultural tradition, customs, ethos and participation in forestry programmes.

2. Forest Soils, Soil Conservation and Watershed Management:

Forest Soils : Classification, factos affecting soil formation; physical and biological properties.

Soil Conservation - definision, causes for erosion; types-wind and water erosion; conservation and management of eroded soils/areas, wind breaks, shelter belts; sand dunes; reclamation of saline and alkaline soils, water logged and other waste lands. Role of forests in conserving soils. Maintanance and build up of soil organic matter, provision of loppings for green leaf manuring; forest leaf litter and composting; role of micro-organisms in ameliorating soils; N and C clyhcles, VAM. Watershed Management - Concepts of watershed; role of mini-forests and forest trees in overall resource management, forest hydrology, watershed development in respect of torrent control, river channel stabilization, avalanche and landslide controls, rehabilitation of degraded areas; hilly and mountain areas; watershed management and environmental functions of forests; water-harvesting and conservation; ground water recharge and watershed management; role of integrating forest trees, horticultural crops, grass and fodders.

3. Environmental Conservation and Biodiversity:

Environment: Components and importance, principles of conservation, impact of deforestation; forest fires and various human activities like mining, construction and development projects, population growth on environment.

Population: Types, Global worming, green house effects, ozone layer depletion, acid rain, impact and control measures, environmental monitoring; concept of sustainable development. Role of trees and forests in environmental conservation; control and prevention of air, water and noise population. Environmental policy and legislation in India. Environmental Impact Assessment, Economics assessment of watershed development vis-á-vis ecological and environmental protection.

4. Tree-Improvement and Seed Technology:
General concept of tree improvement, methods and techniques, variation and its use, provenance, seed source, exotics; quantitative aspects of forest tree improvement, seed production and seed orchards, progeny tests, use of tree improvement in natural, forest and stand improvement, genetic testing programming, selection and breeding for resistance to diseases, insects, and adverse environment; the genetics base, forest genetic resources and gene conservation in situ and ex-situ. Cost benefit ratio, economic evaluation.

FORESTRY
PAPER II
SECTION A

1. Forest Management and Management System: Objective and principles; techniques; stand structure and dynamics, sustained yield relation, normal forest, growing stock; regulation of yield; management of forest plantations, commercial forests, forest cover monitoring. Approaches viz., (i) site-specific planning, (ii) strategic planning, (iii) Approval, sanction and expenditure. (iv) Monitoring (v) Reporting and governance. Details of steps involved such as formation of Village Forest Committees, Joint Forest Participatory Management.

2. Forest Working Plan : Forest planning, evaluation and monitoring tools and approaches for integrated planning; multipurpose development of forest resources and forest industries development; working plans and working schemes, their role in nature conservation, bio-diversity and other dimensions; preparation and control. Divisional Working Plans, Annual Plan of Operations.

3. Forest Mensuration and Remote Sensing:
Methods of measuring-diameter, girth, height and volume of trees; form-factor; volume estimation of stand, current annual increment; mean annual increment, Sampling methods and sample plots. Yield calculation; yield and stand tables, forest cover monitoring through remote sensing; Geographic Information Systems for management and modeling.

4. Surveying and Forest Engineering : Forest surveying – different methods of surveying, maps and map reading. Basic principles of forest engineering. Building materials and construction. Roads and Bridges, General principles, objects, types, simple design and construction of timber bridges

SECTION B

1. Forest Ecology and Ethnobotany:
Forest Ecology : Biotic and abiotic components, forest eco-systems; forest community concepts; vegetation concepts, ecological succession and climax, primary productivity, nutrient cycling and water relations; physiology in stress environments (drought, water logging salinity and alkalinity). Forest types in India, identification of species, composition and associations; dendrology, taxonomic classification, principles and establishment of herbaria and arboreta. Conservation of forest ecosystems. Clonal parks. Role of Ethnobotany in India Systems of Medicine; Ayurveda and Unani – Introduction, nomenclature, habitat, distribution and botanical features of medicinal and aromatic plants. Factors affecting and toxicity of drug plants and their chemical constituents.

2. Forest Resources and Utilization: Environmentally sound forest harvesting practices; logging and extraction techniques and principles, transportation systems, storage and sales; Non-Timber forest Products (NTFPs) – definition and scope; gums, resins, oleoresins, fibres, oil seeds nuts, rubber, canes, bamboos, medicinal plants, charcoal, lac and shellac, katha and Bidi leaves, collection; processing and disposal,

need and importance of wood seasoning and preservation; general principles of seasoning, air and kiln seasoning, solar dehumidification, st5eam heated and electrical kilns. Composite wood; adhesives-manufacture, properties, uses plywood manufacture-properties, uses, fibre boards-manufacture properties, uses; particle boards-manufacture; properties, uses. Present status of composite wood industry in India and future expansion plants. Pulp-paper and rayon; present position of supply of raw material to industry, wood substitution, utilization of plantation wood; problems and possibilities. Anatomical structure of wood, defects and abnormalities of wood, timber identification- general principles.

3. **Forest Protection & Wildlife Biology** : Injuries to forest – abiotic and biotic, destructive agencies, insect – pests and disease, effects of air pollution on forests and forest die back. Susceptibility of forests to damage, nature of damage, cause, prevention, protective measures and benefits due to chemical and biological control. General forest protection against fire, equipment and methods, controlled use of fire, economic and environmental cost; timber salvage operations after natural disasters. Role of afforestation and forest regeneration in absorption of CO_2. Rotational and controlled grazing, different methods of control against grazing and browsing animals; effect of wild animals on forest regeneration, human impacts; encroachment, poaching, grazing, live fencing, theft, shifting cultivation and control.

4. **Forest Economics and Legislation:**

Forest economics: Fundamental principles, cost-benefit analyses; estimation of demand and supply; analysis of trends in the national and international market and changes in production and consumption patterns; assessment and projection of market structures; role of private sectors and co-operatives; role of corporate financing. Socio-economic analysis of forest productivity and attitudes; evaluation of forest goods and service.

Legislation – History of forest development; Indian Forest Policy of 1894, 1952 and 1988. People's involvement, Joint Forest Management, Involvement of women; Forestry policies and issues related to land use, timber and non-timber products, sustainable forest management; industrialization policies; institutional and structural changes. Decentralization and Forestry Public Administration, Forest laws, necessity; general principles, Indian Forest Act 1927; Forest Conservation Act, 1980; Wildlife Protection Act 1972 and their amendments; Application of Indian Penal Code of Forestry, Scope and objectives of Forest Inventory.

GEOGRAPHY
PAPER - I
(Principles Of Geography)

Physical Geography

1. Geomorphology: process of landform development; endogenetic and exogenetic forces; Origin and evolution of the earth's crust; Fundamentals of geomagnetism; interior of the earth's; Geosynclines; Continental drift; Isostasy; Plate tectonics; Recent views on mountain building; Vulcanicity; Earthquakes and Tsunamis; Concepts of geomorphic cycles and Landscape development ; Denudation chronology; Channel morphology; Erosion surfaces; Slope development ; Applied Geomorphology : Geohydrology, economic geology and environment.

2. Climatology: Temperature and pressure belts of the world; Heat budget of the earth; Atmospheric circulation; atmospheric stability and instability. Planetary and local winds; Monsoons and jet streams; Air masses and fronto genesis, Temperate and tropical cyclones; Types and distribution of precipitation; Weather and Climate; Koppen's, Thornthwaite's and Trewartha's classification of world climates; Hydrological cycle; Global climatic change and role and response of man in climatic changes, Applied climatology and Urban climate.

3. Oceanography: Bottom relief of the Atlantic, Indian and Pacific Oceans; Temperature and salinity of the oceans; Heat and salt budgets, Ocean deposits; Waves, currents and tides; Marine resources: biotic, mineral and energy resources; Coral reefs and tools, coral bleaching; sea-level changes; law of the sea and marine pollution.

4. Biogeography: Genesis of soils; Classification and distribution of major soils; Soil profile; Soil erosion, Degradation 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. Principle and concept of ecology; Human ecological adaptations; Influence of man on ecology and environment; Global and regional ecological changes and imbalances; 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:

1. Perspectives in Human Geography: Areal differentiation; regional synthesis; Dichotomy and dualism; Environmentalism; Quantitative revolution and locational analysis; radical, behavioural, human and welfare approaches; Languages, religions and secularisation; Cultural regions of the world; Human development index. Models, Theories and Laws in Human Geography: Systems analysis in Human geography; Malthusian, Marxian and demographic transition models; Central Place theories of Christaller and Losch;Perroux and Boudeville; Von Thunen's model of agricultural location; Weber's model of industrial location; Ostov's model of stages of growth. Heartland and Rimland theories; Laws of international boundaries and frontiers.

2. 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; Food security; famine: causes, effects and remedies; World industries: locational patterns and problems; patterns of world trade.

3. Population and Settlement Geography: Growth and distribution of world population; demographic attributes; Causes and consequences of migration; concepts of over-under-and optimum population; Population theories, world population problems and policies, Social well-being and quality of life; Population as social capital.

   Types and patterns of rural settlements; Environmental issues in rural settlements; Hierarchy of urban settlements; Urban morphology: Concepts of primate city and rank-size rule; Functional classification of towns; Sphere of urban influence; Rural - urban fringe; Satellite towns; Problems and remedies of urbanization; Sustainable development of cities.

4. Regional Planning: Concept of a region; Types of regions and methods of regionalisation; Growth centres and growth poles; Regional imbalances; regional development strategies; environmental issues in regional planning; Planning for sustainable development.

GEOGRAPHY
PAPER – II
(Geography Of India)

1. Physical aspect and Resources: Space relationship of India with neighbouring countries; Structure and relief; Drainage system and watersheds; Physiographic regions; Mechanism of Indian monsoons and rainfall patterns, Tropical cyclones and western disturbances; Floods and droughts; Climatic regions; Natural vegetation; Soil types and their distributions. Land, surface and ground water, energy, minerals, biotic and marine resources; Forest and wild life resources and their conservation; Energy crisis.
2. Agriculture: Infrastructure: irrigation, seeds, fertilizers, power; Institutional factors: land holdings, land tenure and land reforms; Cropping pattern, 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; aqua - culture; sericulture, apiculture and poultry; agricultural regionalisation; agro-climatic zones; agro- ecological regions.
3. Industry: Evolution of industries; Locational factors of cotton, jute, textile, iron and steel, aluminium, fertilizer, paper, chemical and pharmaceutical, automobile, cottage and agro - based industries; Industrial houses and complexes including public sector undertakings; Industrial regionalisation; New industrial policies; Multinationals and liberalization; Special Economic Zones; Tourism including eco -tourism.
4. 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; Trade Policy; Export processing zones; Developments in communication and information technology and their impacts on economy and society; Indian space programme.
5. Cultural aspect and Settlements: Historical Perspective of Indian Society; Racial, linguistic and ethnic diversities; religious minorities; major tribes, tribal areas and their problems; cultural regions; Growth, distribution and density of population; Demographic attributes: sex-ratio, age structure, literacy rate, work-force, dependency ratio, longevity; migration (inter-regional, intra- regional and international) and associated problems; Population problems and policies; Health indicators. Types, patterns and morphology of rural settlements; Urban developments; Morphology of Indian cities; Functional classification of Indian cities; Conurbations and metropolitan regions; urban sprawl; Slums and associated problems; town planning; Problems of urbanization and remedies.
6. Regional Development and Planning: Experience of regional planning in India; Five Year Plans; Integrated rural development programmes; Panchayati Raj and decentralised planning; Command area development; Watershed management; Planning for backward area, desert, drought prone, hill, tribal area development; multi-level planning; Regional planning and development of island territories.
7. Political Aspects: Geographical basis of Indian federalism; State reorganisation; Emergence of new states; Regional consciousness and inter state issues; international boundary of India and related issues; Cross border terrorism; India's role in world affairs; Geopolitics of South Asia and Indian Ocean realm.
8. Contemporary Issues: Ecological issues: Environmental hazards: landslides, earthquakes, Tsunamis, floods and droughts, epidemics; Issues relating to environmental pollution; Changes in patterns of land use; Principles of environmental impact assessment and environmental management; Population explosion and food security; Environmental degradation; Deforestation, desertification and soil erosion; Problems of agrarian and industrial unrest; Regional disparities in economic development; Concept of sustainable growth and development; Environmental awareness; Linkage of rivers; Globalisation and Indian economy.

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

GEOLOGY
PAPER - I
SECTION A

1. General Geology:

The Solar System, Meteorites, Origin and interior of the earth and age of earth; Volcanoes- causes and products, Volcanic belts; Earthquakes-causes, effects, Seismic zones of India; Island arcs, trenches and mid-ocean ridges; Continental drifts; Seafloor spreading, Plate tectonics; Isostasy.

2. Geomorphology and Remote Sensing:

Basic concepts of geomorphology; Weathering and soil formations; Landforms, slopes and drainage; Geomorphic cycles and their interpretation; Morphology and its relation to structures and lithology; Coastal geomorphology; Applications of geomorphology in mineral prospecting, civil engineering; Hydrology and environmental studies; Geomorphology of Indian subcontinent.

Aerial photographs and their interpretation-merits and limitations; The Electromagnetic spectrum; Orbiting satellites and sensor systems; Indian Remote Sensing Satellites; Satellites data products; Applications of remote sensing in geology; The Geographic Information Systems (GIS) and Global Positioning System (GPS) - its applications.

3. Hydrogeology :

Hydrologic cycle and genetic classification of water; Movement of subsurface water; Springs; Hydrological properties of rocks - Porosity, permeability, hydraulic conductivity, specific yield, specific retention, transmissivity and storage coefficient, classification of aquifers; Water-bearing characteristics of rocks; Groundwater chemistry; Saline water intrusion; Types of wells; Drainage basin morphometry; Exploration for groundwater; Groundwater; Artificial recharge; Problems and management of groundwater; Rainwater harvesting.

4. Engineering Geology:

Engineering properties of rocks; Geological investigations for dams, tunnels highways, railway and bridges; Rock as construction material; Landslides-causes, prevention and rehabilitation; Earthquake-resistant structures.

SECTION B

5. Structural Geology:

Principles of geologic mapping and map reading, Projection diagrams, Stress and strain ellipsoid and stress-strain relationships of elastic, plastic and viscous materials; Strain markers in deformed rocks; Behaviour of minerals and rocks under deformation conditions; Folds and faults classification and mechanics; Structural analysis of folds, foliations, lineations, joints and faults, unconformities; Time-relationship between crystallization and deformation.

