

(iii) Economic Activities : Food gathering and hunting. Pastoral herding. Fishing and forestry. Types of agriculture-shifting, subsistence, commercial and plantation. Mining. Power. Manufacturing, locational factors of textile, iron and steel, sugar and fertilizer industries. Tertiary activities—trade, transport, communication and services. Weber's theory of industrial location.

(iv) Settlements : Origin, types and patterns of rural settlements. Urban settlements. Concept of primate city and rank size rule. Rural urban fringe. Processes of urbanization. Morphology and functional classification of towns. Million-cities and mega-cities. Christaller's central place theory.

### 3. Geography of the World

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

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

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

(iv) Regional Geography of South Asia.

### 4. Geography of India

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

(ii) Economical Geography of India : Minerals and energy resources, aquatic resources, forest resources, irrigation, agriculture and industries. Trade and commerce. Industries and industrial development. Transport and trade.

(iii) Population : Population growth, distribution and density. Demographic characteristics.

(iv) Environmental problems, developmental issues and regional planning.

(v) Contemporary Issues : International boundaries issues. Disputes on sharing of water resources. Geopolitics of Indian Ocean. Environmental hazards. Environmental pollution. Problems of agrarian and industrial unrest. Regional disparities in economical development.

## 10. INDIAN HISTORY

1. Foundation of Indian Culture and Civilisation. Indus Civilisation. Vedic Culture. Sangam Age.

2. Religious Movements – Buddhism, Jainism, Bhagavatism and Brahmanism.

3. The Maurya Empire.

4. Trade and Commerce in the pre-Gupta and Gupta period.

5. Agrarian structure in the post-Gupta period.

6. Changes in the social structure of ancient India.

7. Political and social condition (800A.D.–1200 A.D.). The Cholas.

8. The Delhi Sultanate -Administration. Agrarian conditions.

9. The Provincial Dynasties. Vijaynagar Empire. Society and Administration.

10. The Indo-Islamic culture. Religious movements (15th and 16th centuries).

11. The Mughal Empire (1526A.D.–1707A.D.) Mughal Polity. Agrarian relations. Art, architecture and culture.

12. Beginning of European commerce.

13. The Maratha Kingdom and Confederacy.

14. The Decline of the Mughal Empire. The autonomous states with special reference to Bengal, Mysore and Punjab.

15. The East Indian Company, and the Bengal Nawabs.
16. British economic impact in India.
17. The Revolt of 1857 and other popular movements against British rule in the 19th century.
18. Social and cultural awakening the lower castes. Trade unions and the peasant movements.
19. The freedom struggle.

## 11. LAW

### I. Jurisprudence

1. Schools of Jurisprudence : Analytical, historical, philosophical and sociological.
2. Sources of Law: Custom, precedent and legislation.
3. Rights and Duties.
4. Legal Personality.
5. Ownership and Possession.

### II. Constitutional Law of India

1. Salient features of the Indian Constitution.
2. Preamble.
3. Fundamental Rights, Directive Principles and Fundamental Duties.
4. Constitutional position of the President and Governors and their powers.
5. Supreme Court and High Courts, their powers and jurisdiction.
6. Union Public Service Commission and State Public Service Commissions. Their powers and functions.
7. Distribution of Legislative powers between the Union and the States.
8. Emergency provisions.
9. Amendment of the Constitution.

### III. International Law

1. Nature of International law.
2. Sources : Treaty, custom, general principles of law recognized by civilized nations and subsidiary means for the determination of law.
3. State Recognition and State Succession.
4. The United Nations : Objectives, principal organs, the constitution; role and jurisdiction of the International Court of Justice.

### IV. Torts

1. Nature and definition of tort.
2. Liability based on fault and strict liability.
3. Vicarious liability.
4. Joint tort-feasors.
5. Negligence.
6. Defamation.

7. Conspiracy.
8. Nuisance.
9. False imprisonment and malicious prosecution.

#### V. Criminal Law and IPC

1. General principles of criminal liability.
2. Mens rea.
3. General exceptions.
4. Abetment and conspiracy.
5. Joint and constructive liability.
6. Criminal attempts.
7. Murder and culpable homicide.
8. Sedition.
9. Theft : extortion, robbery and dacoity.
10. Misappropriation and criminal breach of trust.

