ANNEXURE-II

SCHEME AND SYLLABUS FOR RECRUITMENTS
NOTIFIED VIDE NOTIFICATION NO. 12/2004

POST CODE NO. 1 : ASST. B.C. WELFARE OFFICERS
POST CODE NO. 2 : ASST. SOCIAL WELFARE OFFICERS
POST CODE NO. 3 : ASST. TRIBAL WELFARE OFFICERS

SCHEME

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<th>Part-A: Written (Objective type) Examination</th>
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SYLLABUS

PAPER-1 GENERAL STUDIES

1. SCIENCE AND TECHNOLOGY:
   a) General Science and Technology
   b) Role and impact of science and Technology on India’s development.
   (Questions will cover general appreciation and understanding of matters of everyday observation and experience as may be expected of a well-educated person who has not made a special study of science and technology disciplines).

2. INDIAN HISTORY AND CULTURE:
   a) Modern Indian History from 19th century to the present
   b) Nationalist Movement and Constitutional development
   c) Indian culture and Heritage including architecture, Fine Arts, dance forms, music, paintings, Folk arts and performing arts.
   d) History of Andhradesa Society, Culture, Geography and Economic development.

3. INDIAN POLITY:
   General and broad understanding of the structural (institutions) and functional (processes) aspects of Indian Political system.

4. INDIAN ECONOMY AND GEOGRAPHY OF INDIA:
   (a) Structure of National economy
   (b) Economic development (including planning) since independence
   (c) Economic Reforms
   (d) Physical, economic and social Geography of India.

5. CURRENT EVENTS:
   Current Events of Regional, National and International importance.

6. GENERAL MENTAL ABILITY: (Reasoning and analytical abilities)
LIST OF OPTIONAL SUBJECTS

The candidates have to choose one Optional subject from the following:

<table>
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<tr>
<th>Code No.</th>
<th>Subject:</th>
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<th>Subject:</th>
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<tr>
<td>1.</td>
<td>English Literature</td>
<td>15.</td>
<td>Sociology</td>
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<td>2.</td>
<td>Hindi Literature</td>
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<td>Telugu Literature</td>
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<td>Animal Husbandry &amp;Veterinary Science</td>
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<td>4.</td>
<td>Urdu Literature</td>
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<td>5.</td>
<td>Anthropology</td>
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<td>Chemistry</td>
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<td>6.</td>
<td>Commerce</td>
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<td>Geology</td>
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<td>Geography</td>
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<td>Physics</td>
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<td>10.</td>
<td>Law</td>
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<td>Zoology</td>
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<td>Philosophy</td>
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<td>Civil Engineering</td>
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<td>Psychology</td>
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<td>Electronics &amp; Telecommunication</td>
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1. ENGLISH LITERATURE

History of Literature and Literary criticism:

2. Literary movements; classical, Neo-classical, Romantic, Pre-Repahelie
3. Literary forms and concepts; Satire, Sonnet, Ode, Elegy, Mock-Heroic poem, Dramatic Monologue Stream of consciousness, Technique, Realism, Existentialism, Modernism, Expressionism, Freudianism, Feminism.
4. Discussion of a General or Literary topic.
5. Critical appreciation of an unseen poem.

(English Literature)

1. Critical comment on the two out of four of the following passages: (Celebrated lines to be given from the following works):
   b. Shelley – Ode to the West Wind.
   c. Keats – Ode to A Nightingale, Grecian Urn, Eve of St. Agnes.
   d. Browning – My last Duches, Andrea del Sarto.
   e. Philip Larkin – Church – Going
   f. Robert Frost – Birches
   g. Nissim Ezekiel – Night of the Scorpion
   h. Derek Walcott – A Far cry from Africa.

2. Critical study of:
   b. Shaw – Saint Joan
   c. T.S. Eliot – Murder in the Cathedral
   e. Eugene O’Neill – Desire under the Elms
   f. Girish Karnad – Hayavadana
   g. Wole Soyinka – The Lion and the Jewel.
3. Poetry:
   a) Milton – Paradise Lost, Book-1
   b) Coleridge – The Rhyme of the Ancient Mariner.
   c) Matthew Arnold – Dover Beach
   d) Tennyson – Lotos-Eaters; Ulysses
   e) W.B. Yeats – Second Coming; Easter 1916
   f) Sylvia Plath – Daddy; Lady Lazarus
   g) A.D. Hope – Australia
   h) A.K. Ramanujan – Small-Scale Reflections on a Great House

4. Novels:
   a. Jane Austen – Emma
   b. Dickens – Hard Times
   c. D.H. Lawrence – Sons and Lovers
   d. E.M. Forster – A Passage to India
   e. Arun Joshi – The Strange Case of Billy Biswas
   f. Anita Desai – Fire on the Mountain
   g. V.S. Naipaul – The Mimic Men
   h. Saul Bellow – Herzog

2. HINDI LITERATURE

HINDI LITERATURE – TEXTS (PROSE, POETRY AND DRAMA)