6. Paleontology:

Species- definition and nomenclature; Megafossils and Microfossils; Modes of preservation of fossils; Different kinds of microfossils; Application of microfossils in correlation, petroleum exploration, paleoclimatic and paleoceanographic studies; Evolutionary trend in Hominidae, Equidae and Proboscidae; Siwalik fauna; Gondwana flora and fauna and its importance; Index fossils and their significance.

7. Principles of Stratigraphy

Fundamental law of stratigraphy; Classification of stratigraphy sequences - lithostratigraphic, biostratigraphic, chronostratigraphic and magnetostratigraphic and their interrelationships; sequences stratigraphic; Geological time scale.

8. Indian Stratigraphy:

Distribution and classification of Precambrian rocks of India; Study of stratigraphic distribution and lithology of Phanerozoic rocks of India with reference to fauna, flora and economic importance; Major boundary problems- Cambrian/Precambrian, Permian/Triassic, Cretaceous/Tertiary and Pliocene/ Pleistocene; Study of climatic conditions, paleogeography and igneous activity in the Indian subcontinent in the geological past; Tectonic framework of India; Evolution of the Himalayas.

GEOLOGY
PAPER - II
SECTION A

1. Crystallography and Mineralogy: (A)

Classification of crystals into systems and classes of symmetry; Symmetry elements lof nolrmal classes of severn crystal systems; International system of crystallographic notation; Use of projection diagrams to represent crystal symmetry; Elements of X-ray crystallography.

Physical and chemical characters of rock forming silicate mineral groups; Structural classification of silicates; Common minerals of igneous and metamorphic rocks; Minerals of the carbonate, phosphate, sulphide and halide groups; Clay minerals.

2. Igneous Petrology:

Generation and crystallization of magmas; Crystallization of albite-anorthite, diopside-anorthite and diopside-wollastonite-silica systems; Bowen's Reaction Principle; Magmatic differentation and assimilation; Petrogenetic significance of the textures and structures of igneous rocks; Petrography and petrogenesis of granite, syenite, diorite, basic and ultrabasic groups, charnockite, anorthosite and alkaline rocks; Carbonatites; Deccan volcanic province.

3. Metamorphic Petrology:

Types and agents of metamorphism; Metamorphic grades and zones; Phase rule; Facies of regional and contact metamorphism; ACF and AKF diagrams; Textures and structures of metamorphic rocks; Metamorphism of arenaceous, argillaceous and basic rocks; Minerals assemblages Retrograde metamorphism; Metasomatism and granitisation, migmatites, Granulite terrains of India.

4. Sedimentary Petrology:

Sediments and Sedimentary rocks: Processes of formation; digenesis and lithification; Sedimentary Rocks of mechanical origin and biochemical origin - their classification, petrography and depositional environment; Sedimentary facies and provenance; Sedimentary structures classification and their significance; Heavy minerals and their significance; Sedimentary basins of India.

SECTION B

5. Economic Geology:

Ore, ore minerals and gangue, tenor of ore, classification of ore deposits; Process of formation of minerals deposits; Controls of ore localization; Ore textures and structures; Metallogenic epochs and provinces; Geology of the important Indian deposits of aluminium, chromium, copper, gold, iron, lead zinc, manganese, titanium, uranium and thorium and industrial minerals; Deposits of coal and petroleum in India; National Mineral Policy; Conservation and utilization of mineral resources; Marine mineral resources and Law of Sea.

6. Mining Geology:

Methods of prospecting-geological, geophysical, geochemical and geobotanical; Techniques of sampling; Estimation of reserves or ore; Methods of exploration and mining metallic ores, industrial minerals, marine mineral resources and building stones; Mineral beneficiation and ore dressing.

7. Geochemistry:

Cosmic abundance of elements; Composition of the planets and meteorites; Structure and composition of Earth and distribution of elements; Trace elements; Elements of crystal chemistry-types of chemical bonds, coordination number; Isomorphism and polymorphism; Elementary thermodynamics.

8. Environmental Geology:

Natural hazards-floods, mass wasting, costal hazards, earthquakes and volcanic activity and mitigation; Environmental impact of urbanization, 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.

HISTORY
PAPER - I
SECTION A

UNIT I

1. Sources:
   Archaeological sources:
   Exploration, excavation, epigraphy, numismatics, monuments
   Literary sources:
   Indigenous: Primary and secondary; poetry, scientific literature, literature, literature in regional languages, religious literature.
   Foreign accounts: 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. Indus Valley Civilization:
   Origin, date, extent, characteristics, decline, survival and significance, art and architecture.

UNIT II

1. Megalithic Cultures:
   Distribution of pastoral and farming cultures outside the Indus, Development of community life, Settlements, Development of agriculture, Crafts, Pottery, and Iron industry.

2. Aryans and Vedic Period:
   Expansions of Aryans in India.
   Vedic Period: Religious and philosophic literature; Transformation from Rig Vedic period to the later Vedic period; Political, social and economical life; Significance of the Vedic Age; Evolution of Monarchy and Varna system.

3. Period of Mahajanapadas:
   Formation of States (Mahajanapada) : Republics and monarchies; Rise of urban centres; Trade routes; Economic growth; Introduction of coinage; Spread of Jainism and Buddhism; Rise of Magadha and Nandas.
   Iranian and Macedonian invasions and their impact.

UNIT III

1. Mauryan Empire:
   Foundation of the Mauryan Empire, Chandragupta, Kautilya and Arthashastra; Ashoka; Concept of Dharma; Edicts; Polity, Administration; Economy; Art, architecture and sculpture; External contacts; Religion; Spread of religion; Literature.
   Disintegration of the empire; Sungas and Kanvas.

2 Post - Mauryan Period (Indo-Greeks, Sakas, Kushanas, Western Kshatrapas):
   Contact with outside world; growth of urban centres, economy, coinage, development of religions, Mahayana, social conditions, art, architecture, culture, literature and science.

3. Early State and Society in Eastern India, Deccan and South India:
   Kharavela, The Satavahanas, Tamil States of the Sangam Age; Administration, economy, land grants, coinage, trade guilds and urban centres; Buddhist centres; Sangam literature and culture; Art and architecture.

UNIT IV

1. Guptas, Vakatakas and Vardhanas:
   Polity and administration, Economic conditions, Coinage of the Guptas, Land grants, Decline of urban centres, Indian feudalism, Caste system, Position of women, Education and educational institutions; Nalanda, Vikramshila and Vallabhi, Literature, scientific literature, art and architecture.

2. Regional States during Gupta Era:
   The Kadambas, Pallavas, Chalukyas of Badami; Polity and Administration, Trade guilds, Literature; growth of Vaishnava and Saiva religions. Tamil Bhakti movement, Shankaracharya; Vedanta; Institutions of temple and temple architecture; Palas, Senas, Rashtrakutas, Paramaras, Polity and administration; Cultural aspects. Arab conquest of Sind; Alberuni, The Chalukyas of Kalyana, Cholas, Hoysalas, Pandyas; Polity and Administration; local Government; Growth of art and architecture, religious sects, Institution of temple and Mathas, Agraharas, education and literature, economy and society.

3. 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

UNIT I

1. Early Medieval India, 750-1200:
   - Polity: Major political developments in Northern India and the Peninsula, origin and the rise of Rajputs
   - The Cholas: administration, village economy and society
   - "Indian Feudalism"
   - Agrarian economy and urban settlements
   - Trade and commerce
   - Society: the status of the Brahman and the new social order
   - Condition of women
   - Indian science and technology

2. Cultural Traditions in India, 750-1200:
   - Philosophy: Skankaracharya and Vedanta, Ramanuja and Vishishtadvaita, Madhva and

Brahma-Mimansa
- Religion: Forms and features of religion, Tamil devotional cult, growth of Bhakti, Islam and its arrival in India, Sufism
- Literature: Literature in Sanskrit, growth of Tamil literature, literature in the newly developing languages, Kalhan's Rajtarangini, Alberuni's India
- Art and Architecture: Temple architecture, sculpture, painting

3. The Thirteenth Century:
   - Establishment of the Delhi Sultanate: The Ghurian invasions – factors behind Ghurian success
   - Economic, social and cultural consequences
   - Foundation of Delhi Sultanate and early Turkish Sultans
   - Consolidation: The rule of Iltutmish and Balban

UNIT II

1. The Fourteenth Century:
   - "The Khalji Revolution"
   - Alauddin Khalji: Conquests and territorial expansion, agrarian and economic measures
   - Muhammad Tughluq: Major projects, agrarian measures, bureaucracy of Muhammad Tughluq
   - Firuz Tughluq: Agrarian measures, achievements in civil engineering and public works, decline of the Sultanate, foreign contacts and Ibn Battuta's account

2. Society, Culture and Economy in the Thirteenth and Fourteenth Centuries:
   - Society: composition of rural society, ruling classes, town dwellers, women, religious classes, caste and slavery under the Sultanate, Bhakti movement, Sufi movement
   - Culture: Persian literature, literature in the regional languages of North India, literature in the languages of South India, Sultanate architecture and new structural forms, painting, evolution of a composite culture
   - Economy: Agricultural production, rise of urban economy and non-agricultural production, trade and commerce

3. The Fifteenth and Early Sixteenth Century – Political Developments and Economy:
   - Rise of Provincial Dynasties: Bengal, Kashmir (Zainul Abedin), Gujarat, Malwa, Bahmanids
   - The Vijayanagra Empire
   - Lodis
   - Mughal Empire, First phase: Babur and Humayun
   - The Sur Empire: Sher Shah's administration
   - Portuguese Colonial enterprise
   - Bhakti and Sufi Movements

UNIT III

1. The Fifteenth and early Sixteenth Century – Society and Culture:
   - Regional cultural specificities
   - Literary traditions
   - Provincial architecture
   - Society, culture, literature and the arts in Vijayanagara Empire.

2. Akbar:
   - Conquests and consolidation of the Empire
   - Establishment of Jagir and Mansab systems
   - Rajput policy

- Evolution of religious and social outlook, theory of Sulh-i-kul and religious policy
- Court patronage of art and technology

3. Mughal Empire in the Seventeenth Century:
   - Major administrative policies of Jahangir, Shahjahan and Aurangzeb
   - The Empire and the Zamindars
   - Religious policies of Jahangir, Shahjahan and Aurangzeb
   - Nature of the Mughal State
   - Late Seventeenth century crisis and the revolts
   - The Ahom Kingdom
   - Shivaji and the early Maratha Kingdom.

UNIT IV

1. Economy and Society in the Sixteenth and Seventeenth Centuries:
   - Population, agricultural production, craft production
   - Towns, commerce with Europe through Dutch, English and French companies : a trade revolution
   - Indian mercantile classes, banking, insurance and credit systems
   - Condition of peasants, condition of women
   - Evolution of the Sikh community and the Khalsa Panth

2. Culture in the Mughal Empire:
   - Persian histories and other literature
   - Hindi and other religious literature
   - Mughal architecture
   - Mughal painting
   - Provincial architecture and painting
   - Classical music
   - Science and technology

3. The Eighteenth Century:
   - Factors for the decline of the Mughal Empire
   - The regional principalities: Nizam's Deccan, Bengal, Awadh
   - Maratha ascendancy under the Peshwas
   - The Maratha fiscal and financial system
   - Emergence of Afghan Power, Battle of Panipat:1761
   - State of politics, culture and economy on the eve of the British conquest

HISTORY
PAPER – II
SECTION A

UNIT I

1. European Penetration into India:

The Early European Settlements; The Portuguese and the Dutch; The English and the French East India Companies; Their struggle for supremacy; Carnatic Wars; Bengal -The conflict between the English and the Nawabs of Bengal; Siraj and the English; The Battle of Plassey; Significance of Plassey.

2. British Expansion in India:

Bengal – Mir Jafar and Mir Kasim; The Battle of Buxar; Mysore; The Marathas; The three Anglo-Maratha Wars; The Punjab, Annexation & Consolidation of the Lushai Hills.

3. **Early Structure of the British Raj:**

The early administrative structure; From diarchy to direct control; The Regulating Act (1773); The Pitt's India Act (1784); The Charter Act (1833); The voice of free trade and the changing character of British colonial rule; The English utilitarian and India.

UNIT II

1. **Economic Impact of British Colonial Rule:**

(a) Land revenue settlements in British India; The Permanent Settlement; Ryotwari Settlement; Mahalwari Settlement; Economic impact of the revenue arrangements; Commercialization of agriculture; Rise of landless agrarian labourers; Impoverishment of the rural society.

(b) Dislocation of traditional trade and commerce; De-industrialisation; 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; European business enterprise and its limitations.

2. **Social and Cultural Developments:**

The state of indigenous education, its dislocation; Orientalist-Anglicist controversy, The introduction of western education in India; The rise of press, literature and public opinion; The rise of modern vernacular literature; Progress of science; Christian missionary activities in India.

3. **Social and Religious Reform movements in Bengal and Other Areas:**

Ram Mohan Roy, The Brahmo Movement; Devendranath Tagore; Iswarchandra Vidyasagar; The Young Bengal Movement; Dayanada Saraswati; The social reform movements in India including Sati, widow remarriage, child marriage etc.; The contribution of Indian renaissance to the growth of modern India; Islamic revivalism – the Feraizi and Wahabi Movements.

UNIT III

1. **Indian Response to British Rule:**

Peasant movements and tribal uprisings in the 18th and 19th centuries including the Rangpur Dhing (1783), the Kol Rebellion (1832), the Mopla Rebellion in Malabar (1841-1920), the Santal Hul (1855), Indigo Rebellion (1859-60), Deccan Uprising (1875) and the Munda Ulgulan (1899-1900); The Great Revolt of 1857 - Origin, character, causes of failure, the consequences; The shift in the character of peasant uprisings in the post-1857 period; the peasant movements of the 1920s and 1930s.

Factors leading to the birth of Indian Nationalism; Politics of Association; The Foundation of the Indian National Congress; The Safety-valve thesis relating to the birth of the Congress; Programme and objectives of Early Congress; the social composition of early Congress leadership; the Moderates and Extremists; The Partition of Bengal (1905); The Swadeshi Movement in Bengal; the economic and political aspects of Swadeshi Movement; The beginning of revolutionary extremism in India.