#### VI. Law of Contract and Indian Contract Act, 1872

1. Basic elements of contract, offer, acceptance, consideration, contractual capacity.
2. Factors vitiating consent.
3. Void, voidable, illegal and unenforceable agreements.
4. Performance of contracts.
5. Dissolution of contractual obligations, frustration of contracts.
6. Quasi-contracts.
7. Remedies for breach of contract.

#### VII. Law of Evidence and Indian Evidence Act.

### 12. MATHEMATICS

#### 1. Algebra

Elements of Set Theory. Algebra of Real and Complex numbers including DeMoivre's Theorem. Polynomials and Polynomial Equations. Relations between Co-efficients and Roots, Symmetric functions of roots. Elements of Group Theory. Sub-groups, permutation groups and their elementary properties.

#### 2. Matrices

Addition, Multiplication, Determinants of a Matrix, Properties of Determinants of order, Inverse of a Matrix, Cramer's rule.

#### 3. Geometry and Vector

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

#### 4. Calculus

Functions, Sequences, Series, Limits, Continuity, Derivatives. Application of Derivatives. Rates of change, Tangents, Normals, Maxima, Minima, Rolle's Theorem, Mean Value Theorems of Lagrange and Cauchy, Asymptotes, Curvature, methods of finding indefinite integrals. Definite Integrals, Fundamental Theorem of Integral Calculus. Application of definite integrals to area, Length of a plane curve, Volume and Surfaces of revolution.

**5. Ordinary Differential Equations**

Order and Degree of a Differential Equation, First order differential Equations, Singular solution, Geometrical interpretation, Second order equations with constant co-efficients.

**6. Mechanics**

Concepts of particles, Lamina, Rigid Body, Displacement, Force, Mass, Weight, Motion, Velocity, Speed, Acceleration. Parallelogram of forces. Parallelogram of velocity, acceleration, resultant, equilibrium of coplanar forces. Moments, Couple, Friction, Centre of mass, Gravity. Laws of motion. Motion under conservative forces. Motion under gravity. Projectile, Escape velocity; Motion of artificial satellites.

**7. Probability**

Sample space, Events, Algebra of events, Probability—Classical, Statistical and Axiomatic Approaches. Conditional Probability and Baye's Theorem Random Variables and Probability. Distributions—Discrete and Continuous. Mathematical Expectations. Binomial, Poisson and Normal Distributions.

**8. Statistical Methods**

Collection, Classification, tabulation and presentation of data. Measures of central value. Measures of dispersion. Skewness, moments and Kurtosis. Correlation and regression.

**13. MECHANICAL ENGINEERING****1. Statics**

Simple application of equilibrium equations.

**2. Dynamics**

Simple applications of equations of motion work, energy and power.

**3. Theory of Machines**

Simple examples of kinematics chains and their inversions. Different types of gears, bearings, governors, flywheels and their functions. Static and dynamic balancing of grid rotors. Simple vibrations analysis of bars and shafts.

**4. Mechanics of Solids**

Stress, strain and Hooke's Law. Shear and bending moments in beams. Simple bending and torsion of beams, spring and thin walled cylinders. Elementary concepts of elastic stability, mechanical properties and material testing.

**5. Manufacturing Science**

Mechanics of metal cutting, tool life, economics of machining, cutting tool materials. Basic types of machine tool and their processes. Metal forming processes and machines—shearing, drawing, spinning, rolling, forging, extrusion. Types of casting and welding methods. Powder metallurgy and processing of plastics. Corrosion control methods. Types of corrosion.

**6. Manufacturing Management**

Methods and time study, motion economy and work space design, operation and flow process charts. Cost estimation, break-even analysis. Location and layout of plants. material handing. Capital budgeting. Job shop and mass production, scheduling, despatching, routing inventory. Basic concepts of quality control.