(A) TEXTS FOR ANNOTATIONS AND CRITICAL QUESTIONS:

i) MEDIEVAL POETRY:
   - KABIR
     Kabir Grandhavali by Syamsundardas (First 100 Dohas)
   - SURDAS
     Bramarageet Saar, Ed. Ramachandra Shukla (First 100 Padas)
   - TULASIDAS
     Vinaya Patrika (101 to 150 Padas)

ii) MODERN POETRY:
   Jayashankar Prasad
     - Kamayani (Chinta, Sradhaa and Ida only)
   Sumitranandan Pant
     - Ragvirag (First 15 Poems)
   Suryakant Tripathi Nirala
     - Ram Ki Shaktipuja

(B) TEXTS FOR CRITICAL QUESTIONS ONLY: (No Annotations from these texts)

1) Chintamani Part-I (Utsaah, Sradha-Bhakti, Kavita Kya Hai?
   Kavya mein Lok Mangal Ki Saadhanaavasta)
2) Godan (Premchand – Novel)
3) Maila Anchal (Phaniswarnath Renu – Novel)
4) Manasa Sarovar by PREMCHAND Bhag-1 (First 12 short stories only)
5) Ateet Ke Chalchitra – Mahadevi Varma (First six sketches)
6) Chandra Gupta – (Jaishankar Prasad – Drama)

HINDI LANGUAGE: HISTORY OF HINDI LANGUAGE, LITERATURE AND CRITICISM

A) HISTORY OF HINDI LANGUAGE:

1. General classification of the historical periods of Language – Pracheen Arya Bhasha Kail,
   Madhya Kaleen Arya Bhasha Kaal, Navya Kaleen Arya Bhashayen.
2. Hindi dialects and Evolution of Khadiboli.
3. Standardization of Hindi Language and Deva Nagari Script.
   Development and its needs.
5. Significant Grammatical features of Modern Hindi and structure of modern Hindi Language.
B) HISTORY OF HINDI LITERATURE:
1. Main Characteristics of the Major periods of Hindi Literature – Adikal, Bhaktikal, Ritikal and Adhunik Kal.

2. Significant features of the Main literary trends and tendencies in Modern Hindi Poetry – Chayavad, Rahasyavad, Prayogvad, Pragativad and Nayee Kavita.

   1. Novel
   2. Short Story
   3. Drama
   4. One Act Play
   5. Rekha Chitra
   6. Nibandh

C) INDIAN POETICS AND LITERARY CRITICISM:
1. Bharatiya Kavya Saastra Ke Vikas Ki Roop-Rekha

2. Bharatiya Kavya Saastra ke Sampraday-Ras, Alankar, Riti, Dwani.

3. Definition and Scope of Criticism.

4. Types of Criticism.

5. Contribution of the following critics to the Hindi Criticism: Ramachandra Shukla, Nandadulare Vajapeyee, Hazaari Prasad Dwivedi, Dr. Nagendra and Dr. Ram Vilas Sharma.

3. TELUGU LITERATURE

4. URDU LITERATURE

Functional Urdu and General History of Urdu Language and Literature:

1. Functional Grammar

2. Discussion of a General Literary topic

3. Translation from English to Urdu

4. Explanation of Couplets from Ghazals of modern and medieval poets

5. General History of Urdu Language and Literature
   a) Arrival of Aryans – Indo Aryan Language – Prakrit and Appa bharansh – Western Hindi and its dialects, Development of Urdu 1200 to 1700 A.D.
   c) Critical notes on the following:

Books recommended for History of Language and Literature:

1. Dr. Jameel Jalibi: Tareekh-e-Adeb-e-Urdu Vol-I&II.

2. Ram babu Saxena: Tareekh-e-Adab-e-Urdu

3. Dr. Ajaz Hussain: Mukhtasar Tareekh-e-Adab-e-Urdu.

Detailed study of literature and literary criticism:

1. Fiction:
   a) Nazeer Ahmed: Ibnul Waqt
   b) Premchand: Gowdan
   c) Mirza Hadi Ruswa: Umrao Jan Ada
   d) Krishan Chander: Shikast
2. Essay, Drama and Letters:
   a) Rasheed Ahmed Siddiqui: Ganjhey Granmaya
   b) Imtiaz Ali Taj: Anarkali
   c) Abul Kalam Azad: Gubar-e-Khatir

3. Poetry:
   a) Mir Hasan: Sehral Bayan
   b) Mir: Intekhab-e-kalam-e-Mir (Ed.by: Hamidi Kashmiri)
   c) Ghalib: Diwan-e-Ghalib (Radeef Alif)
   d) Jadeed Urdu Nazm: Published by Department of Urdu, Osmania University
   e) Jadeed Urdu Ghazal: Published by Department of Urdu, Osmania University

4. Literary Criticism:
   a) Definition and scope of Criticism.
   b) Various approaches to Literature

5. ANTHROPOLOGY

Section-1.

Section-1 is compulsory; candidates have to choose between Section-2 (A) and Section-2 (B) and answer questions from either A or B. Section-1 carries 100 marks. Section-2 carries 50 marks. Total 150 marks, Paper-II (150 marks)

1. Definitions and Scope of Anthropology:

2. Anthropology – its relationship with other branches in Anthropology and also other disciplines – Like History, Sociology, Political Science, Psychology in Social Sciences, Zoology and Botany in life Sciences, Medicine and Physical Science and Earch Sciences.