2. Rise of Gandhi; Character of Gandhian nationalism; Gandhi's popular appeal; Rowlatt Satyagraha; the Khilafat Movement; the Non-cooperation Movement; National politics from the end of the Non-cooperation movement to the beginning of the Civil Disobedience movement; the two phases of the Civil Disobedience Movement; Simon Commission; The Nehru Report; the Round Table Conferences; Nationalism and the Peasant Movements; Nationalism and Working class movements; Women and Indian youth and students in Indian politics (1885-1947); the election of 1937 and the formation of ministries; Cripps Mission; the Quit India Movement; the Wavell Plan; The Cabinet Mission.

3. Constitutional Developments in the Colonial India between 1858 and 1935 and **Other strands in the National Movement**

The Revolutionaries: Bengal, the Punjab, Maharashtra, U.P, the Madras Presidency, Outside India. The Left; The Left within the Congress: Jawaharlal Nehru, Subhas Chandra Bose, the Congress Socialist Party; the Communist Party of India, other left parties.

UNIT IV

1. Politics of Separatism; the Muslim League; the Hindu Mahasabha; Communalism and the politics of partition; Transfer of power; Independence.
2. Consolidation as a Nation; Nehru's Foreign Policy; India and her neighbours (1947-1964); The linguistic reorganisation of States (1935-1947); Regionalism and regional inequality; Integration of Princely States; Princes in electoral politics; the Question of National Language.
   Caste and Ethnicity after 1947; Backward castes and tribes in post-colonial electoral politics; Dalit movements.
3. Economic development and political change; Land reforms; the politics of planning and rural reconstruction; Ecology and environmental policy in post - colonial India; Progress of science.

SECTION B

UNIT I

1. Enlightenment and Modern ideas:
   (i) Major ideas of Enlightenment: Kant, Rousseau
   (ii) Spread of Enlightenment in the colonies
   (iii) Rise of socialist ideas (up to Marx); spread of Marxian Socialism.

2. Origins of Modern Politics:
   (i) European States System.
   (ii) American Revolution and the Constitution.
   (iii) French revolution and aftermath, 1789-1815.
   (iv) American Civil War with reference to Abraham Lincoln and the abolition of slavery.
   (v) British Democratic Politics, 1815-1850; Parliamentary Reformers, Free Traders, Chartists.

3. Industrialization:
   (i) English Industrial Revolution: Causes and Impact on Society
   (ii) Industrialization in other countries: USA, Germany, Russia, Japan
   (iii) Industrialization and Globalization.

UNIT II

1. Nation-State System:
   (i) Rise of Nationalism in 19th century
   (ii) Nationalism: state-building in Germany and Italy
   (iii) Disintegration of Empires in the face of the emergence of nationalities across the world.

2. Imperialism and Colonialism:
   (i) South and South-East Asia
   (ii) Latin America and South Africa
   (iii) Australia
   (iv) Imperialism and free trade: Rise of neo-imperialism.

3. Revolution and Counter-Revolution:
   (i) 19th Century European revolutions
   (ii) The Russian Revolution of 1917-1921
   (iii) Fascist Counter-Revolution, Italy and Germany.
   (iv) The Chinese Revolution of 1949

UNIT III

1. World Wars:
   (i) 1st and 2nd World Wars as Total Wars: Societal implications
   (ii) World War I: Causes and consequences
   (iii) World War II: Causes and consequence

2. The World after World War II:
   (i) Emergence of two power blocs
   (ii) Emergence of Third World and non-alignment
   (iii) UNO and the global disputes.

3. Liberation from Colonial Rule:
   (i) Latin America-Bolivar
   (ii) Arab World-Egypt
   (iii) Africa-Apartheid to Democracy
   (iv) South-East Asia-Vietnam

UNIT IV

1. Factors constraining development: Latin America, Africa

2. Unification of Europe:
   (i) Post War Foundations: NATO and European Community
   (ii) Consolidation and Expansion of European Community
   (iii) European Union.

3. Disintegration of Soviet Union and the Rise of the Unipolar World:
   (i) Factors leading to the collapse of Soviet communism and the Soviet Union, 1985-1991
   (ii) Political Changes in Eastern Europe 1989-2001.
   (iii) End of the cold war and US ascendancy in the World as the lone superpower.

HOME SCIENCE
PAPER- I

A. Meaning, importance and processes of Home Management.

B. Resources-Human and Non-Human
   (i) Time :
      (a) Time as resource
      (b) Time Plans
      (c) Time demands during different stages of family life,
   (ii) Energy :
      (a) Energy as a resource
      (b) Energy demands during different stages of family life.
      (c) Fatigue-Physiological and Psychological
   (iii) Money as a resource :
      (a) Sources of income
      (b) Types of income
      (c) Methods of handling family income
      (d) Budgeting-Types, preparation, Account keeping, savings and investments.
   (iv) (a) Objectives and principles of work simplification.

C. Consumer Economics :
(a) Consumer goods-classification, brands, advertisements.
(b) Consumer Protection-Quality control and Labelling.

D. Home furnishing and Interior decoration :
(a) Objectives and principles of home furnishing
(b) Flower arrangement, principles and types
(c) Accessories.

II. CLOTHING & TEXTILES:

A. (i) A study and classification of textile fibres.
(ii) Properties of –
(a) Cellulose fibres (b) Protein fibres
(c) Thermoplastic fibres (d) Mineral fibres.

B. Yarn :
(i) Yarn making, different types of yarns.
(ii) Fabric construction.
(a) Weaving, different kinds of weaves-Plain, Twill, Datin, Dateen, pile, jacquard.
(b) Court of cloth (c) Knitting.

C. Finishes:
(i) Objectives of Finishes
(ii) Kinds of Finishes

D. Dyeing and Printing Textiles.
(i) Study of different indigenous and chemical dyes.
(ii) Printing-Block, Screen, discharge, Resist.

E. Dry cleaning – Use of absorbents and solvents.

F. Clothing:
(i) Importance of clothing.
(ii) Sociological and Psychological aspects of clothing
(iii) Clothing in relation to family budget.

HOME SCIENCE
PAPER - II

1. FOODS AND NUTRITION :

A. Review of Essential nutrients, their food sources, requirements and deficiency diseases.
1) Carbohydrates.
2) Proteins.
3) Fats.
4) Vitamins.
5) Minerals.

B. Balanced diet:
1) Definition
2) Factors to be considered while planning a balanced diet.

C. Malnutrition, and optimum Nutrition:
   1) Definition
   2) Protein-Calorie Malnutrition,
   3) Kwashiorkar
   4) Marasmus
   5) Obesity.

D. Diet therapy :
   1) Principles of therapeutic diets.
   2) Types of therapeutic diets-Liquid, Semisolid, bland and low sodium diet.
   3) Diets in diseases-peptic ulcer, Diabetic mellitus Hypertension, Anaemia.

E. Food preservation :
   1) Importance and principles of food preservation.
   2) Different methods of food preservation-drying, smoking dehydration, refrigeration, pasteurization, canning.

2. CHILD DEVELOPMENT :

A. Meaning and principles of child development.

B. Growth and Development:
   1) Introduction
   2) Factors affecting growth and development.
   3) Types of growth and development. :
      (a) Physical
      (b) Social
      (c) Emotional
      (d) Language.
      (e) Mental.

C. Stages of development and characteristics of teach stages :
   1) Infancy
   2) Pre-School.
   3) Childhood
   4) Adolescence.

D. Prenatal care and development:
   a) Diagnosis, signs and symptoms of Pregnancy.
   b) Physical and Psychological care of the mother.
   c) Stages of prenatal growth care and development.
   d) Post natal care of mother.
   e) Care of new born baby.

E. Breast feeding and bottle feeding :
   1) Advantages and dis-advantages of each.
   2) Weaning.

F. Child Psychology :
   Definition, Meaning and scope.

LAW
PAPER - I
SECTION A
(Indian Constitution and Administrative Law)

Unit 1.

(1) Constitutional and Constitutionalism: The distinctive features of the Constitution.
(2) Fundamental Rights – Public Interest Litigation; Legal Aid; Legal Service Authority.
(3) Relationship between fundamental rights, directive principles and fundamental rights.

Unit 2.

(1) Constitutional position of the President and relation with the Council of Ministers.
(2) Governor and His powers.
(3) Centre, States and local bodies.
    a. Distribution of legislative powers between the Union and the States.
    b. Local Bodies.
    c. Administrative relationship among Union, State and Local Bodies.
    d. Eminent domain – State property – Community property
(4) Legislative powers, privileges and immunities.

Unit 3.

(1) Supreme Court and High Courts:
    a. Appointments and transfer.
    b. Powers, functions and jurisdiction.
(2) Services under the Union and the States:
    a. Recruitment and conditions of services; Constitutional safeguards; Administrative Tribunals.
    b. Union Public Service Commission and State Public Service Commission – Powers and functions.
    c. Election Commission – Powers and functions.
(3) Emergency Provisions.
(4) Amendment of the Constitution.

Unit 4.

(1) Principles of natural justice – Emerging trends and judicial approach.
(2) Delegated legislation and its constitutionality.
(3) Separation of Powers and constitutional governance.
(4) Judicial review of administrative action.
(5) Ombudsman : Lokayukta, Lokpal, etc

SECTION B

Unit 1.

(1) Nature and definition of international law.
(2) Relationship between international law and municipal law.
(3) State recognition and state succession.
(4) Individuals; Nationality, statelessness; Human rights and procedures available for their enforcement.

Unit 2.

(1) Territorial jurisdiction of States, Extradition and Asylum.
(2) Treaties : Formation, application, termination and reservation.
(3) United Nations: Its principal organs, powers, functions and reform.

Unit 3.

(1) Law of the Sea: Inland waters, territorial sea, contiguous zone, continental shelf, exclusive economic zone, high seas.
(2) New International economic order and monetary law: WTO, TRIPS, GATT, IMF, World Bank.
(3) Protection and improvement of the human environment : International efforts.

Unit 4.

(1) Peaceful settlement of disputes – different modes.
(2) Lawful recourse to force : aggression, self-defense, intervention.
(3) Fundamental principles of international humanitarian law – International Conventional and contemporary developments.
(4) Legality of the use of nuclear weapons; ban on testing of nuclear weapons; Nuclear-non-proliferation treaty, CTBT.
(5) International terrorism, state sponsored terrorism, hijacking, international criminal court.

LAW
PAPER – II
SECTION – A
(Law of Crime and Law of Torts)

Law of Crimes (Unit 1 & 2)

Unit 1.

(1) General principles of criminal liability : Mens rea and actus reus, mens rea in statutory offences.
(2) Kinds of punishment and emerging trends as to abolition of capital punishment.
(3) Preparation and criminal attempt.
(4) General exceptions.
(5) Joint and constructive liability.
(6) Abetment.
(7) Criminal conspiracy.
(8) Offences against the State.
(9) Offences against public tranquility.
(10) Defamation.

Unit 2.

(1) Offence against women.
(2) Offence against human body.
(3) Offence against property.
(4) Prevention of Corruption Act, 1988
(5) Protection of Civil Rights Act, 1955 and subsequent legislative development.
(6) Plea bargaining.

Law of Torts (Unit 3 & 4)

Unit 3.

(1) Nature and definition of Tort.
(2) General defenses.
(3) Joint tort feasors.
(4) Remedies.
(5) Conspiracy.
(6) False imprisonment.
(7) Malicious prosecution.

Unit 4.

(1) Liability based upon fault and strict liability; Absolute liability.
(2) Vicarious liability including State liability.
(3) Negligence.
(4) Defamation.
(5) Nuisance.
(6) Consumers Protection Act, 1986.

SECTION – B
(Law of Contracts and Mercantile Law and Contemporary Legal Developments)

Law of Contract and Mercantile Law (Unit 1 & 2).

Unit 1.

(1) Nature and formation of contract/E-contract.
(2) Factors vitiating free 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.
(8) Contract of agency.
(9) Standard form contracts.

Unit 2.

(1) Sale of goods and hire-purchase.
(2) Formation and dissolution of partnership.
(3) Negotiable Instruments Act, 1881.
(4) Arbitration and Conciliation Act, 1996.

Contemporary Legal Developments (Unit 2 & 4)

Unit 3.

(1) Public Interest Litigation
(2) Major Statues concerning environmental law:
    a. Environment (Protection) Act, 1986.
    b. Air (Protection & Control of Pollution) Act, 1981.
    c. Water (Protection & Control of Pollution) Act, 1974.
(3) Right to information Act
(4) Trial by Media.

Unit 4.

(1) Intellectual property right-Concept, types/prospects.
(2) Information Technology Law including Cyber Laws-Concepts, purpose/prospects.
(3) Competition Law-Concepts, purpose/prospects.
(4) Alternate Dispute Resolution-Concept, types/prospects.

MANAGEMENT
PAPER – I
SECTION A

UNIT I Managerial Function and Process:

Concept and Foundations of Management, Evolution of Management Thoughts; Managerial Functions – Planning, Organizing, Controlling; Decision making; Role of Manager, Managerial skills; Management of innovation; Managing in a global environment, Flexible Systems Management; Social responsibility and managerial ethics; Managerial processes on direct and indirect value chain.

UNIT II Organisational Behaviour:

Conceptual model of organization behaviour; The individual processes – personality, values and attitude, perception, motivation, learning and reinforcement, work stress and stress management; The dynamics of organization behaviour – power and politics, conflict and negotiation, leadership process and styles, communication;

UNIT III Organisational Process & Design :

The Organizational Processes - decision making, job design; Classical, Neoclassical and Contingency approaches to organizational design; Organizational theory and design - organizational culture, managing cultural diversity, learning organization; organizational change and development; Knowledge Based Enterprise – systems and processes; Networked and virtual organizations.

UNIT IV Entrepreneurship

Concept of Entrepreneurship ; Theories of entrepreneurship, Entrepreneurship and economic development, factors contributing to entrepreneurship; characteristics of an Entrepreneur, entrepreneur vs manager, types of entrepreneur, Creativity and Business opportunity; Opportunity and competitive advantages, Business model and planning. Financing an entrepreneurial venture, financing a small business, legal and technical issues in starting a small business, growth strategies and start-up; Business failure and turn-around; Harvest and exit; Intrapreneurship; Innovations and women entrepreneurship.

SECTION B

UNIT I Human Resource Management:

HR challenges; HRM functions; The future challenges of HRM; Strategic Management of human resources; Human resource planning; Job analysis; Job evaluation; Recruitment and selection; Training and development; Promotion and transfer; Performance management; Compensation management and benefits; Employee morale and productivity; Management of organizational climate and Industrial relations; Human resources accounting and audit; Human resource information system; International human resource management.