**7. Thermodynamics**

Basic concepts, definitions and laws, heat, work and temperature scales, first law, second law and its corollaries. Analysis of air standard power cycles, carnot, otto, diesel, dual brayton cycle, refrigeration cycle—Beil coleman. Vapour absorption and vapour compression cycle analysis, open and closed cycle gas turbine with intercooling, reheating,

energy conversion. Flow of steam through nozzles, critical pressure ratio, steam generators, mountings and accessories. Impulse and reaction turbines, elements and layout of thermal power plants. Hydraulic turbines and pumps, specific speed, layout of hydraulic power plants. Introduction to nuclear reactors and power plants handling of nuclear waste.

## 8. Refrigeration and Air Conditioning

Refrigeration system, properties of an ideal refrigerant; domestic refrigerator, COP. Principles of air conditioning, psychrometric chart, comfort zones, humidification and dehumidification.

# 14. PHYSICS

## 1. Mechanics

Units and dimensions. S.I. units. Motion in one and two dimensions. Newton's laws of motion with applications. Variable mass systems. Frictional forces. Work, power and energy. Conservative and non-conservative systems. Collisions, conservation of energy. Linear and angular momenta. Rotational Kinematics. Rotational dynamics. Equilibrium of rigid bodies. Gravitation, planetary motion, artificial satellites. Surface tension and Viscosity. Fluid dynamics, streamline and turbulent motion. Bernoulli's equation with applications. Stoke's law and its application. Special theory of relativity. Lorentz transformation. Mass energy equivalence.

## 2. Waves and Oscillations

Simple harmonic motion. Travelling and stationary waves. Superposition of waves. Forced oscillations. Damped oscillation. Resonance, sound waves. Vibrations of air columns, strings and rods. Ultrasonic waves and their application. Doppler effect.

## 3. Optics

Matrix methods in paraxial optics. Thin lens formulae. Nodal planes. Systems of two thin lenses. Chromatic and Spherical aberration. Optical instruments. Eyepieces. Nature and propagation of light. Interference. Division of wavefront. Division of amplitude. Simple interferometers. Diffraction—Fraunhofer and Fresnel, Gratings, Resolving power of optical instruments. Rayleigh criterion. Polarization. Production and detection of polarised light. Rayleigh scattering. Raman scattering. Lasers and their applications.

## 4. Thermal Physics

Thermometry. Laws of thermodynamics. Heat engines. Entropy. Thermodynamic potentials and Maxwell's relations. Van der Waals' equation of State. Critical constants. Joule-Thomson effect. Phase transition. Transport phenomenon, heat conduction and specific heat in solids. Kinetic Theory of Gases. Ideal Gas equation. Maxwell's velocity distribution. Equipartition of Energy. Mean free path. Brownian Motion. Black-body radiation. Planck's Law.

## 5. Electricity and Magnetism

Electric charge Fields and potentials. Coulomb's law. Gauss Law. Capacitance. Dielectrics. Ohm's Law. Kirchhoff's Laws. Magnetic field. Ampere's Law. Faraday's Law of electromagnetic induction. Lenz's Law. Alternating Currents. LCR Circuits. Series and parallel resonance. Q-factor Thermoelectric effects and their applications. Electromagnetic waves. Motion of charged particle in electric and magnetic fields. Particle accelerators. Van de Graaff generator. Cyclotron. Betatron. Mass spectrometer. Hall effect. Dia Para and ferro magnetism.

## 6. Modern Physics

Bohr's Theory of Hydrogen atom. Optical and X-ray spectra. Photoelectric effect. Compton effect. Wave nature of matter and wave-particle quality. Natural and artificial radioactivity, alpha, beta and gamma radiation, chain decay, nuclear fission and fusion. Elementary particles and their classification.

**7. Electronics**

Vacuum tubes—diode and triode, p- and n-type materials, p-n diodes and transistors. Circuits for rectification, amplification and oscillations. Logic gates (AND, OR, NOT).