3. Basic concepts and definitions:
   Social & Cultural: (a) Culture (b) Society (c) Community (d) Civilisation (e) Institution (f) Association (g) Group (h) Band (i) Tribe (j) Caste (k) Values (l) Norms (m) Custom (n) Mores (o) Folkways (p) Structure (q) Function (r) Status (s) Role.
   Physical/Biological: (a) Evolution (b) Adaptive radiation (c) Phylogeny (d) Human genetics (e) Gene (f) Genetic polymorphism (g) Mutation (h) Inbreeding (i) Colour Blindness (j) Zygote (k) Race (l) DNA (m) Sickle Cell (n) Genetic drift (o) Anthropometry (p) Somotometry (q) Dermotgylphics (r) Gerontology
   Archaeological Anthropology: (a) Site (b) Artifact (c) Assemblage (d) Tradition (e) Phase (f) Abbevillian (g) Acheulian (h) Mousterian (i) Levalloisian (j) Clactoriean (k) Bio-archaeology (l) Analytical Archaeology (m) Processual Archaeology (n) Pleistocene (o) Glacier (p) Pluvial (q) Chronology (r) Fertile crescent (s) Microlith

4. Marriage Family and Kinship:
   a) Incest Taboo-Exogamy
   b) Universal Definition of Marriage
   c) Forms of Marriage
   d) Functions of Marriage
   e) Preferential and prescriptive forms of marital alliances and their theoretical implications
   f) Marriage payments: Bride price, Dowry, Prestation
   g) Marital Instability – Divorce and Remarriage

Family:
   a) Definition and Universality of family
   b) Functions and typologies of families
   c) Hindu joint family – Stability and change, Impact of urabanisation, industrialisation and modernisation.

Kinship:
   a) Definition of Kinship and Descent
   b) Kinship terminology – Criteria of analysis and major kinship terminological systems
   c) Kinship behaviour (usages)
d) Descent – Rules of descent, descent groups – structure and functions; Descent and residential patterns
e) Concept of domestic groups.

5. **Economic and Political Anthropology**
   a) Different levels of economies – Hunting – Gathering, Fishing, Pastoral, Shifting Cultivation, Horticulture and settled Farming systems with special reference to Indian Tribes.
   b) Substantivist and formalist approaches to the understanding of economic processes.
   c) Primitive forms of a exchange
d) Culture – Enterpreneurship and modernisation of traditional economic systems.
e) Incipient Legal and Political systems
f) Primitive forms of government, statutory Panchayat and its impact on traditional Political systems
g) Tribal law and justice.

6. **Religion and Magic**:
   Conceptual differences between magic, science and religion; sympathetic and contagious magic; magic, witchcraft and sorcery. Theories of the origin of religion; animism, animatism, manaism and primitive monotheism.
   Myth and Ritual: Totem and taboo and their ritual and secular importance.
   Religious functionaries: Priest, Shaman, Medicine-Man-their role and status; Man-nature – Spirit complex.

7. Medical Anthropology – Meaning and Scope – Ethno-Medicine; Concept of disease and treatment in traditional societies Cultural dimensions of food, health and nutrition.

8. Anthropology and Development – Anthropological approaches to development, planning and execution; Sustainable development, Modernisation, Economic development and Culture change, Development, displacement and rehabilitation.

9. Field work and Anthropology – participant and Non-participant observation, Case study, Interview, questionnaire and schedule, Genealogical method, participatory Rapid Assessment Techniques (PRA) and Rapid Rural Appraisal (RRA)

### Section-2(A).

1. Theory of Organic evolution; Principles of Evolution; Lamarckism, Darwinism and synthetic theory; nature, nurture and culture; nutritional, ecological and cultural factors in evolution; micro-evolution and ongoing human evolution.

2. **Primates**: Classification of the Order Primates and their features; relationship of primates with other mammals; Comparative anatomy of Man and Apes. Primate Locomotion, arboreal and terrestrial adaptation.

3. **Meocene fossils**: Dryopethecus, Rama Pethecus.

4. Fossil Homonids – Distribution, Physical features, Phylogenetic position of the following:
   a) Austrolopethecence
   b) Home Habelis
c) Homo Erectus – Homocrectus Javanicus Homo Erectus Pekinensus
d) Swans comb Man and Heidelberg Man
e) Neanderthal Man – Classical and Progressive types
f) Homo Sapiens: Cromagnon, Grimaldi, Chancelade

5. **Human Genetics**:
   a) Meaning and scope, its relation with other sciences and medicine
   b) Methods for genetic study of Man – Pedigree analysis, twin method, Family fosterchild, Cotwin, biochemical methods, Chromosomal analysis, ammunological method and recombinant technology
d) Chromosomal Disorders – Kleinefelter, Turner, Down, Patau, Edward and Crui-de-chat syndromes, Genetic imprinting on human diseases, Gene therapy, Genetic screening and counselling for Genetic disorders.
6. **Race:** Concept of race; criteria of classification of races and distribution of races; morphological, serological and genetic and environmental factors in the formation of races; racial classification of Indian population and their distribution.

7. **Human Growth and Development:** Prenatal, infant, childhood, adolescence, maturity, gerontology; factors affecting growth and development genetical, biochemical, nutritional and cultural.


**Section-2(B).**


2. Diffusionist theory of culture – British, German and American diffusionist schools - Geographical and Environmental determinants of culture – Culture-area theory.