UNIT II Marketing Management:

Concept, evolution and scope; Marketing strategy formulation and components of marketing plan; Segmenting and targeting the market; Positioning and differentiating the market offering; Analyzing competition; Analyzing consumer markets; Industrial buyer behaviour; Market research; Product strategy; Pricing strategies; Designing and managing Marketing channels; Integrated marketing communications; Building customer satisfaction, Value and retention; Services and non-profit marketing; Ethics in marketing; Consumer protection; Internet marketing; Retail management.

UNIT III Accounting for Managers:

Financial accounting – concept, importance and scope, generally accepted accounting principles, preparation of financial statements with special reference to analysis of a balance sheet and measurement

of business income, inventory valuation and depreciation, financial statement analysis, fund flow analysis, the statement of cash flows; Management accounting – concept, need, importance and scope; Cost accounting – records and processes, cost ledger and control accounts, reconciliation and integration between financial and cost accounts; Overhead cost and control, Job and process costing, Budget and budgetary control, Performance budgeting, Zero-base budgeting, relevant costing and costing for decision-making, standard costing and variance analysis, marginal costing and absorption costing.

UNIT IV Financial Management:

Goals of finance function; Concepts of value and return; Valuation of bonds and shares; Management of working capital: Estimation and financing; Management of cash, receivables, inventory and current liabilities; Cost of capital; Capital budgeting; Financial and operating leverage; Design of capital structure: theories and practices; Shareholder value creation: dividend policy, corporate financial policy and strategy, management of corporate distress and restructuring strategy; Capital and money markets: institutions and instruments; Leasing, hire purchase and venture capital; Regulation of capital market; Risk and return: portfolio theory; CAPM; APT; Financial derivatives: option, futures, swap; Recent reforms in financial sector.

MANAGEMENT
PAPER – II
SECTION A

UNIT I Business Statistics:

Descriptive statistics – tabular, graphical and numerical methods, introduction to probability, discrete and continuous probability distributions, inferential statistics-sampling distributions, central limit theorem, hypothesis testing for differences between means and proportions, inference about population variances, Chi-square and ANOVA, simple correlation and regression, time series and forecasting, index numbers.

UNIT II Operations Research

Overview of operations research, modeling in operations research, applications and scope of operations research, Linear programming-graphical and simplex method, duality, sensitivity analysis, transportation – mathematical models, methods of finding initial and optimal solutions, Assignment Problems – Mathematical models, statement of the problems and finding optional solutions. Project Management – PERT, CPM, steps in PERT and CPM, Crashing, Simulation, Markov analysis, Decision theory, game theory, queing theory, simulation.

UNIT III Production and Operations Management:

Fundamentals of operations management; Organizing for production; Aggregate production planning, capacity planning, plant design: process planning, plant size and scale of operations, Management of facilities; Line balancing; Equipment replacement and maintenance; Production control; Supply chain management - vendor evaluation and audit; Statistical process control, Flexibility and agility in manufacturing systems; World class manufacturing; Project management concepts, R&D management, Management of service operations; make or buy decision; Waste management.

UNIT IV Material and Quality Management:

Material management – concept, role and importance of material management, purchase management, store management, Introduction in to Quality management – conceptual framework, strategic quality management, contemporary views. TQM – Evolutions and issues related to quality control, responsibilities for quality, quality cost concept, quality & productivity, Contribution of quality gurus – Dencing, Juram, Cosby, Ishikawn and its comparison.

SECTION B

UNIT I Management Information System:

Conceptual foundations of information systems; Information theory; Information resource management; Types of information systems; Systems development - Overview of systems and design; System development management life-cycle, Designing for online and distributed environments; Implementation and control of project; Trends in information technology; Managing data resources - Organising data; DSS and RDBMS; Enterprise Resource Planning (ERP), Expert systems, e-Business architecture, e-Governance; Information systems planning, Flexibility in information systems; User involvement; Evaluation of information systems.

UNIT II Government Business Interface:

State participation in business, Interaction between Government, Business and different Chambers of Commerce and Industry in India; Government's policy with regard to Small Scale Industries; Government clearances for establishing a new enterprise; Public Distribution System; Government control over price and distribution; Consumer Protection Act (CPA) and The Role of voluntary organizations in protecting consumers' rights; New Industrial Policy of the Government: liberalization, deregulation and privatisation; Indian planning system; Government policy concerning development of Backward areas/regions; The Responsibilities of the business as well as the Government to protect the environment; Corporate Governance; Cyber Laws.

UNIT III Strategic Management:

Business policy as a field of study; Nature and scope of strategic management, Strategic intent, vision, objectives and policies; Process of strategic planning and implementation; Environmental analysis and internal analysis; SWOT analysis; Tools and techniques for strategic analysis - Impact matrix: The experience curve, BCG matrix, GEC mode, Industry analysis, Concept of value chain; Strategic profile of a firm; Framework for analysing competition; Competitive advantage of a firm; Generic competitive strategies; Growth strategies – expansion, integration and diversification; Concept of core competence, Strategic flexibility; Reinventing strategy; Strategy and structure; Chief Executive and Board; Turnaround management; Management of strategic change; Strategic alliances, Mergers and Acquisitions; Strategy and corporate evolution in the Indian context.

UNIT IV International Business:

International Business Environment: Changing composition of trade in goods and services; India's Foreign Trade: Policy and trends; Financing of International trade; Regional Economic Cooperation; FTAs; Internationalisation of service firms; International production; Operation Management in International companies; International Taxation; Global competitiveness and technological developments; Global e-Business; Designing global organisational structure and control; Multicultural management; Global business strategy; Global marketing strategies; Export Management; Export- Import procedures; Joint Ventures; Foreign Investment: Foreign direct investment and foreign portfolio investment; Cross-border Mergers and Acquisitions; Foreign Exchange Risk Exposure Management; World Financial Markets and International Banking; External Debt Management; Country Risk Analysis.

MATHEMATICS
PAPER - I
SECTION A

UNIT - I Linear Algebra:

Vector spaces over R and C, linear dependence and independence, subspaces, bases, dimension; Linear transformations, rank and nullity, matrix of a linear transformation.

Algebra of Matrices; Row and column reduction, Echelon form, congruence's and similarity; Rank of a matrix; Inverse of a matrix; Solution of system of linear equations; Eigenvalues and eigenvectors, characteristic polynomial, Cayley-Hamilton theorem, Symmetric, skew-symmetric, Hermitian, skew-Hermitian, orthogonal and unitary matrices and their eigenvalues.

UNIT - II Calculus:

Real numbers, functions of a real variable, limits, continuity, differentiability, mean-value theorem, Taylor's theorem with remainders, indeterminate forms, maxima and minima, asymptotes; Curve tracing; Functions of two or three variables: limits, continuity, partial derivatives, maxima and minima, Lagrange's method of multipliers, Jacobian.

UNIT - III

Riemann's definition of definite integrals; Indefinite integrals; Infinite and improper integrals; Double and triple integrals (evaluation techniques only); Areas, surface and volumes.

UNIT - IV Analytic Geometry:

Cartesian and polar coordinates in three dimensions, second degree equations in 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

UNIT - V Ordinary Differential Equations:

Formulation of differential equations; Equations of first order and first degree, integrating factor; Orthogonal trajectory; Equations of first order but not of first degree, Clairaut's equation, singular solution.

Second and higher order linear equations with constant coefficients, complementary function, particular integral and general solution.

Second order linear equations with variable coefficients, Euler-Cauchy equation; 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 2^{nd} order linear equations with constant coefficients.

UNIT - VI Dynamics & Statics:

Rectilinear motion, simple harmonic motion, motion in a plane, projectiles; constrained motion; Work and energy, conservation of energy; Kepler's laws, orbits under central forces.

UNIT - VII

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.

UNIT - VIII Vector Analysis:

Scalar and vector fields, differentiation of vector field of a scalar variable; Gradient, divergence and curl in cartesian and cylindrical coordinates; Higher order derivatives; Vector identities and vector equations.

Application to geometry: Curves in space, Curvature and torsion; Serret-Frenet's formulae.

Gauss and Stokes' theorems, Green's identities.

MATHEMATICS
PAPER - II
SECTION A

UNIT - I ALGEBRA:

Groups, subgroups, cyclic groups, cosets, Lagrange's Theorem, normal subgroups, quotient groups, homomorphism of groups, basic isomorphism theorems, permutation groups, Cayley's theorem.
Rings, subrings and ideals, homomorphisms of rings; Integral domains, principal ideal domains, Euclidean domains and unique factorization domains; Fields, quotient fields.

UNIT - II Real Analysis:

Real number system as an ordered field with least upper bound property; Sequences, limit of a sequence, Cauchy sequence, completeness of real line; Series and its convergence, absolute and conditional convergence of series of real and complex terms, rearrangement of series.
Continuity and uniform continuity of functions, properties of continuous functions on compact sets.
Riemann integral, improper integrals; Fundamental theorems of integral calculus.
Uniform convergence, continuity, differentiability and integrability for sequences and series of functions; Partial derivatives of functions of several (two or three) variables, maxima and minima.

UNIT - III Complex Analysis:

Analytic functions, Cauchy-Riemann equations, Cauchy's theorem, Cauchy's integral formula, power series representation of an analytic function, Taylor's series; Singularities; Laurent's series; Cauchy's residue theorem; Contour integration.

UNIT - IV Linear Programming:

Linear programming problems, basic solution, basic feasible solution and optimal solution; Graphical method and simplex method of solutions; Duality.
Transportation and assignment problems.

SECTION B

UNIT - V Partial differential equations:

Family of surfaces in three dimensions and formulation of partial differential equations; Solution of quasilinear partial differential equations of the first order, Cauchy's method of characteristics; Linear partial differential equations of the second order with constant coefficients, canonical form; Equation of a vibrating string, heat equation, Laplace equation and their solutions.

UNIT - VI Numerical Analysis:

Numerical methods: Solution of algebraic and transcendental equations of one variable by bisection, Regula-Falsi and Newton-Raphson methods; solution of system of linear equations by Gaussian elimination and Gauss-Jordan (direct), Gauss-Seidel(iterative) methods. Newton's (forward and backward) interpolation, Lagrange's interpolation.
Numerical integration: Trapezoidal rule, Simpson's rules, Gaussian quadrature formula.
Numerical solution of ordinary differential equations: Euler and Runga Kutta-methods.

UNIT - VII Computer programming:

Computer Programming: Binary system; Arithmetic and logical operations on numbers; Octal and Hexadecimal systems; Conversion to and from decimal systems; Algebra of binary numbers.
Elements of computer systems and concept of memory; Basic logic gates and truth tables, Boolean algebra, normal forms.

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

UNIT - VIII Mechanics and Fluid Dynamics:

Generalized coordinates; 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; Navier-Stokes equation for a viscous fluid.

MECHANICAL ENGINEERING
PAPER - I
SECTION A

Unit I Mechanics:

Mechanics of rigid bodies:

Equations of equilibrium in space and its application; first and second moments of area; simple problems on friction; kinematics of particles for plane motion; elementary particle dynamics.

Mechanics of deformable bodies:

Generalized Hook's law and its application; design problems on axial stress, shear stress and bearing stress; material properties for dynamic loading; bending shear and stresses in beams;. determination of principle stresses and strains - analytical and graphical; compound and combined stresses; bi-axial stresses - thin walled pressure vessel; deflection of beam for statically determinate problems; theories of failure.

Unit II Design of machined elements :

Material behaviour and design factors for dynamic load; design of circular shafts for bending and torsional load only; design of belts and gears for transmission of power.

Unit III Engineering Materials:

Basic concepts on structure of solids; common ferrous and non-ferrous materials and their applications; heat-treatment of steels; non-metals- plastics, composite materials and nano-materials.

Unit IV Theory of Machines:

Kinematic and dynamic analysis of plane mechanisms. Cams, Gears and epicyclic gear trains, flywheels, governors, balancing of rigid rotors, balancing of single and multicylinder engines, linear vibration analysis of mechanical systems (single degree of freedom), Critical speeds and whirling of shafts.

SECTION B

Unit I Conventional Machining:

Machine tool engineering – Merchant's force analysis; Taylor's tool life equation;
Forming and welding processes; NC and CNC machining processes; jigs and fixtures.

Unit II Non-conventional machining

EDM, ECM, ultrasonic, water jet machining; application of lasers and plasmas; energy rate calculations.

Unit III Production Management:

System design: factory location- simple OR models; plant layout - methods based; applications of engineering economic analysis and break- even 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.

Unit IV Quality Control

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.

Metrology - concept of fits and tolerances; tools and gauges; comparators; inspection of length; position; profile and surface finish.

MECHANICAL ENGINEERING
PAPER – II
SECTION A

Unit I Thermodynamics,

Basic concept of First –law and second law of Thermodynamics; concept of entropy and reversibility; availability and unavailability and irreversibility.

Unit II Fluid mechanics

Classification and properties of fluids; incompressible and compressible fluids flows; effect of Mach number and compressibility; continuity momentum and energy equations; normal and oblique shocks; one dimensional isentropic flow; flow or fluids in duct with frictions that transfer energy.

Unit III Gas Dynamics and Turbine:

Flow through fans, blowers and compressors; axial and centrifugal flow configuration; design of fans and compressors; single problems compresses and turbine cascade; open and closed cycle gas turbines; work done in the gas turbine; reheat and regenerators.

Unit IV Heat Transfer:

Conduction heat transfer- general conduction equation - Laplace, Poisson and Fourier equations; Fourier law of conduction; one dimensional steady state heat conduction applied to simple wall, solid and hollow cylinder of spheres.

Convection heat transfer- Newton's law of convection; free and forces convection; heat transfer during laminar and turbulent flow of an incompressible fluid over a flat plate; concepts of Nusselt number, hydrodynamic and thermal boundary layer their thickness; Prandtl number; analogy between heat and momentum transfer- Reynolds, Colbum, Prandtl analogies; heat transfer during laminar and turbulent flow through horizontal tubes; free convection from horizontal and vertical plates.

Black body radiation - basic radiation laws such as Stefan-Boltzman, Planck distribution, Wein's displacement etc.

Basic heat exchanger analysis; classification of heat exchangers.

SECTION B

Unit I I .C. Engines:

Classification, thermodynamic cycles of operation; determination of break power, indicated power, mechanical efficiency, heat balance sheet, interpretation of performance characteristics, petrol, gas and diesel engines.

Combustion in SI and CI engines, normal and abnormal combustion; effect of working parameters on knocking, reduction of knocking; Forms of combustion chamber for SI and CI engines; rating of fuels; additives; emission.

Different systems of IC engines- fuels; lubricating; cooling and transmission systems. Alternate fuels in IC engines.