**15. POLITICAL SCIENCE & INTERNATIONAL RELATIONS****Section A (Theory and International Relations)**

1. (a) The State-Sovereignty. Theories of Sovereignty.  
(b) Theories of the origin of the State (social/contract historical—evolutionary and Marxist).  
(c) Theories of the functions of the State (liberal, welfare and socialist)  
(d) Social Movements : Backward classes movement, Feminist and peasant movement, Concerns for environment.
2. (a) Concepts—Rights, Property, Liberty, Equality, Justice and Human Rights.  
(b) Democracy—Electoral process. Theories of representations. Public opinion. Freedom of speech and the role of the press. Parties and pressure groups.  
(c) Political Theories—Liberalism. Early Socialism. Marxian Socialism, Facism and Gandhism.  
(d) Theories of development and under-development. Liberal and Marxist.
3. (a) Nature, Scope and Changes : phases and structures of International Relations.  
(b) Theories of International Relations : Realism and Neo-Realism, Systems, Marxist and Critical theories.  
(c) India's Role in International Order, Non-alignment—its role and relevance.  
(d) Changed contours of India's foreign policy, relations with neighbours.

**Section B (Government)**

1. Constitution and constitutional government. Parliamentary and Presidential government. Federal and Unitary government. State, Local government. Cabinet Government. Bureaucracy.

**2. India—**

- (a) Colonialism and nationalism in India. The national liberation movement and Constitutional development.
- (b) The Indian Constitution, Fundamental Rights, Directive Principles of State Policy, Legislature, Executive, Judiciary including Judicial Review, the Rule of Law.
- (c) Federalism including Centre-State relations—its comparison with the Federalism of USA, Canada and Australia. Parliamentary system in India.
- (d) Panchayati Raj and Municipal Government changing structure and role of women.

3. Challenges for Indian Political System—Communalism, regionalism, terrorism, casteism, poverty, illitracy, population, criminalization, corruption and development.

**16. PSYCHOLOGY**

1. Scope of psychology.
2. Methods : Observation and sociometrics experimental methods. Fields studies. Clinical and case methods. Characteristics of method of psychology.
3. Physiological Basis : Structure and functions of the nervous system. Structure and functions of brain. Structure and functions of the endocrine system.
4. Development of Behaviour : Genetic mechanism. Environmental factors. Growth and maturation. Relevant experimental studies.
5. Perception : Meaning and nature of perception. Perceptual organisation. Perception of form, colour, depth and time. Perceptual constancy. Role of motivation, social and cultural factors in perception.

6. Learning : Meaning and nature of learning. Learning theories. Classical conditioning. Operant conditioning. Cognitive learning. Perceptual learning. Learning and maturation. Laws of learning.
7. Memory : Nature of memory. Measurement of memory. Short-term memory. Long-term memory. Forgetting. Theories of forgetting.
8. Thinking : Language and thinking. Development of thinking. Creative thinking. Language and Thought. Images. Concept formation. Problem solving. Deductive and inductive reasoning.
9. Intelligence : Nature and meaning of intelligence. Theories of intelligence. Intelligence and creativity.
10. Motivation : Needs, drives and motives. Classification of motives. Measurement of motives. Theories of motivation. Characteristics of motivated behaviour. Frustration and conflict of motives—source of frustration and types of conflicts.
11. Emotion : Characteristics of emotional behaviour. Expressions of emotions. Physiological correlates of emotions. Role of nervous system and endocrine glands in emotions. Theories of emotions : James Lange, Cannon Bard and Schachter. Stress—stressors, coping with stress.
12. Personality : Nature of personality. Development of self, culture and personality. Trait and type approaches. Biological and socio-cultural determinants of personality. Personality assessment techniques and tests.
13. Attitudes : Nature of attitudes. Theories of attitudes. Measurement of attitudes. Change of attitudes, factors in attitude change.
14. Classification of Psychological Disorders  
Classifying psychological disorders. Empirical approaches to classification : DSM system of classification. Recurring issues in classification.
15. Abnormal behaviour  
Psychological Disorders. Concept of normalcy and abnormalcy. Causes of abnormal behaviour—biological, psychological and socio-cultural. Structural aspect of Freudian theory and defence mechanism. Neurosis—symptoms, aetiology and treatment. Phobic disorder, Obsessive compulsive disorder, Anxiety disorder, Conversion disorder, Dissociative disorder. Psychosomatic disorders—hypertension and peptic ulcers. Psychotic disorders – symptoms, aetiology and treatment. Functional Psychosis—depressive disorders, manic depressive psychosis, schizophrenia. Drug abuse – alcohol, narcotics, stimulants (amphetamines), hallucinogens (LSD), marijuana (hashish). Methods of assessing abnormal behaviour.
16. Treatment of abnormalcy – psychotherapies (psychoanalysis and behaviour therapy; physical and chemotherapies). ECT. Anti-psychotic drugs. Antianxiety drugs. Antidepressant drugs.
17. Miscellaneous : Applications of psychology in industry, education and community. Characteristics of leadership. Leadership training. Juvenile delinquency and criminal behaviour—causes and prevention techniques.