4. Psychological approaches of the study of culture – Culture patterns, culture configurations, Culture-Personality, modal personality.

5. Culture and cognition; Anthropological symbolism.

1. Growth of Anthropology in India – Contributions by foreign and Indian Anthropologists and administrators of 19th and 20th centuries.

2. Evolution of Indian Culture and Civilisation:
   a) Pre-historical cultures – Typo – Technological, Economic, Social, Chronological divisions; Characteristic features and distribution of Lower Palaeolithic, Middle Palaeolithic and Upper Palaeolithic cultures in India; Emergence of early farming and village communities (Mesolithic and Neolithic) in India.
   b) Process of urbanisation: Indus civilisation, origin, development and fall, distribution and features of Indus valley civilisation; Vedic and post Vedic cultures in India.
   c) Vedic and Post Vedic cultures in India contributions of tribal cultures to Vedic and Post Vedic beginnings.


4. Ethnic, Linguistic and religious diversities in Indian population.

5. Basis of Indian Social system; Varna and Jati Purushartha and Ashramas; Karma, Rina and Rebirth; Joint family.

6. Theories of origin of caste system; variations in caste structure over different regions of India; Caste and Village economy and Jajmani system; Caste and Politics Concept of dominant Caste.

7. Tribes –characteristics, Biogenetic variability, Linguistic socio-economic characteristics, Distribution of Tribal societies; Tribe-caste continuum.


9. **Tribal problems:** Land alienation, poverty indebtedness, low literacy, un-employment and under employment, health and mal-nutrition, forest policy and tribal problems; Displacement and problems of rehabilitation; Impact of urbanisation and industrialisation on tribal population; Tribal movements and revolts.

10. History of administration of tribal areas – Policies, Plans, Programmes of tribal development and their implementation, Tribal sub-plans, Role of statutory panchayats and N.G.Os.

12. Constitutional safeguards for Scheduled Tribes and Scheduled Castes; Special Programmes for the welfare and development of Scheduled castes.

13. Cultural factors in tribal and rural development – Role of Anthropology in Tribal and Rural Development in India.

6. COMMERCE

ACCOUNTING AND FINANCE

Part-1: Accounting, Auditing and Taxation:

Accounting as a Financial and Management information system-Impact of behavioral sciences – Accounting Standards and conventions.

Methods of accounting of changing price levels with particular reference to current purchasing power (CPP) accounting Advanced problems of company accounting – Amalgamation absorption and reconstruction of companies-Accounting of holding Companies valuation of shares and goodwill-Human Resources Accounting.


Auditing – Definition – Significance – Different types of Audit Programming the audit work – Vouching – Valuation and verification of all types of assets and liabilities – Audit of limited companies – Appointment, Status, Rights, Duties and Liabilities of an Auditor – Auditors report Investigation.

Part-II: Business Finance and Financial Institutions:


Indian money market – Constituents and their deficiencies – Reserve Bank of India – Functions – An assessment of its monetary and credit policies – Commercial Banks – Role and their functioning – Narasimham Committee Recommendations – Indian Capital Market – Constituents functions and working of All India term financial institutions such as IDBI, IFCI, ICICI, UTI – Stock Exchanges – Functions and their regulation by agencies like SBBI.

ORGANISATION THEORY AND INDUSTRIAL RELATIONS:

Part-1: Organisation Theory:


Conflicts and its management in organisation – Management of change – Resistance to change and Methods to overcome – Organisational change, adaptation, growth and development – Organisational control and effectiveness – Organisational culture and its significance

**Part-II: Industrial Relations:**


**7. ECONOMICS**


2. Economic Choice: Consumer behaviour, producer behaviour, market forms and distribution


4. Banking: Supply of money and near money; Central Banking – Objectives, instruments of credit policy in a developing economy.


2. Agriculture: Agricultural policy; Land Reforms – Technological change – Relationship with the industrial sector.


5. Budgetary trends and Fiscal policy.

6. Monetary and credit trends and policies – Banking and non-banking financial institutions.

7. Foreign trade and Balance of payments (Before and after economic reforms)
8. Indian Planning: Objectives, strategy, experience and problems.


8. GEOGRAPHY

Section-A -Map Work: Map Location – India/World:

i. Mountains, Plateaus and Plains, Isotherms, Isohyets
ii. Rivers
iii. Vegetation types and forests
iv. Wild Life sanctuaries
v. Industrial towns
vi. Mining Centres
vii. Tourist Centres
viii. Ports, Harbours and Airports
ix. Important Road, Railway and Sea routes
x. Capital Cities
xi. Seas, Islands and Peninsulas
xii. Ocean currents

Section-B: Principles of Physical Geography:


Oceanography: Movements of Ocean Water – Tides and Ocean currents, Hypsographic Curve, Salinity, Coral reefs, Ocean deposits, Marine resources.

Soils, Vegetation & Eco-System: Soils – Types and world distribution, Major biotic regions of the world – Savanna and Monsoon biomes, concept of Ecosystem – interrelations and energy flows, Man’s impact on ecosystem.

Human and Economic Geography:

1. Development of Geographical thought, Dualism in Geography – Determinism and possiblism, Quantitative and Behavioural revolution in geography.