Unit II Steam Engineering:

Steam generation- modified Rankine 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.

Unit III Water pumps and turbines

Various types of pumps, Receprocating pump; centrifugal pump; axial flow pump and jet pump. Classification of water turbines. Impuse turbine (Pelton wheel); inward flow reaction turbine (Francis turbine) and axial flow reaction turbine (Kaplan turbine)

Unit IV Refrigeration and air-conditioning:

Vapour compression refrigeration cycle - cycle on p-H & T-s diagrams; eco-friendly refrigerants - R134a,123; Systems like evaporators, condensers, compressor, expansion devices. Simple vapour absorption systems.

Psychrometry - properties; processes; charts; sensible heating and cooling; humidification and dehumidification effective temperature; air-conditioning load calculation; simple duct design.

MEDICAL SCIENCE
PAPER - I
SECTION A

Unit I General Medicine:

Etiology, clinical features, diagnosis and principles of management (including prevention) of: - Tetanus, Rabies, AIDS, Dengue, Kala-azar, Japanese Encephalitis.

Etiology, clinical features, diagnosis and principles of management of:

Ischaemic heart disease, pulmonary embolism.

Bronchial asthma.

Pleural effusion, tuberculosis, Malabsorption syndromes, acid peptic diseases, Viral hepatitis and cirrhosis of liver.

Glomerulonerphritis and pyelonephritis, renal failure, nephrotic syndrome, renovascular

hypertension, complications of diabetes mellitus, coagulation disorders, leukemia, Hypo and hyper thyroidism, meningitis and encephalitis.

Unit II Pharmacology:

Mechanism of action and side effects of the following drugs

- Antipyretics and analgesics, Antibiotics, Antimalaria; Antikala-azar,Antidiabetics
- Antihypertensive, Antidiuretics, General and cardiac vasodilators, Antiviral, Antiparasitic, Antifungal, Immunosuppressa
- Anticancer

Unit III Dermatology:

Psoriasis, Allergic dermatitis, scabies, eczema, vitiligo, Stevan Johnson's syndrome, Lichen Planus.

Unit IV Psychiatry and Radio Diagrnosis:

Imaging in medical problems, ultrasound, echocardiogram, CT scan, MRI.
Anxiety and Depressive Psychosis and schizophrenia and ECT.

SECTION B

Unit I Paediatrics:

Immunization, Baby friendly hospital, congenital cyanotic heart disease, respiratory distress syndrome, broncho - pneumonias, kernicterus. IMNCI classification and management, PEM grading and management. ARI and Diarrhoea of under five and their management.

Unit II Pathology:

Inflammation and repair, disturbances of growth and cancer, Pathogenesis and histopathology of rheumatic and ischemic heart disease and diabetes mellitus. Differentiation between benign, malignant, primary and metastatic malignancies, Pathogenesis and histopathology of bronchogenic carcinoma, carcinoma breast, oral cancer, cancer cervix, leukaemia, Etiology, pathogenesis and histopathology of - cirrhosis liver, glomerulonephritis, tuberculosis, acute osteomyelitis.

Unit III Community Medicine (Preventive and Social Medicine):

Principles, methods, approach and measurements of Epidemiology
Nutrition, nutritional diseases / disorders & Nutrition Programmes.
Health information Collection, Analysis and Presentation.
Objectives, components and critical analysis of National programmes for control/eradication of: Malaria, Kala-azar, Filaria and Tuberculosis,
HIV/AIDS, STDs and Dengue
Critical appraisal of Health care delivery system.
Health management and administration: Techniques, Tools, Programme Implementation and Evaluation.
Objective, Component, Goals and Status of Reproductive and Child Health, National Rural Health Mission and Millennium Development Goals
Management of hospital and industrial waste.

Unit IV Human Physiology:

Conduction and transmission of impulse, mechanism of contraction, neuromuscular transmission, reflexes, control of equilibrium, posture and muscle tone, descending pathways, functions of cerebellum, basal ganglia, Physiology of sleep and consciousness.
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, regulation and fate of blood cells.
Cardio-vascular, cardiac output, blood pressure, regulation of cardiovascular functions;

MEDICAL SCIENCE
PAPER - II
SECTION A

Unit I General Surgery:

Clinical features, causes, diagnosis and principles of management of cleft palate, harelip.
Laryngeal tumour, oral and oesophageal tumours.
Peripheral arterial diseases, varicose veins, coarctation of aorta
Tumours of Thyroid, Adrenal Glands
Abscess, cancer, fibroadenoma and adenosis of breast.
Bleeding peptic ulcer, tuberculosis of bowel, ulcerative colitis, cancer stomach.
Renal mass, cancer Prostate..
Haemothorax, stones of Gall bladder, Kidney, Ureter and Urinary Bladder.
Management of surgical conditions of Rectum, Anus and Anal canal, Gall bladder and Bile ducts Splenomegaly, cholecystitis, portal hypertension, liver abscess, peritonitis, carcinoma head of pancreas.

Unit II Forensic Medicine and Toxicology:

Forensic examination of injuries and wounds; Examination of blood and seminal stains; poisoning, sedative overdose, hanging, drowning, burns, DNA and finger print study.

Unit III Human Anatomy:

Applied anatomy including blood and nerve supply of upper and lower limbs and joints of shoulder, hip and knee.
Gross anatomy, blood supply and lymphatic drainage of tongue, thyroid, mammary gland, stomach, liver, prostate, gonads and uterus
Applied anatomy of diaphragm, perineum and inguinal region.
Clinical anatomy of kidney, urinary bladder, uterine tubes, vas deferens.
Embryology: Placenta and placental barrier. Development of heart, gut, kidney, uterus, ovary, testis and their common congenital abnormalities.
Central and peripheral autonomic nervous system: Gross and clinical anatomy of ventricles of brain, circulation of cerebrospinal fluid; Neural pathways and lesions of cutaneous sensations, hearing and vision; Cranial nerves, distribution and clinical significance; Components of autonomic nervous system.

Unit IV Orthopaedics, Endoscopy and Laparoscopic Surgery

Fractures of spine, Colles' fracture and bone tumours.
Endoscopy
Laparoscopic Surgery.

SECTION B

Unit I Obstetrics and

Diagnosis of pregnancy.
Labour management, complications of 3rd stage, Antepartum and postpartum haemorrhage,

resuscitation of the newborn, Management of abnormal lie and difficult labour, Management of small for date or premature newborn.
Diagnosis and management of anaemia. Preeclampsia and Toxaemias of pregnancy,

Unit II Gynaecology including Family Planning:
Management of Post menopausal Syndrome.
Intra-uterine devices, pills, tubectomy and vasectomy. Medical termination of pregnancy including legal aspects.
Cancer cervix.
Leucorrhoea, pelvic pain, infertility, dysfunctional uterine bleeding (DUB), amenorrhoea, Fibroid and prolapse of uterus.

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

Unit IV Microbiology:
Humoral and cell mediated immunity
Diseases caused by and laboratory diagnosis of-
- Meningococcus, Salmonella
- Shigella, Herpes, Dengue, Polio
- HIV/AIDS, Malaria, E. Histolytica, Giardia
- Candida, Cryptococcus, Aspergillus

MIZO ELECTIVE
PAPER-I
SECTION-A

1. Literary Trends
2. Poetry/Hla:
   (a) Mizo Hla Hlui (Mizo Traditional Song/Poem):
      1) Salu lam Zai - Chang 7
      2) Chawngchen Zai - Chang 7
      3) Chai Hla - Chang 7
      4) Laltheri Zai - Chang 7
      5) Saikuti Zai - Chang 7
      6) Hrangchhawni Zai - Chang 7
      7) Awithangpa Zai - Chang 7
   (b) Kum 1900-1940 chhung hlate:
      1) Mizo fate u finna zawng ula - Thanga
      2) Thil tha kan hmuh ang hi - Liangkhaia
      3) Ral a lian e khawvelah hian - L.Siamliana
   (c) Kum 1900-1940 chhung hlate:
      1) Kumsul lo vei kan nun..... - Laithangpuia
      2) Ramthianghlim Lal lo piang chu - Patea
      3) Thal romei zing rii riai hnuaiah - Ngurliana Sailo
      4) He lei hi chatuan ram a tling lo - Saihnuna

(d) Kum 1940-1965 chhung hla te:

1)	Leng dun ila	-	Lalzuithanga
2)	Hmangaihna	-	Vankhama
3)	Ram tuan rel lovin	-	Lozova Chhangte
4)	Harh la, harh la Zoram	-	Rokunga

(e) Kum 1966 hnu lam hlate:

1)	Kan hun tawng zingah	-	Suakliana
2)	Tho la, ding ta che	-	V. Thangzama
3)	Zan Lalnu	-	Roliana Ralte
4)	Zonun Mawi	-	Zirsangzela Hnamte

SECTION –B

3. History of Mizo Literature

4. Drama/Lemchan

1)	Liandova te unau	-	Lalthangfala Sailo
2)	Macbeth (William Shakespeare)	-	Lettu: R. Lalrawna

5. Prose/Thu:

1)	Thlirtu	-	Kaphleia
2)	Thilnawi kan hmaihthelh	-	Zikpuii-pa
3)	Harsatna	-	J. Malsawma
4)	Rihdil leh Mizoram	-	Siamkima Khawlhring
5)	Huaisen	-	Darchhawna
6)	Mizo tlawmngaihna a sir lehlam	-	Sangzuala pa
7)	Lehkhabu hlutna	-	L.T. Khiangte
8)	Khaw'nge Chawlhna	-	R.L.Thanmawia

6. Fiction/Thawnthu:

1)	Hawilopari	-	L. Biakliana
2)	Thlahrang	-	Lalzuithanga

Prescribed text for 1&3: Thuhlaril, Published by CTBEB
Prescribed text for 2 : Ngirtling, Published by CTBEB
Prescribed text for 5 : Ainawn, Published by CTBEB

MIZO ELECTIVE
PAPER – II
SECTION – A

1. Epic:

1)	Hlado	-	Chang 10
2)	Bawhhla	-	Chang 5
3)	Taitesena	-	Lalkhawliana

2. Ballad:

1)	Chhinlung chhuak kan ni	-	Liandala
2)	Rairahtea	-	Hrawva
3)	Tukluh Bawih (Chang 11)	-	L.Z.Sailo

3. Elegy:
   1) Fam an chang ta - Ngurchhawna
   2) Val leh hrang an ral - R.L.Kamlala
   3) Damlai Pialral - R.L.Thanmawia

4. Ode:
   1) Virthlileng - Lalmama
   2) Thal - Kaphleia
   3) Lalruanga dawi bur thar - L.T.Khiangte

5. Lyric:
   1) Tlaizawng Par - Vankhama
   2) Sikni Eng - Zikpuii-pa
   3) Virthli leng vel - V. Hawlla

6. Satire:
   1) Leng Uchuaki - P.S. Chawngthu
   2 Tleitir Lungmawl F. Laltuaia
   3) Ka thai ve chu - Jimmy L.Chhangte

7. Narrative:
   1) Kan ram leh hnam - J. Liankhuma
   2) A tak chu khaw'nge - James Dokhuma
   3) Sibuta Lung - Lalsangzuali Sailo

SECTION-B

8. Fiction/Thawnthu-Rambuai Hma:
   1) Chhingpuii - Kaphleia
   2) Phira leh Ngurthanpari - Lalzuithanga
   3) Sialton Oficial - C. Thuamluaia
   4) Thla hlei-nga zan - James Dokuma

9. Fiction/Thawnthu-Rambuai Hnu:
   1) Nunna kawng thuampuiah - Zikpuii-pa
   2) Duhtak Sangpuii - Khawlkungi

10. Dram/Lemchan-Mizo Lemchan:
   1) Lawm a kim - Liansailova
   2) Darlalpuii - Lalchungnunga

11. Drama/lemchan-Lehlin:
   1) Twelfth Night - Lettu: R. Thangvunga
   2) As you like it - Lettu: P.L.Liandinga
   3) Oepidus, the King - Lettu: C. Lalsiamthanga

Prescribed Text for 1-7: Ngirtling, published by CTBEB

PHILOSOPHY
PAPER – I

HISTORY AND PROBLEMS OF PHILOSOPHY

SECTION A :

1. Plato and Aristotle : Idiqs; Substance; form and Matter; Causation; Actuality and Potentiality.
2. Rationalism (Descates, Spinoza, Leibniz): Cartesian Method and Certain Knowledge; Substance; God; Mind-Body Dualism; Determinism and Freedom.
3. Empiricism (Locke, Berkeley, Hume): Theory of Knowledge; substance and Qualities; Self of God; Scepticism.
4. Kant: Possibility of Synthetic a priori Judgements; space and Time; Categories; Ideas of Reason; antinomies; Critique of Proofs for the Existence of God.
5. Hegel: Dialectical Method; Absolute Idealism.
6. Moore, Russell and Early Wittgenstein: Defence of Commonsense,; Refutation of Idealism; Logical Atomism; Logical Constructions; Incomplete Symbols; Picture Theory of Meaning; Saying and Showing.
7. Logical Positivism: Verification Theory of Meaning; Rejection of Metaphysics; Linguistic Theory of Necessary Propositions.
8. Later Wittgenstein: Meaning and Use; Language-games;Critique of Private Language.
9. Phenomenology (Husserl): Method; Theory of Essences; Avoidance of Psychologism.
10. Existentialism (Kierkegaard, Sartre, Heidegger): Existence and Essence; Choice, Responsibility and Authentic Existence; Being-in-the-world and Temporality.
11. Quine and Strawson: Critique of empiricism; Theory of Basic Particulars and Persons.

SECTION B:

1. Ca-rva-ka: Theory of Knowledge; Rejection of Transcendent Entities.
2. Jainsim: Theory of Reality; Saptabhan (ginaya; Bondage and Liberation.
3. Schools of Buddhism: Prati-tyasamutpa-da; Ksanikavada, Naira-tmyava-da
4. Naya-ya-Vais'esika: theory of Categories; Theory of Appearance; Theory of Prama-na; Self, Liberation; god; Proofs for the Existence of God; Theory of Causation; Atomistic Theory of Creation.
5. Sa-mkhya: Prakrti; Purusa; Causation; Liberation
6. Yaga: Citta; Cittavrtti; Klesas; Samadhi; Kaivalya
7. Mima-msa: theory of Knowledge
8. Schools of Veda-nta: Brahman; I-s'vara; A-tman; Jagat; Ma-ya; Avidya; Adhya-sa; Moksa; Aprthaksiddhi; Pancavidhabheda
9. Aurobindo: Evolution, Involution; Integral Yoga.