#### 17. PUBLIC ADMINISTRATION

1. Introduction: Meaning, scope and significance of Public Administration; Private and Public Administration. Evolution of Public Administration as a discipline.
2. Theories and Principles of Administration : Scientific Management; Bureaucratic Model; Classical Theory; Human Relations Theory; Behavioural approach; Systems approach; The principle of Hierarchy; Unity of Command Span of Control; Authority and Responsibility; Coordination; Delegation, Supervision; Line and Staff.
3. Administrative Behaviour : Decision Making Leadership theories; Communication; Motivation.
4. Personnel Administration: Role of Civil Service in developing society; Position Classification Recruitment; Training; Promotion; Pay and Service condition; Neutrality and Anonymity.
5. Financial Administration : concept of Budget, Formation and execution of budget; Accounts and Audit.
6. Control over Administration : Legislative, Executive and Judicial Control, Citizen and Administration.
7. Comparative Administration : Salient Features of administrative systems in U.S.A., USSR, Great Britain and France.
8. Central Administration in India : British legacy constitutional context of Indian administration; The

President; The Prime Minister as Real executive; Central Secretariat; Cabinet Secretariat; Planning Commission; Finance Commission; Comptroller and Auditor General of India; Major patterns of Public Enterprises.

9. Civil Service in India : Recruitment of All India and Central Services, Union Public Service Commission; Training of IAS and IPS; Generalists and Specialist; Relations with the Political Executive.

10. State, District and Local Administration: Governor, Chief Minister, Secretariat; Chief Secretary; Directorates. Role of District Collector in revenue, law and order and development administration; Panchayati Raj; Urban local Government; Main features Structure and problems areas.

### 18. SOCIOLOGY

1. Basic Concepts  
Society, community, association, institution. Culture—culture change, cultural lag, cultural relativism, ethnocentrism. Social Groups—primary, secondary and reference groups. Social structure, social system, social action. Status and role, role conflict role set. Norms and values—conformity and deviance. Socio-cultural processes : socialisation, assimilation, integration, cooperation, competition, conflict, accommodation, relative deprivation.
2. Marriage, Family and Kinship  
Marriage : types and forms, marriage as contract, and as a sacrament.  
Family : types, functions and changes.  
Kinship : terms and usages, rules of residence, descent, inheritance.
3. Social Stratification  
Forms and functions. Caste and class. Jajmani system. Dominant caste. Sanskritisation.
4. Types of Society  
Tribal, agrarian, industrial and post-industrial.
5. Industrial and Urban Society  
Rural—Urban Continuum. Urban growth and urbanisation—town, city and metropolis. Basic features of industrial society. Impact of automation of society. Industrialisation and environment.
6. Social Demography  
Population size, growth, composition and distribution in India. Components of population growth—births, deaths and migration. Causes and consequences of population growth. Population and social development. Population policy.
7. Political Processes  
Power, authority and legitimacy. Political socialisation. Political modernisation. Pressure groups. Caste and politics.
8. Weaker Sections and Minorities  
Social justice—equal opportunity and special opportunity. Protective discrimination. Constitutional safeguards.
9. Social Change  
Theories of change. Factors of change. Science, technology and change. Social movements – peasant movement, women's movement, backward caste movement, dalit movement.

### 19. ZOOLOGY

1. Cell structure and function : Structure of an animal cell, nature and function of cell organelles, mitosis and meiosis, chromosomes and genes, laws of inheritance, mutation.
2. General survey and classification of non-chordates and chordates (upto classes) of following : Protozoa, Porifera, Coelenterata, Platyhelminthes, Aschelminthes, Annelida, Arthropoda, Mollusca, Echinodermata and Chordata.