4. Concept of Heartland and Rimland, Geopolities of Indian Ocean Region, Major International Trade Routes, Transportation in India – Roads and Railways.

5. Theory of Agricultural Location, Typology and World Agricultural Regions, Agricultural Efficiency and crop combination, Major agricultural regions of the world with reference to India, Green Revolution in India.

6. Theories of Industrial Location, Major industrial regions of the world factors influencing the location and growth of Cotton-Textiles, Sugar, Cement, Iron & Steel Industry in India.
9. HISTORY

Section-A (Ancient India)

1. Indus civilization – origin extent: characteristic features or main features, causes of decline and its significance.
2. The Vedic Age; Distinction between Indus civilization and Vedic civilization. Political, social and economic pattern. Religious ideas and rituals, Vedic texts and later Vedic civilization – social and political pattern.
5. Political and economic history northern and southern India 200 BC to 300 AD. Languages like Sanskrit, Prakrit and Tamil. Economy and Society, Kanishka – Rise of Mahayana and (theistic cults). Development of Art (Gandhara, Mathura and other schools) cultural contacts with central Asia.
6. Gupta period: Socio-economic conditions Gupta’s Administration. Significance of literature, art and religion, contacts with South Asia.

Section-B – Mediavel India (750 AD to 1765 AD) (India, 750 AD to 1200 AD)

1. History of Rajputs – Social, Land structure, its impact on society.
2. Trade and Commerce.
4. Mervitasen activities, contacts with the Arabs, cultural impacts.
5. Rastrakutas their role in history, contributions to art and culture.
6. Indian society its conditions on the eve of Mahmed Gazini expeditions AL-Birunis findings.
7. Delhi Sultanate (India 1200 AD to 1765 AD). Circumstances its impact on the Indian society.
8. Role of Khilgi: Significance and implications: Administration economic regulations or Market regulations and their impact on State.
9. Reforms of Mohammed bin Thugluq. Implications of his policies and principles on the State. Role of Firozshah.
10. Disintegration of the Delhi sultanate, causes its effects on the Indian Policy.
13. The vijayanagara empire, (1336 AD) Sources it origin and growth and their contribution to Art, literature and culture. Socio-economic conditions, Administration fall of Vijayanagara Empire.
14. Sources of history, Important chronicles, Travellers Accounts.
15. The great Mughals (1526-1707) political history. Political and social conditions in Hindustan on the eve of Babur’s invasion. Establishment of the Portuguese control in the Indian ocean, its political and economic consequences.
16. Sher Shah sur Administration, political, revenue and military administration.
17. Akbar: Political unification; Munsabadi and Jagir systems central and provincial Administration – Land Revenue and Religious policy. Relations with the non-muslims, military organization.
18. Growth of regional languages and literature in the medieval period. Development of Art and architecture.
19. Aurangazeb’s religious policy, expansion in Deccan, revolts against Aurangazeb – character and consequences.
20. Growth of urban centres, Industrial economy. The mughals and the European trading companies.

22. Rise of Shivaji, his conflict with Mughals, Administration of shivaji Maratha power (1707-1761) Maratha political structure under the first three peshwas, chauth and sardeshmukhi, third battle of Panipat its causes and effects.

23. Disintegration of the Mughal Empire, emergence of the new regional states.

Section-A - MODERN INDIA (1757 – 1947 AD)

1. Factors leading for the British supremacy and consequence of India with special reference to Bengal, Maharashtra and Sind, Carnatic and Mysore Wars. Resistance of Indian Powers and causes of their failures.

2. Stages of colonialism – changes in administrative structure and Policies, Revenue, Judicial and Social and Educational and their Linkages with British colonial interests.


5. Civil rebellions, Revolt of 1857, Civil rebellions and peasant revolts with special reference to Indigo revolt. Deccan riots and moppla uprising.

6. Rise and growth of Indian National Movements – specific basis of Indian Nationalism policies, early nationalists and militant nationalist. Rise and growth of communalism. Emergence of Gandhiji in Indian politics and his techniques of mass mobilisation, non-cooperation, civil disobedience and quit India movement. Trade Union and left wing movements, Constitutional changes, 1909 to 1935. Indian National Army, Naval Mutiny of 1947, the partition of India and achievements of freedom.

SECTION – B : WORLD HISTORY (1500 – 1950 A.D.)


2. Renaissance and Reformation in Europe. Emergency of the National States.

3. Commercial revolution in Western Europe – Mercantilism.

4. The thirty years – wars – its significance in European History.

5. Industrial Revolution its impact.

6. The emergence of a scientific view of the world. The age of enlightenment.


9. The growth of liberal ism and democracy in Western Europe (1815 – 1914).

10. Socialist and Labour movements in Europe, consolidation of large nation states – the unification of Italy – the founding of the German Empire.

11. The American Civil War.

12. Imperialism and Colonialism in Asia and Africa during the 19th and 20th Centuries.

13. China and the Western powers modernization of Japan and its emergence as a great power.

14. The European powers and the Ottoman empire (1815 – 1914)

15. First World War – Europe the eve of the first world war – The economic and social impact of the war – The peace of Paris 1919.