PHILOSOPHY
PAPER – II

Socio-Political Philosophy

1. Social and Political Ideals: Equality, Justice, Liberty.
2. Sovereignty: Austin, Bodin, Laski, Kautilya.
3. Individual and State: Rights; Duties and Accountability
4. Forms of Government: Monarchy; Theocracy and Democracy.
5. Political Ideologies: Anarchism; Marxism and Socialism
6. Humanism; Secularism; Multiculturalism.
7. Crime and Punishment: Corruption, Mass Violence, Genocide, Capital Punishment.

8. Development and Social Progress.
9. Gender Discrimination: Female Foeticide, Land and Property Rights; Empowernment.
10. Caste Discrimination: Gandhi and Ambedkar

Philosophy of Religion:

1. Notions of God: Attributes; Relation to Man and the World. (Indian and Western).
2. Proofs for the Existence of God and their Critique (Indian and Western).
3. Problem of Evil.
4. Soul: Immortality; Rebirth and Liberation.
5. Reason, Revelation and Faith.
6. Religious Experience: Nature and Object (Indian and Western).
7. Religion without God.
8. Religion and Morality.
9. Religious Pluralism and the Problem of Absolute Truth.
10. Nature of Religious Language: Analogical and Symbolic; Cognitivist and Non- cognitive.

PHYSICS
PAPER – I

1. (a) Mechanics of Particles: Laws 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 Poisson equations, gravitational self-energy; Two-body problem; Reduced mass; Rutherford scattering; Centre of mass and laboratory reference frames.

(b) Mechanics of Rigid Bodies: 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 tri-atomic molecules; Precessional motion; top, gyroscope.

(c) Mechanics of Continuous Media: Elasticity, Hooke's law and elastic constants of isotropic solids and their inter-relation; Streamline (Laminar) flow, viscosity, Poiseuille's equation, Bernoulli's equation, Stokes' law and applications.

(d) Special Relativity: Michelson-Morley experiment and its implications; Lorentz transformations-length contraction, time dilation, addition of relativistic velocities, aberration and Doppler effect, mass-energy relation, simple applications to a decay process; Four dimensional momentum vector; Covariance of equations of physics.

2. Waves and Optics:

(a) Waves: Simple harmonic motion, damped oscillation, forced oscillation and resonance; Beats; Stationary waves in a string; Pulses and wave packets; Phase and group velocities; Reflection and Refraction from Huygens' principle.

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

(c) Interference: Interference of light-Young's experiment, Newton's rings, interference by thin films, Michelson interferometer; Multiple beam interference and Fabry-Perot interferometer.

(d) Diffraction: Fraunhofer diffraction-single slit, double slit, diffraction grating, resolving power; Diffraction by a circular aperture and the Airy pattern; Fresnel diffraction: half-period zones and zone plates, circular aperture.

(e) Polarization and Modern Optics: Production and detection of linearly and circularly polarized light; Double refraction, quarter wave plate; Optical activity; Principles of fibre optics, attenuation; Pulse dispersion in step index and parabolic index fibres; Material dispersion, single mode fibres; Lasers-Einstein A and B coefficients; Ruby and He-Ne lasers; Characteristics of laser light-spatial and temporal coherence; Focusing of laser beams; Three-level scheme for laser operation; Holography and simple applications.

3. **Electricity and Magnetism:**

(a) Electrostatics and Magnetostatics: Laplace and Poisson equations in electrostatics and their applications; Energy of a system of charges, multipole expansion of scalar potential; Method of images and its applications; Potential and field due to a dipole, force and torque on a dipole in an external field; Dielectrics, polarization; Solutions to boundary-value problems-conducting and dielectric spheres in a uniform electric field; Magnetic shell, uniformly magnetized sphere; Ferromagnetic materials, hysteresis, energy loss.

(b) Current Electricity: Kirchhoff's laws and their applications; Biot-Savart law, Ampere's law, Faraday's law, Lenz' law; Self-and mutual-inductances; Mean and r m s values in AC circuits; DC and AC circuits with R, L and C components; Series and parallel resonances; Quality factor; Principle of transformer.

(c) Electromagnetic Waves and Blackbody Radiation: Displacement current and Maxwell's equations; Wave equations in vacuum, Poynting theorem; Vector and scalar potentials; Electromagnetic field tensor, covariance of Maxwell's equations; Wave equations in isotropic dielectrics, reflection and refraction at the boundary of two dielectrics; Fresnel's relations; Total internal reflection; Normal and anomalous dispersion; Rayleigh scattering; Blackbody radiation and Planck's radiation law, Stefan-Boltzmann law, Wien's displacement law and Rayleigh-Jeans' law.

4. **Thermal and Statistical Physics:**

(a) Thermodynamics: Laws of thermodynamics, reversible and irreversible processes, entropy; Isothermal, adiabatic, isobaric, isochoric processes and entropy changes; Otto and Diesel engines, Gibbs' phase rule and chemical potential; van der Waals equation of state of a real gas, critical constants; Maxwell-Boltzman distribution of molecular velocities, transport phenomena, equipartition and virial theorems; Dulong-Petit, Einstein, and Debye's theories of specific heat of solids; Maxwell relations and applications; Clausius-Clapeyron equation; Adiabatic demagnetisation, Joule-Kelvin effect and liquefaction of gases.

(b) Statistical Physics: Macro and micro states, statistical distributions, Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac distributions, applications to specific heat of gases and blackbody radiation; Concept of negative temperatures.

PHYSICS
PAPER - II

1. **Quantum Mechanics:** Wave-particle dualitiy; Schroedinger equation and expectation values; Uncertainty principle; Solutions of the one-dimensional Schroedinger equation for a free particle (Gaussian wave-packet), particle in a box, particle in a finite well, linear harmonic oscillator; Reflection and transmission by a step potential and by a rectangular barrier; Particle in a three dimensional box, density of states, free electron theory of metals; Angular momentum; Hydrogen atom; Spin half particles, properties of Pauli spin matrices.

2. **Atomic and Molecular Physics:** Stern-Gerlach experiment, electron spin, fine structure of hydrogen atom; L-S coupling, J-J coupling; Spectroscopic notation of atomic states; Zeeman effect; Frank-Condon principle and applications; Elementary theory of rotational, vibrational and electronic spectra of diatomic molecules; Raman effect and molecular structure; Laser Raman spectroscopy; Importance of neutral hydrogen atom, molecular hydrogen and molecular hydrogen ion in astronomy; Fluorescence and Phosphorescence; Elementary theory and applications of NMR and EPR; Elementary ideas about Lamb shift and its significance.

3. **Nuclear and Particle Physics:** Basic nuclear properties-size, binding energy, angular momentum, parity, magnetic moment; Semi-empirical mass formula and applications, mass parabolas; Ground state of deuteron, magnetic moment and non-central forces; Meson theory of nuclear forces; Salient features of nuclear forces; Shell model of the nucleus - successes and limitations; Violation of parity in beta decay; Gamma decay and internal conversion; Elementary ideas about Mossbauer spectroscopy; Q-value of nuclear reactions; Nuclear fission and fusion, energy production in stars; Nuclear reactors.

   Classification of elementary particles and their interactions; Conservation laws; Quark structure of hadrons; Field quanta of electroweak and strong interactions; Elementary ideas about unification of forces; Physics of neutrinos.

4. **Solid State Physics, Devices and Electronics:** Crystalline and amorphous structure of matter; Different crystal systems, space groups; Methods of determination of crystal structure; X-ray diffraction, scanning and transmission electron microscopies; Band theory of solids - conductors, insulators and semiconductors; Thermal properties of solids, specific heat, Debye theory; Magnetism: dia, para and ferromagnetism; Elements of superconductivity, Meissner effect, Josephson junctions and applications; Elementary ideas about high temperature superconductivity.

   Intrinsic and extrinsic semiconductors; p-n-p and n-p-n transistors; Amplifiers and oscillators; Op-amps; FET, JFET and MOSFET; Digital electronics-Boolean identities, De Morgan's laws, logic gates and truth tables; Simple logic circuits; Thermistors, solar cells; Fundamentals of microprocessors and digital computers.

POLITICAL SCIENCE AND INTERNATIONAL RELATIONS

PAPER – I
(Political Theory and Indian Politics)

SECTION A - UNIT I

1. Political Theory : meaning and approaches.
2. Theories of the State : Liberal, Neo-Liberal, Marxist, Pluralist, Post-Colonial.
3. Justice : Conceptions of justice with special reference to Rawl's theory of justice and its communitarian critiques.
4. Equality : Social, political and economic; relationship between equality and freedom; Affirmative action.
5. Rights : Meaning and theories; different kinds of rights; Concept of Human Rights.

UNIT - II

1. Democracy : Classical and Contemporary theories; different models of democracy - representative, participatory and deliberative.

2. Concept of Welfare State - various dimensions.
3. Political Idealogies; Liberalism,Socialism,Marxism, Democratic Socialism.

UNIT - III

Indian Political thought : Kautilya, Arthashastra, The Theory of Government, Power & functions of the Rulers; Sri Aurobindo Ghosh, M.K. Gandhi, B.R.Ambedkar, M.N.Roy, Balgangadhar Tilak.

UNIT - IV

Western Political Thought : Plato, Aristotle, Machiavelli, Hobbes, Locke, Rousseau, Karl Marx.

SECTION B - UNIT I

Indian Government and Politics.

Indian Nationalism :

1. (a) Political strategies of India's freedom struggle : Constitutionalism to mass Satyagraha, Non-cooperation, Civil Disobedience, Militant and revolutionary movements,
2. Making of the Indian Constitution : Ideology & Philosophy, Legacies of the British rule; Sources of the Indian Constitution.

UNIT - II

1. Salient features of the Indian Constitution : The Preamble, Fundamental Rights and Duties, Directive Principles, Parliamentary System, Amendment Procedures, Judicial Review.
2. Principal organs of the Union Government : Envisaged role and actual working of the Executive, Legislature and Supreme Court.
3. Principal organs of the State Government : Envisaged role and actual working of the Executive, Legislature and High Courts.

UNIT - III

1. Grassroots Democracy : Panchayati Raj and Municipal Government; Significance of the 73rd and 74th Amendments; Grassroot movements.
2. Statutory Institutions/Commission : Election Commission, Comptroller and Auditor General, Finance Commission, Union Public Service Commission, National Commission for Women, National Human Rights Commission, National Commission for Minorities.
3. Federalism : Constitutional provisions; changing nature of Centre-State relations, inter-state disputes.

UNIT - IV

1. Planning and Economic Development : Liberalisation and Privatisation; role of planning and public sector, Poverty alleviation and Development.
2. Casteism, Communalism and Ethnicity in Indian Politics.
3. Party System : National and Regional political parties, ideological and social bases of parties, patterns of coalition politics; pressure groups; trends in electoral behaviour.
4. Social Movements :Women's Movements; Students' Movements, Peasants and Workers' Movements.

POLITICAL SCIENCE AND INTERNATIONAL RELATIONS

PAPER – II

(*Comperative Politics and International Relations)*

Major Political System (Political Systems of UK, USA, Switzerland and China) & International Politics

SECTION A - UNIT I

Comperative Politics :

1. State in comprative perspective : Characteristics and changing nature of the State in Capitalist and Socialist economies and advance industrial and developing societies.
2. The British political system : Rule of Law, Conventions, Monarchy and Parliamentary Government.
3. Federal System, Separation of powers, the Congress, Executive and Judicial system in the U.S.A.
4. The Swiss Government : Federal Assembly, Federal Council and Federal Tribunal, Direct Democracy.
5. People Republic of China : Political development,NPC, President of PRC, State Council.

UNIT - II

1. Globalisation, New International World Order, Terrorism.
2. Approaches to the study of International Relations : Idealist, Realist, Marxist, Functionalist and Systems theories.

UNIT - III

1. Key concepts in International Relations : National interest, Collective Security, national power, Balance of Power and diplomacy.
2. Changing International Political Order :Rise of super powers; Arms Control and Cold War, Disarmament.

UNIT - IV

1. United Nations : Envisaged role and actual record; specialized UN agencies - aims and functioning; Working and future prospects of the U.N.

SECTION B - UNIT I

1. Regionalisation of World Politics : ASEAN, APEC, NAFTA.
2. Contemporary Global concerns : Democracy, human rights, environment, nuclear proliferation.

UNIT - II

1. India and the World : Indian Foreign Policy : Determinants of foreign policy; institutions of policy-making; continuity and change.
2. India and the Nuclear Question : Changing perceptions and policy.

UNIT - III

1. India and the South Asia : India and SAARC countries, Role of SAARC in South Asian Politics, India's "Look East" Policy.
   Impediments to regional co-operation : river water disputes; illegal cross-border migration, ethnic conflicts and insurgencies, border disputes.

UNIT - IV

1. India and the U.N. : Role in UN Peace-Keeping, demand for permanent seat in the Security Council.
2. Recent developments in Indian Foreign Policy : India's position on the recent crises in Afghanistan and West Asia; Vision of a New World Order.

PSYCHOLOGY

PAPER - I
(Foundations of Psychology)
Section-A

UNIT I

Introduction : Psychology as a Science

Definitions and perspective. Psychology in relation to other social and natural sciences. Use of interdisciplinary approach.

UNIT II

a) 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.

b) 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, one-way ANOVA correlation and regression and chi-square tests).

UNIT III

Development of Human Behaviour

The nature, origin and development. Role of genetic and environmental factors in determining human behaviour. Influence of cultural factors and socialization. Life span development-the critical periods and their handling, Mastery of the developmental tasks. Influence of child rearing practices and its impact on the growth and development of the individual.

UNIT IV

a) Attention, Sensation 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 organization-influence of past experiences, Perceptual defence-factors influencing. Space and depth perception, size estimation and perceptual readiness.

b) Learning,

Concepts and theories of learning (Pavlov, Skinner and Piaget). The processes of extinction, discrimination and generalization. Programmed learning, probability learning, self instructional learning, concepts, types and the schedules of reinforcement. Modelling and social learning.

c) Memory

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

Section-B

UNIT I

a) Personality

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

b) 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, strategies for fostering values.

c) Motivation and Emotion

Definition and concepts. Theories and physiological basis of motivation and emotion. Measurement of motivation and emotion Motivation and emotion-their effects on behaviour.