3. Structure, reproduction and life history of following types: Amoeba, Plasmodium, Paramecium, Sycon, Hydra, Obelia, Fasciola, Taenia, Ascaris, Pheretima, Cockroach, a snail Balanoglossus, an Ascidia, Amphioxus.
4. Comparative anatomy of vertebrates; Integument endoskeleton, locomotory organs, digestive system, respiratory system, heart and circulatory system, urinogenital system and sense organs.
5. Physiology : Chemical composition of protoplasm, nature and function of enzymes, colloids and hydrogen ion concentration, biological oxidation. Elementary physiology of digestion, excretion, respiration, blood, mechanism of circulation with special reference to man. nerve impulse, conduction and transmission across synaptic junction.
6. Embryology : Gametogenesis, fertilization, cleavage, gastrulation, early development and metamorphogenesis of frog. Ascidian and retrogressive metamorphosis. Neoteny development of foetal membrane in chick and mammals.
7. Evolution : Origin of life, principles and evidences of evolution, speciation, mutation and isolation.
8. Ecology : Biotic and abiotic factors, concept of eco-system, food chain and energy flow, adaptation of aquatic and desert fauna, interspecific interaction. Factors causing environmental pollution and its prevention endangered species.
9. Economic Zoology : Beneficial and harmful insects.

## **SYLLABI FOR THE MAIN WRITTEN EXAMINATION**

### **COMPULSORY SUBJECTS**

#### **1. ENGLISH AND ENGLISH ESSAY**

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:

English—

- (i) Precis Writing
- (ii) Comprehension of given passages
- (iii) Essay
- (iv) Usage and Vocabulary.
- (v) General Grammar / Composition

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.

#### **2. HINDI AND HINDI ESSAY**

(in Devnagri script)

- (i) Translation of an English passage into Hindi.
- (ii) Letter / precis writing
- (iii) Explanation of Hindi passage (prose and poetry) in the same language.
- (iv) Composition (idioms, corrections etc.)
- (v) Essay on a specific topic. The choice of subjects will be given.

#### **3. GENERAL STUDIES**

The nature and standard of questions in these 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 subject which will have relevance for a career in Civil Services.

**Part-I**

## (a) History of Modern India and Indian Culture

The 'History of Modern India' will cover history of the country from about the middle of the 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.

## (b) Geography of India

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

## (c) Indian Polity

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

## (d) 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 the present-day India, such as the following: Demography and Human Resources & related issues. Behavioural and social issues and social welfare problems, such as child labour, gender equality, adult literacy, rehabilitation of the handicapped and other deprived segments of the society, drug abuse, public health etc. Law enforcement issues, human rights, corruption in public life, communal harmony etc. Internal Security and related issues. Environmental issues, ecological preservation, conservation of natural resources and national heritage. The role of national institutions, their relevance and need for change.

**Part-II**

## (a) India and the World

This part is intended to test candidate's awareness of India's relationship with the world in various spheres, such as the following:-

Foreign Affairs. External Security and related matters. Nuclear Policy. Indian abroad

## (b) Indian Economy

In this part, questions will be on the planning and economic development in India, economic and trade issues, foreign trade, the role and functions of I.M.F., World Bank, W.T.O. etc.

## (c) International Affairs &amp; Institutions.

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

## (d) Developments in the field of science and technology, communications and space.

In this part, questions will test the candidate's awareness of the developments in the field of science and technology, communications and space and also basic ideas of computers.

## (e) Statistical analysis, graphs and diagrams.

This part will include exercises to test the candidate's ability to draw common sense conclusions from information presented in statistical, graphical or diagrammatical form and to point out deficiencies, limitations or inconsistencies therein.

**OPTIONAL SUBJECTS FOR MAIN WRITTEN EXAMINATION****1. AGRICULTURE****Part-I**

Concepts of multiple cropping, multistorey, relay and inter-cropping, and their importance in relation to food production. Package of practices for production of important cereals, pulses, oil seeds, fibres, sugar, commercial and fodder crops grown during Kharif and Rabi seasons in different regions of the country. Extension, social forestry and agro-forestry. Second generation problems of green revolution and approaches to solve these problems. Diversification and value addition in agricultural crops. W.T.O. and its impact on Indian agriculture. Sustainable agriculture.

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