17. Rise of Nazism in Germany.

18. Rise of Nationalist movements in Indonesia, China and Indo-China.


10. LAW

INDIAN CONSTITUTIONAL LAW:


2. Fundamental Rights – Relationship with Directive Principles
   a) Right to Equality – Reservations
   b) Freedom of speech and Expression
   c) Rights to Life and personal liberty
d) Rights of the accused person – preventive detention

e) Religious, cultural and Educational Rights – Minority Rights

4. Fundamental Duties.
5. President and his powers.
7. Governor and his powers.
8. Supreme Court and High Courts – their powers and functions.
9. Distribution of legislative powers between the Union and the States.
10. Administrative and Financial relations between the Union and the States
11. Trade, Commerce and inter-course in India.
12. Union Public Service commission and State Public Service commission – their powers and Functions.
15. Emergency provisions.
16. Amendment of the Constitution – Basic structure theory.

INTERNATIONAL LAW:

1. Nature of International Law.
2. Relationship between Municipal Law and International Law.
6. State Territory and Jurisdiction.
7. Law of the sea – Territorial sea, continental shelf, EEZ and open sea beyond national jurisdiction.
8. Air space and outer space.
10. Place of Individuals – Nationality, Statelessness, Extradition and Asylum.
12. Diplomatic Missions – Privileges and immunities.
13. Treaties – Formation, ratification and termination.
15. Lawful resources to use of force – Self-defence, intervention.
16. Legality of use of Nuclear weapons.

LAW – JURISPRUDENCE

SECTION – A

1. Nature and scope of jurisprudence
2. Schools of Jurisprudence
   A) Historical
   B) Analytical
   C) Philosophical
   D) Sociological
3. Theories of Law
   Austinian, Neo-Austinian, Hart Kersenian, Natural Law etc.
4. Sources of Law
   Meaning of the term sources of law
   A) Custom
   B) Legislation – Supreme and Subordinate Legislation Delegated Legislation
   C) Precedent:-
      a) Nature and authority of Precedent
      b) Ratio – desidendi, stare-decisis
      c) Judges as a Law makers – Judicial activism
      d) Doctrine of prospective over ruling
5. Various Legal concepts
   A) Rights and Duties
   B) Ownership and possession
   C) Persons – corporate personality
   D) Civil and Criminal liability
   E) Liability – Strict liability – vicarious liability
   F) Property and obligation
GENERAL PRINCIPLES OF CONTRACT

(Section 1 to 75 of the Indian Contract Act)

1. Formation Contract
2. Offer and acceptance
3. Consideration
4. Void, voidable, illegal and unenforceable agreements
5. Free consent etc.
6. Performance of contracts
7. Discharge of contract – Frustration of contract
8. Remedies of Breach of contract
9. Quasi – contracts

SECTION – B

LAW OF TORTS

1. Nature of tortious liability
2. Theority of Fault – Conditions of liability – Defences
3. Statutory liability
4. Vicarious liability
5. Strict liability – Rule in Rylands v. Fletcher
6. State liability
7. Joint – tort feasors
8. Negligence
9. Liability of occupiers
10. Detenue and conversion
11. Nuisance – Public and private
12. False imprisonment and Malicious prosecution
13. Defamation
14. Nervous shock
15. Trespass

LAW OF CRIMES

1. Concept of crime – actus rens and Mens rea - Mens rea in statutor offences
2. Joint Liability (Sec. 4-38) Group Liability (Sec.149)
3. General exceptions (Secs.76-106)
4. Abetment and criminal conspiracy
5. Offences against the state-offences against Public Tranquility (Ch. VIII)
6. Offences by or relating to public servants (Chap.IX)
7. Offences affecting Human Body
8. Offences against property – Theft, Estorsion, robbery and decoity, criminal breach of trust, criminal misappropriation of property, Mischief, criminal trespass, House trespass and House breaking
9. Offences relating to documents – forgery
10. Offences relating to Marriage (Ch.XX)
11. Defamation
13. Dowry Prohibition Act, 1961

11. PHILOSOPHY

SECTION - A – WESTERN

2. Aristotle: Form, matter and causation.
3. Descartes: Cartesian method and certain knowledge Mind-Body problem: God:
4. Spinoza: Substance, Attributes and modes, Pantheism.

SECTION - B – INDIAN
5. Yoga:- Yoga Psychology – Eight limbs of yoga.
12. Radhakrishna:- His idealistic views, its difference from classical vendanta.

SECTION - A – ETHICS
1. The conception of Good, Right and their relation.
2. Psychological Hedonism.
3. Utilitarianism (Bentham and J.S. Mill)
4. Kantian Ethics.
5. Moral Judgements: Descriptivism: Prescriptivism: Emotivism:
8. The Budhist conception of Mahakaruna.

SECTION – B – LOGIC
1. Laws of thought.
2. Logical division and definition.
3. Classification of propositions: Traditional and modern.
4. Syllogism: Figures and moods, Rules of Syllogism (General and Specific) – Formal Fallacies.
5. Rules of Quantificasion:

SECTION – C- Philosophy of Religion
2. Proofs for the existence of God and their Criticism.
3. Immortality of soul.
6. Religion and morality.