UNIT II

a) Thinking and Problem Solving

Concept formation processes. Reasoning and problem solving. Creative thinking and fostering creativity. Information processing. Decision making and judgement.

b) Intelligence and Aptitude

Concept and definition of Intelligence and aptitude, Nature and theories of intelligence. Measurement of Intelligence and aptitude Concepts and measurement of emotional and multiple intelligence.

UNIT III

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.

UNIT IV

Recent Trends

Computer application in the Psychological laboratory and psychological testing. Artificial Intelligence. Psychocybernetics. Study of consciousness-sleep-wake schedules; dreams, stimulus deprivation, meditation, hypnotic/drug induced states. Extrasensory perception. Inter sensory perception Simulation studies.

PSYCHOLOGY

PAPER-II
(Issues and Applications)

Section-A

UNIT 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.

UNIT II
a) Well being and Mental Disorders

Concept of health, positive health, well being and ill health. Mental disorders (Anxiety disorders, mood disorders, schizophrenia and delusional disorders; personality disorders, substance abuse disorders). Causal factors in mental disorders. Assessment and Diagnosis: DSM IV and other tool. Factors influencing positive health, well being, life style and quality of life.

b) Therapeutic Approaches

Psychodynamic therapies. Behaviour therapies. Client centered therapy. Cognitive therapies. Indigenous therapies (Yoga, Reiki, Meditation) Biofeedback therapy. Prevention and rehabilitation of the mentally ill.

UNIT III
a) Work Psychology and Organisational Behaviour

Personnel selection and training. Use of Psychological tests in the industry. Training and human resource development. Theories of work motivation. Leadership and participatory management. Advertising and marketing, Stress and its Management

b) 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.

c) Rehabilitation Psychology

Primary, secondary and tertiary prevention programmes - role of psychologists. Organising of services for rehabilitation of physically, mentally and socially challenged persons including old persons. Rehabilitation of persons suffering from substance abuse, juvenile delinquency, criminal behaviours. Rehabilitation of victims of violence. Rehabilitation of HIV/.AIDS victims.

UNIT IV
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.

Section-B

UNIT I

a) 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.

b) 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.

c) 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. Entrepreneurship through e-commerce. Multilevel marketing. Impact of TV and fostering value through IT and mass media. Psychological consequences of recent developments in Information Technology.

UNIT II

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 in-group and out-group. Casual factors of such conflicts and prejudices. Psychological strategies for handling the conflicts and prejudices. Measures to achieve social integration.

UNIT III

Psychology and Economic development

Achievement motivation ad economic development. Characteristics of entrepreneurial behaviour. Motivating and Training people for entrepreneurship and economic development. Women Entrepreneurs. Consumer rights and consumer courts.

UNIT IV

a) Application of Psychology to environment and related fields

Environmental Psychology-effects of noise, pollution and crowding. Population psychology-psychological consequences of population explosion and high population density. Motivating for small family norms. Impact of rapid scientific and technological growth on degradation of environment.

b) Other applications of Psychology

Counselling Psychology - group counselling, family and marital counselling, counselling the socially disadvantaged. Sports psychology-improving performance of sports, personnel, psychology and understanding of political behaviour. Voting behaviours. Psychology of corruption and strategies to deal with Psychology of terrorism.

PUBLIC ADMINISTRATION
PAPER – I
(Administrative Theory)

1. **Introduction:**
Meaning, scope and significance of Public Administration; Wilson's vision of Public Administration; Evolution of the discipline and its present status; New Public Administration; Public Choice approach; Challenges of liberalization, Privatisation, Globalisation; Good Governance: concept and application; New Public Management.

2. **Administrative Thought:**
Scientific Management and Scientific Management movement; Classical Theory; Weber's bureaucratic model – its critique and post-Weberian Developments; Dynamic Administration (Mary Parker Follett); Human Relations School (Elton Mayo and others); Functions of the Executive (C.I. Barnard); Simon's decision-making theory; Participative Management (R. Likert, C.Argyris, D.McGregor).

3. **Administrative Behaviour:**
Process and techniques of decision-making; Communication; Morale; Motivation Theories – content, process and contemporary; Theories of Leadership: Traditional and Modern.

4. **Organisations:**
Theories – systems, contingency; Structure and forms: Ministries and Departments, Corporations, Companies, Boards and Commissions; Ad hoc and advisory bodies; Headquarters and Field relationships; Regulatory Authorities; Public - Private Partnerships.

5. **Accountability and control:**
Concepts of accountability and control; Legislative, Executive and Judicial control over administration; Citizen and Administration; Role of media, interest groups, voluntary organizations; Civil society; Citizen's Charters; Right to Information; Social audit.

6. **Administrative Law:**
Meaning, scope and significance; Dicey on Administrative law; Delegated legislation; Administrative Tribunals.

7. **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; Riggsian models and their critique.

8. **Development Dynamics:**
Concept of development; Changing profile of development administration; 'Anti-development thesis'; Bureaucracy and development; Strong state versus the market debate; Impact of liberalisation on administration in developing countries; Women and development - the self-help group movement.'

9. **Personnel Administration:**
Importance of human resource development; Recruitment, training, career advancement, position classification, discipline, performance appraisal, promotion, pay and service conditions; employer-employee relations, grievance redressal mechanism; Code of conduct; Administrative ethics.

10. **Public Policy:**
Models of policy-making and their critique; Processes of conceptualisation, planning, implementation, monitoring, evaluation and review and their limitations; State theories and public policy formulation.

11. **Techniques of Administrative Improvement:**
Organisation and methods, Work study and work management; e-governance and information technology; Management aid tools like network analysis, MIS, PERT, CPM.

12. **Financial Administration:**
Monetary and fiscal policies; Public borrowings and public debt Budgets - types and forms; Budgetary process; Financial accountability; Accounts and audit.

PUBLIC ADMINISTRATION

PAPER – II
(Indian Administration)

1. **Evolution of Indian Administration:**
Kautilya's Arthashastra; Mughal administration; Legacy of British rule in politics and administration - Indianization of public services, revenue administration, district administration, local self-government.

2. **Philosophical and Constitutional framework of government:**
Salient features and value premises; Constitutionalism; Political culture; Bureaucracy and democracy; Bureaucracy and development.

3. **Public Sector Undertakings:**
Public sector in modern India; Forms of Public Sector Undertakings; Problems of autonomy, accountability and control; Impact of liberalization and privatization.

4. **Union Government and Administration:**
Executive, Parliament, Judiciary - structure, functions, work processes; Recent trends; Intragovernmental relations; Cabinet Secretariat; Prime Minister's Office; Central Secretariat; Ministries and Departments; Boards; Commissions; Attached offices; Field organizations.

5. **Plans and Priorities:**
Machinery of planning; Role, composition and functions of the Planning Commission and the National Development Council; 'Indicative' planning; Process of plan formulation at Union and State levels; Constitutional Amendments (1992) and decentralized planning for economic development and social justice.

6. **State Government and Administration:**
Union-State administrative, legislative and financial relations; Role of the Finance Commission; Governor; Chief Minister; Council of Ministers; Chief Secretary; State Secretariat; Directorates.

7. **District Administration since Independence:**
Changing role of the Collector; Union-state-local relations; Imperatives of development management and law and order administration; District administration and democratic decentralization.

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. **Financial Management:**
Budget as a political instrument; Parliamentary control of public expenditure; Role of finance ministry in monetary and fiscal area; Accounting techniques; Audit; Role of Controller General of Accounts and Comptroller and Auditor General of India.

10. **Administrative Reforms since Independence:**
Major concerns; Important Committees and Commissions; Reforms in financial management and human resource development; Problems of implementation.

11. **Rural Development:**
Institutions and agencies since independence; Rural development programmes: foci and strategies; Decentralization and Panchayati Raj; 73rd Constitutional amendment.

12. **Urban Local Government:**
Municipal governance: main features, structures, finance and problem areas; 74th Constitutional Amendment; Global-local debate; New localism; Development dynamics, politics and administration with special reference to city management.

13. **Law and Order Administration:**
British legacy; National Police Commission; Investigative agencies; Role of central and state agencies including paramilitary forces in maintenance of law and order and countering insurgency and terrorism; Criminalisation of politics and administration; Police-public relations; Reforms in Police.

14. **Significant issues in Indian Administration:**
Values in public service; Regulatory Commissions; National Human Rights Commission; Problems of administration in coalition regimes; Citizen-administration interface; Corruption and administration; Disaster management.

SOCIOLOGY

PAPER – I
(Fundamentals Of Sociology)

SECTIONI A

1. **SOCIOLOGY - THE DISCIPLINE:**
   (a) Social conditionis in Europe for the emergence of Sociology
   (b) Nature and subject matter of Sociology
   (c) Scope and theoretical perspectives of Sociology
   (d) Relations with other social science

2. SOCIOLOGICAL CONCEPTS:
   (a) Culture: elements, Transmission, Diffusion, Cultural lag
   (b) Socialization : Stages, agencies
   (c) Social Control: Functions, types, agencies
   (d) Social Grolups: Primary, Secondary, Reference Groups

3. MARRIAGE, FAMILY AND KINSHIP:
   (a) Marriage, types of marriage, functions of marriage
   (b) Family, types of family, functions of family, changing family structure
   (c) Kinship, types of kinship, rules of descent, lineage

4. SOCIAL STRATIFICATION AND MOBILITY:
   (a) Social stratification, features, determinants
   (b) Concepts- equality, inequality, hierarchy, exclusion, poverty and deprivation
   (c) Theories of social stratification, Functionalist Theory, Marxist Theory, Weberian Theory
   (d) Social mobility, open and closed systems, types of mobility,
   (e) Factors and barriers olf social mobility.

SECTION B

1. SOCIOLOGICAL THOUGHTS:
   (a) Emile Durkheim- Division of labour, social fact, religion and society
   (b) Karl Marx- Historical materialism, alienation, class struggle
   (c) Max Weber-Ideal types, social action, protestant ethic and the spirit of capitalism
   (d) Talcolt Parsons- Social system, pattern variables.
   (e) Robert K. Merton- Latent and manifest functions, reference groups

2. RESEARCH METHODS:
   (a) Research design
   (b) Types of research
   (c) Variables, hypothesis, sampling
   (d) Elements and steps of scientific research
   (e) Techniques of data collection
   (f) Problem of objectivity and value neutrality

3. ECONOMIC, POLITICAL AND RELIGIOUS INSTITUTIONS:
   (a) Politics: Nation, state, democracy, civil societySociological theories of power
   (b) Power elite, bureaucracy, pressure groups, and political parties.
   (c) Economies: Features of primitive economy, work and occupation in society
   (d) Organization of work in industrial/capitalist society
   (e) Religioin: Types of religious practices - animism, monism, pluralism, sects, cults.
   (f) Religion and science, contemporary trends in religion

4. SOCIAL CHANGE :
   (a) Social change, nature and characteristics, development, progress
   (b) Theories of social change, Evolutionary, Functional, Conflict, Cyclical
   (c) Factors of social change: Education, Science and technology, Social legislation
   (d) Resistance to social change.

SOCIOLOGY

PAPER - II
(Indian Society: Structure And Change)

SECTION B

1. PERSPECTIVES ON INDIAN SOCIETY:
   (a) Indology : GS. Ghurye's perspectives on the study of Indian society
   (b) Marxist Sociology : A R Desai's view on the relevance of Marxist Sociology in India
   (c) Social background of Indian nationalism.
   (d) Modernization of Indian tradition.
   (c) Social reforms

2. RURAL AND AGRARIAN SECTORS:
   (a) The idea of Indian village and village studies
   (b) Land tenure system before independence
   (c) Land reforms after independence
   (d) Develpment planning and mixed economy
   (e) Green Revolution
   (f) Programmes for rual development
   (g) Community Development Programme
   (h) Recent schemes for poverty alleviation

3. TRIBAL COMMUNITIES IN INDIA:
   (a) Definitional Problems
   (b) Features
   (c) Geographical distribution
   (d) Colonial politics and tribes
   (e) Issues of integration and autonomy
   (f) Tribal Welfare Programmes and Constitutional Safeguards

4. CASTE AND CLASSES IN INDIA
   (a) Features of Caste System
   (b) Untouchability - forms and perspectives
   (c) Chases in the Caste System
   (d) Agrarian class structure
   (e) Industrial class structurfe
   (vi) Middle classes in India

SECTION B

1. POPULATION DYNAMICS AND URBANIZATION
   (a) Population size, growth, composition and distribution, literacy, density, longevity.
   (b) Components of population growth: birth, death, migration.
   (c) Population policy and family planning.
   (d) Emerging issues: ageing, sex ratios, child and infant mortality, reproductive health.
   (e) Urbanization, factors of unranization, rural-urban contunuum and contrast

2. SOCIAL MOVEMENTS IN MODERN INDIA
   (a) Characteristics and types of social movements
   (b) Peasant movements
   (c) Women movements
   (d) Backward classes meovements
   (e) Ethnic movementes

3. RELIGION AND SOCIETY
   (a) Religious communities in India
   (b) Problems of religious minorities
   (c) Communalism
   (d) Secularism

4. CHALLENGES TO INDIAN SOCIETY
   (a) Caste conflicts
   (b) Violence against women
   (c) Poverty
   (d) Illiteracy
   (e) Bonded labour
   (f) Regionalism
   (g) Corruption
   (h) Child labour

STATISTICS
PAPER – I

SECTION A

I. 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, probability generating function, moment generation function, standard discrete and continuous probability distributions.

II. Statistical, unbiasedness, consistency, efficiency, sufficiency, completeness, ancillary statistics, factorization theorem, exponential family of distribution and its properties, uniformly minimum variance unbiased (UMVU) estimation, Rao-Blackwell and Lehmann-Scheffe theorems, Cramer-Rao inequality for single parameter.

III. Estimation by methods of moments, maximum likelihood, least squares, minimum chi-square and modified minimum chi-square, properties of maximum likelihood and other estimators, asymptotic efficiency, prior and posterior distributions, loss function, risk function, and minimax estimator. Bayes estimators.

IV. Non-randomised and randomised tests, critical function, MP tests, Neyman-Pearson lemma, UMP tests, monotone likelihood ratio, similar and unbiased tests, UMPU tests for single parameter likelihood ratio test and its asymptotic distribution. Confidence bounds and its relation with tests.

SECTION B

I Order Statistics - joint and marginal distribution of order statistics - distribution of range and midrange. Kolmogoroff's test for goodness of fit and its consistency, sign test and its optimality. Wilcoxon signed-ranks test and its consistency, Kolmogorov-Smirnov two-sample test, run test, Wilcoxon-Mann-Whitney test and median test.