SECTION – D : Socio- Political Philosophy
2. Sovereignty: Austin: Bodin, Laski, Kautilya
3. Individual and state.
4. Democracy: Concept and forms:
5. Socialism and Marxism.
6. Humanism.
7. Secularism
8. Theories of punishment.
11. Scientific temper and progress.
12. POLITICAL SCIENCE


2. Emergence and nature of modern state, Sovereignty, Monism and Pluralism: concepts of power, Authority and Legitimacy.


5. Ideologies regarding the sphere of state activity liberalism, Fascism, Idealism, Utilitarianism, Anarchism, Socialism, communism and Sarvodaya. State as an instrument of socio-economic change: Changing role of the State in the context of Globalization.

6. Political Institutions and their functioning:
   b) Legislature – Unicameral and Bicameral legislatures, Functions and crisis of accountability, decline of legislature.
   c) Judiciary – Functions of Judiciary, Independence of Judiciary.

7. Political parties, its basis, functions and classifications.

8. Pressure groups – role, functions and influence on policymaking process.

9. Federalism – different models; recent trends in the working of Modern federations.

10. Political process: Political socialization Political culture, Political development and Political modernization.


12. a) Indian Political thought – Manu, Kautilya, Gandhi and Ambedkar.

13. Philosophical foundations of Indian Constitution; Fundamental Rights and Directive principles of State Policy.


17. Impact of Socio-economic factors in Indian Politics – Tribal, Regional Caste, Language and Religious reassertions and Environmental movements.

18. Political process in Western and Non-Western societies: Military and Politics; Problems and prospects of democracy in the developing societies; Globalization – its impact on the Third world.

   b) The UNO, Origin, aims and objectives – its role in Uni-polar world.
   c) The Cold war, origin, evolution, impact on international relations – End of cold war.
   d) The new international economic order – North South dialogue, WTO-its impact on international relations – Earth Summit – RIO Declaration.
   e) Non-alignment – Its role and relevance in the changing global order. India’s foreign policy – its determinants.

13. PSYCHOLOGY

1. Scientific approach to Psychology.

2. Nature of psychological research:
   Methods of psychological research – Observational method Survey methods – questionnaire and interview.
   Case history method
   Experimental method
   Advantages and limitations of various methods.
3. Origin and development of behaviour:
   Genes and their role
   Constitutional and endocrinal functions
   Early childhood experiences and their impact on development
   The concept of maturation
   The characteristics of the developmental processes
   Experimental studies on the role of heredity and environment
   Nature-nurture controversy
   The role of social and cultural factors in the process of development.

4. Cognitive processes:
   Perception
   Organic basis of the perceptual process
   Psychophysical laws
   Gestalt Theory of perception
   Perceptual constancies
   Perceptual abnormalities
   Perceptual defence
   Effect of need on perception, perception and personality.

5. Learning:
   Thorndike’s laws of learning
   Classical and instrumental conditioning
   Skinner’s concept of reinforcement
   Hull’s drive reduction theory
   Cognitive theories of learning – Tolman and Razran
   Gestalt approach to learning
   Programmed learning

6. Memory:
   Measurement of memory
   Early experiments – Ebbinghaus
   Short – term memory and long – term memory Forgetting
   Methods of improving memory.

7. Thinking:
   Language and thought
   Convergent and divergent thinking
   Concept formation
   Problem solving
   Theories of the development of thinking in children.

8. Intelligence:
   Binet’s contribution
   Theories of intelligence
   Measurement of intelligence
   Intelligence tests
   Aptitude and its measurement
   The concept of social intelligence.

9. Motivation:
   Motivation – need, drive
   Theories of motivation – psychoanalytical theory, need hierarchy theory.
   Level of aspiration and achievement motivation.

10. Personality:
    The concept of personality
    Trait and type approaches
    Factorial and dimensional approaches
    Theories of personality – Field, Allport, Cattel, Lewin
    Social learning theories
    The Indian approach to the study of personality
    The concept of Gunas
    Measurement of personality
    The role of projective tests.
11. Attitudes and values:
   Formation of attitudes
   Theories of attitudes
   Theories of attitude change
   Attitude scales
   Values
   Motivational Properties of values.

12. Recent trends:
   Psychology and the computer
   Cybernetic model of behaviour
   Simulation studies in psychology
   Altered states of consciousness – sleep, dream, meditation, hypnotic trance, drug induced changes
   Sensory deprivation.
   Human problems in aviation and in space flight.

13. Models of man:
   The mechanical man
   The organic man
   The organizational man
   The Humanistic man
   An integrated model of man.

1. Individual differences:
   Types of psychological tests. Construction of psychological tests. Requirements of a good psychological test. Limitations of psychological tests.

2. Psychological Adjustment:
   The concept of adjustment. Barriers to adjustment.
   Reactions to adjustment
   Defence mechanisms
   The concept of mental health
   Community mental health.

3. Psychological disorder:
   Classification of disorders
   Neurotic, psychotic and psycho physiological disorders
   Psychopathic personality
   The problems of anxiety, depression and stress.

4. Therapeutic approaches:
   Psychoanalytic
   Behaviour therapy
   Client-centered therapy
   Cognitive therapy
   Rational-emotive therapy
   Group therapy.

5. Application of psychology to industrial and organizational problems:
   Personnel selection
   Training and training methods
   Theories of work motivation
   Job designing
   Man-machine systems
   Leadership and its training.