II Bivariate data: Correlation coefficient and its properties, correlation, correlation ratio, principle of least square, fitting of different curous and fitting of linear regression. Partial and multiple correlation in three variables, their measures and related results. Theory ofr attributes independence and association of attributes. Measure of association for two way classified data

III 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 , cluster sampling, two-stage and multi-stage sampling, ratio and regression methods of estimation involving one or more auxiliary variables, two-phase sampling,

IV Fixed effects model (two-way classification) random and mixed effects models (two-way classification with equal observation per cell), CRD, RBD, LSD and their analyses, incomplete block designs, concepts of orthogonality and balance, BIBD, missing plot technique, factorial experiments and 2^2 and 3^2.

STATISTICS
PAPER - II

SECTION A

I 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. 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-Roming tables.

II. Concept of reliability, failure rate and reliability functions, reliability of series and parallel systems and other simple configurations, renewal density and renewal function, Failure models: exponential, Weibull, normal , lognormal.
Problems in life testing, censored and truncated experiments for exponential models.

III Different types of models in Operations Research, their construction and general methods of solution, simulation and Monte-Carlo methods 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, sensitivity analysis, transportation and assignment problems, rectangular games, two-person zero-sum games, methods of solution (graphical and algebraic).

IV 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.

SECTION B

I Determination of trend, seasonal and cyclical components, Box-Jenkins method, tests for stationary series, ARIMA models and determination of orders of autoregressive and moving average components, forecasting.

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 prices, agricultural production and industrial production, test for index numbers - proportionality, time-reversal, factor-reversal and circular .

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

III Demographic data from census, registration, NSS other surveys, their limitations 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.

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

Zoology
PAPER – I
SECTION A

Unit I Principles of classification: binomial nomenclature; species concepts; taxonomic hierarchy; Five Kingdom classification; Six Kingdom classification; Three Domains system. Classification of non-chordates up to classes with their salient features. Locomotion (amoeboid, cell crawling, ciliary and flagellar) and reproduction in protozoans. Origin of Metazoa; metamerism and symmetry in animals. Porifera and Coelenterata: corals and coral reefs; canal system in poriferans; polymorphism in Hydrozoa.

Unit II Characters and affinities of Ctenophora and Onychophora. Platyhelminthes and Nemathelminthes: excretion and reproduction. Annelida: circulation, reproduction and excretion; type study - *Pheretima posthuma*. Mollusca: torsion and detorsion in Gastropoda; type study - *Pila globosa*. Arthropoda: respiratory and reproductive systems, insect metamorphosis and social organisation; type study - *Palaemon malcolmsonii*. Echinodermata: type study - *Asterias*.

Unit III Biosystematics of chordates. Protochordates: salient features and affinities; post-embryonic development of *Amphioxus*. Agnatha: classification up to orders. Pisces: general characters, types of scales, locomotion and migration. Amphibians: general characters and classification up to order; neoteny and paedogenesis. Reptiles: general characters and classification up to order. Status of sphenodon and crocodiles. Birds: general characters and classification up to order; affinities; principle and modes of flight; migration. Mammals: general characters and classification up to order. Oviparous and ovoviviparous mammals.

Unit IV Integument in vertebrates and their derivatives; comparative digestive, urinogenital and respiratory systems; receptor organs; modification of heart. Structure and composition of cartilage, bone and ligaments; vertebrae, limb-bones and girdles; comparative skulls of vertebrates, dentition in mammals.

SECTION B

Unit I Concept of ecology; concept and types of ecosystem; trophic structure: food chain and food webs; energy flow; trophic relationships; ecological pyramids; intraspecific and interspecific interactions. biogeochemical cycles. Abiotic environment. Laws of tolerance and limiting factors; biotic community concept; community developments: ecological succession; greenhouse effect; global warming. Population: characteristics (mortality, natality, density), growth curves; community: species richness and species diversity; Sorensen's and Shannon-Wiever indices; factors affecting species diversity. Concepts of biodiversity, conservation values and ethics; conservation of biodiversity: patterns and processes; loss of biodiversity: causes and factors; mass extinctions; biodiversity hot spots. Conservation of diversity within species; genetics in conservation: heterozygosity, Hardy-Weinberg equilibrium, variation within population, variation among populations, loss of genetic variation, demographic bottleneck and inbreeding depression. Ecozones and faunal diversity of India; sanctuaries, national parks, protected areas and reserves; wildlife legislations; Important International and national organizations/programmes/societies and their roles; national wildlife conservation projects.

Unit II Concepts of evolution; historical development; Lamarkism; Darwinism and the theory of Natural Selection; evolution in action (malaria and drug resistance, high altitude adaptation, pepper moth); concept of speciation. Origin of life: prebiotic soup theory and RNA world hypothesis; origin of prokaryotic and eukaryotic cells (endosymbiotic theory); geological time scale; Cambrian explosion; dinosaurs; phylogeny of horse. Human evolution: hominid fossils and Out of Africa theory; zoogeographical realms; Continental Drift theory and Plate Tectonic; adaptation: volant, aquatic and desert; mimicry: types, colouration and camouflage. Concept of ethology; types of behavior – innate, imprinting, learned and instinct; altruism and reciprocal altruism; communication: sonar, infrasound, echolocation and dancing in bees. Social organisation in animals (parental care, competition and territoriality); evolutionary arms race; genetic and hormonal control of behavior.

Unit III Apiculture: classifications, structure and composition of hive, culture method and economic importance. Lac culture: cultivation, processing and economic importance. Sericulture: classification, rearing and economic importance. Important pharmaceuticals from animal industry. Pests; types of pesticides; pest control (natural, chemical and biological controls); integrated pest management; vermicomposting. Aquaculture; fish culture; prawn fishery: types, species; method and economic importance; oyster culture (edible and pearl). Poultry farming; piggery; cattle farming; leather and wool industry; dairy industry and milk products.

Unit IV Experimental Designs, sampling design &methods: Correlation, Regression, Analysis of Variance. Parametric test-*t*-test, X^2–test, F-test (one- way & two- way).
Historical concept of bioinformatics; basic operating systems; internet for biologists; data bases and information retrieval. Genome and proteome databases: NCBI, BLAST and EMBL; internet tools.

ZOOLOGY
PAPER – II

SECTION A

Unit I Cell theory – tenets and limitations; structure of prokaryotic and eukaryotic cells; cell membrane and membrane transport (simple, facilitated and active transports). Structure, composition and functions of ribosomes, endoplasmic reticulum, Golgi complex, lysosome and peroxisome; endocytosis; phagocytosis. Structure and functions of mitochondria; cytoskeletons: microfilaments, intermediate filaments and microtubules. Extracellular matrix; cell-cell interactions, adhesion and junctions; nuclear envelope: structure and transport of molecules; nucleolus; chromosome structure and karyotyping. Stages of cell cycle; regulation of cell cycle through cyclin-CDK complexes; meiosis; types and characteristics of cancer; carcinogens.

Unit II Mendelian genetics; incomplete dominance; co-dominance; chromosome theory of inheritance; cytoplasmic inheritance; pleiotropism and allelism; epistasis; multiple alleles. Linkage, crossing over and recombination of genes; chromosomal sex determination; sex-linked inheritance and non-disjunction; mutation: causes and types; genetic disorders: Down, Klinefelter and Turner syndromes, and haemophilia.

Unit III Structure and types of DNA and RNA. Chromosomes: chromatin (euchromatin and heterochromatin); higher order of chromosome organization – nucleosomes; special types of chromosomes (polytene and lampbrush chromosomes). DNA replication: semiconservative and mechanism in prokaryotic cells; DNA repair: nucleotide excision; base excision; mismatch; double stand breakage. Gene expression: central dogma of molecular biology; transcription; genetic code; translation; concept of operon: lac operon.

Unit IV Carbohydrates and lipids: classification and significance; classification, structure and properties of amino acids and peptides.
Types, properties and kinetics of enzymes; inhibition; Michaelis-Menten equation; coenzymes; ribozyme; types and properties of vitamins. Glycolysis: reactions and significance; glycogenesis; glycogenolysis; gluconeogenesis. Oxidative phosphorylation: tricarboxylic cycle; electron transport chain, ATP synthesis; HMP shunt. â-oxidation of fatty acids; lipogenesis; urea cycle; ketogenesis; nucleic acids and their metabolism.

SECTION B

Unit I Digestion and absorption of food: extracellular and intracellular digestions; digestion of carbohydrates, proteins and fats; mechanism of respiration (gills and lungs); types of respiration – external, internal, and cutaneous. Open and closed circulation; structure of heart: myogenic and neurogenic; pacemaker; cardiac cycle; blood coagulation; blood groups; structure and function of haemoglobin. Structure and function of kidney: physiology of urine formation; nervous control of micturition; osmogulation in marine and terrestrial vertebrates; types of nitrogenous wastes (ammonotelic, uricotelic and ureotelic). Types of muscles and ultrastructures; muscle proteins; mechanism of muscle contraction; fatigue, isotonic, anisotonic, isometric and tetanic contractions.

Unit II Types and structures of neuron; resting and action potentials; propagation of nerve impulse; major neurotransmitters; synapse; synaptic transmission.
Endocrine glands and the functions of their hormones (hypothalamus, pituitary, thyroid, pancreas, adrenal, testis, ovary); classification of hormones; transport of hormones. Hormone receptors: G-protein coupled, steroid, insulin. Mechanism of action of steroid hormones and peptide hormones; insulin; endocrine disorders: diabetes mellitus, gigantism, dwarfism and cretinism. Biological rhythms: circadian and circannual, hormonal regulations; insect hormones; pheromones and their effects; hormonal regulation of calcium homeostasis.

Unit III Gametogenesis: spermatogenesis and oogenesis; hormonal regulation of gametogenesis; structure of spermatozoon and ovum. Estrous and menstrual cycles: phases and hormonal regulation; chemical basis of contraception. Fertilization *in vivo* and *in vitro*; parthenogenesis; types of eggs; patterns of cleavage. Blastulation and gastrulation in *Amphioxus* and frog; fate maps; placenta in mammals; extra-embryonic membranes in chick. Concept of organizer and induction; morphogenetic fields and gradients; invagination, ingression, involution and delamination. Metamorphosis in insects and amphibians and their hormonal regulation; regeneration in invertebrates and vertebrates.

Unit IV Concepts and models of ageing; developmental defects; concept of transgenesis, stem cells and IVF. Immunity: innate and acquired; components of immune system; antigens: factors, epitopes, haptens; interferons; vaccination. Structure and types of antibodies; antigen-antibody interactions; major histocompatibility complex; hypersensitivity.

SCHEDULE – II
(See Regulations 3 (viii)

A. MEDICAL EXAMINATIONS (FOR ALL CANDIDATES)

To qualify for appointment to the services, a candidate must be in good physical and mental health and must be free from any physical defect likely to interfere with the efficient performance of duties. The Commission shall prescribe forms for Medical Examinations and for Physical Tests.

1. MEDICAL EXAMINATIONS : Medical fitness of the candidates shall be tested on the basis of the following criteria:
   (1) The candidate will be weighed and his weight recorded in kilograms.
   (2) The candidate's eye-sight will be tested properly as follows:
      (a) Naked eye vision (i) Distant
      (ii) Near vision (with or without spectacles)
      (b) Field vision
      (c) Night blindness
      (d) Colour vision
      (e) Oculae condition other than acuity
      (f) Squint should be considered a disqualification in the case of MPS. In the case of other services, the presence of squint should not be considered as a disqualification if the visual aquity is of the prescribed standards.
      (g) If a person has one eye or if he has one eye which has normal vision and the other eye has abnormal vision, he will be disqualified for MPS, but may be qualified for other services.
   (3) Blood pressure of the candidate should be checked for high or low blood pressure to test the medical fitness of the candidate.
   (4) (a) the candidate's hearing in each ear should be good and that there is no sign of disease of the ear;
      (b) that his speech is without impediment;
      (c) that his heart and lungs are sound;
      (d) that there is no abnormal disease;
      (e) that he is not ruptured;
      (f) that his limbs, hand and feet are well formed and developed and that there is free and perfect motion of all joints;
      (g) that he does not suffer from any inveterate skin disease;
      (h) that he bears marks of efficient vaccinations and;
      (i) that he is free from communicable disease.

2. MEDICAL TEST BOARD:

Medical tests will be conducted by a Medical Test Board which shall be constituted by the Government in consultation with the Commission. The Medical Test board will consist of 3 (three) Medical officers of the Government to be nominated by Health & Family Welfare Department from the appropriate line of Doctors. The result of medical examinations shall be submitted by the Medical Test Board to the Commission within 3 days from the date of conducting the test.

B. PHYSICAL STANDARDS
(For Candidates opting Mizoram Police Service)

1. PHYSICAL STANDARDS:

(1) The height and chest measurement of candidate for Mizoram police shall be taken by the Physical Test Board constituted by the Government in consultation with the Commission. The Physical Test Board shall be constituted with 5 (five) members – 2 members from Mizoram Public Service Commission, two members from Police Department not below the rank of senior grade of MPS and one from Medical Officers and it shall be headed by Controller of Examination, MPSC.

(2) The minimum standard of height and chest measurement will be as follows-

	Height	Chest girth	Chest girth fully expanded
Men	160cms	79cms	84cms
Women	152cms	-	-

NB: 1) The height and chest of the candidates will be measured twice before coming to a final decision.
2) There will be no need of measuring chest girth for women candidates.

2. PHYSICAL EFFICIENCY TEST :

There shall be a physical efficiency test, qualifying in nature which will include events like Short Distance Run, Long Jump and High Jump. The Physical tests shall carry no marks. It shall be a qualifying test for entry into the Mizoram Police Service. The minimum qualifying standard for each event shall be as follows-

(1)	Long jump	High jump
Men	3.3mtrs (3 chances)	1.00 mtrs (3 chances)
Women	2.5mtrs (3 chances)	0.90 mtr (3 chances)

(2)	Running	
Men	100 mtr within 15 sec	1000 mtrs within 5.00 minutes
Women	100 mtr within 18 sec	1000 mtrs within 7.00 minutes

(3) The test shall be conducted by the Physical Test Board at such places, date and time to be determined by the Commission.

(4) The result of Physical test i.e. list of qualified and unqualified candidates shall be submitted by the Physical Test Board to the Commission within 3 days from the date of completion of the tests.

C. RESULT OF MEDICAL & PHYSICAL TESTS

The Commission will notify list of qualified and unqualified candidates in the Medical and Physical Tests separately well before a personal interview is held. Only those who qualify the tests shall be allowed to appear in the personal interview.

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