6. Small groups:
   Properties of group
   Groups at work
   Group cohesiveness
   Interaction process analysis
   Interpersonal relations.
7. Social Change:
- Characteristics of social change
- Psychological basis of change
- Planning for change
- Change proneness
- Resistance to change
- Problems of change in the rural context.

8. School Psychology:
- The learner
- School as an agent of socialization. Problems relating to adolescents in learning
- Gifted children
- Creativity
- Retarded children and problems related to their training.

9. Disadvantaged Groups:
- Types of disadvantages – Social, cultural and economic
- Psychological consequences of disadvantage
- Deprivation
- Educating the disadvantaged groups
- Problems of motivating the disadvantaged.

10. Social Integration:
- Prejudice its nature and manifestation
- Ethnic prejudice
- Ameioration of prejudice
- Social tensions – their causes and consequences
- Reducing social tensions
- Strategies to achieve social integration
- National character.

11. Psychology and Economic Development:
- Identification and promotion of entrepreneurship
- Technological change and its impact on human behaviour.

12. Management of Information and Communication:
- Psychological factors in information management
- Information overload
- Psychological basis of effective communication
- Mass media and its role in social change
- Impact of television
- Psychological basis of effective advertisement.

13. Problems of Contemporary Society:
- Stress
- Management of stress
- Alcoholism
- Drug addiction
- Juvenile delinquency
- Rehabilitation of the deviant
- Aging and problems of the aged.

14. PUBLIC ADMINISTRATION

1. Public Administration:

2. Theories of Organisation:
   - Scientific Management (Few Taylor), The Bureaucratic theory of Organisation (Max weber), Classical theory of organization (Henry Fayol, Zulter Gullick & Others), Human Relation Theory, Behavioural approach.

3. Principles of Organisation:
   - Hierarchy, Span of Control, Unity of Command, Authority and Responsibility, Coordination, Supervision, Centralisation and De-centralisation, Delegation.

4. Administrative Behaviour:
   - Decision making with special reference to Herbert Simon’s contribution, Theories of Leadership, Communication, Motivation (Maslow and Herzberg)
5. **Structures of Organisations:** Chief Executive, Types of Chief Executives and their functions, Line, Staff and Auxiliary Agencies, Departments, Corporations, Companies, Boards and Commissions, Headquarters and Field Relationship.

6. **Personnel Administration:** Bureaucracy and Civil Service, Recruitment, Training, Performance Appraisal, Promotion, Pay and Service Conditions, Discipline, Generalists and Specialists, Neutrality and Integrity in Administration.

7. **Financial Administration:** Concept of Budget, Preparation and Execution of Budget, Legislative Control, Accounting and Auditing.

8. **Accountability and Control:** The concept of Accountability and Control, Legislative, Executive and Judicial Control over Administration.

9. **Comparative and Development Administration:** Nature and Scope of Comparative and Development Administration, Contribution of Fred Rigg’s with particular reference to Prismatic Society and Sala Model.

10. **Public Policy:** The Relivance of Policy-making in Public Admin. and Formulation of Publicity Policy and implementation.

1. **Environmental Setting:** Constitutional Framework Federalism, Parliamentary Democracy.

2. **Political Executives at Central State Levels.**

3. **Structure of Administration:** Cabinet Secretariat, State Secretariat, Ministries and Departments.

4. **Public Services:** All India Services, Central and State and Local Services, Union and State Public Service Commissions.

5. **Centre-State Relations:** Legislature, Administrative and Financial.

6. **Machinery For Planning:** Plan formulation at National level, Planning Commission, National Development Council, Planning Machinery at State and District levels.

7. **Control of Public Expenditure:** Parliamentary Control, Role of Finance Ministry, Comptroller and Auditor General.


9. **Administration for Welfare:** Administration of Welfare measure for Scheduled Castes, Scheduled Tribes, Empowerment of Women.

10. **Issues Areas in Indian Administration:** Relationship between Political and Permanent Executives, People’s participation in Administration, Redressal of Citizens Grievances Administrative Reforms in India.

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**15. SOCIOLOGY**

**General Sociology**

1. **Scientific Study of Social Phenomena:** The emergence of Sociology and its relationship with other Social Sciences. Sociology as a Science; Science and Social behaviour; the problem of objectivity; the scientific method and design of Sociological Research; techniques of data collection and measurement including participant and non-participant observation, interview schedules and questionnaires and measurement of attitudes. Sampling, Reliability and validity.

2. **Pioneering contributions to Sociology:** The seminal ideas of Durkheim, Weber, Radcliffe Brown, Malinowski, Parsons, Merton and Marx.
   a) Durkheim: Division of labour, Social fact, religion and society.
   b) Max Weber: Social action, types of authority, Bureaucracy, Protestant ethic and the spirit of capitalism, ideal types, Social action.
   c) Karl Marx: Historical materialism, mode of production, alienation and class struggle.
   d) Talcott Parson: Social system and pattern variables.
   e) Robert K. Merton: Latent and manifest functions, anomie, Conformity and deviance, reference groups.

3. **The individual and society:** Individual behaviour, Social interaction, society and social groups, Social system, Status and role; culture, personality and socialization and social control, role conflict.

4. **Social Stratification and Mobility:** Social differentiation and stratification, Attributes of social stratification, theories of stratification, different conceptions of class and caste; Class and Society, types of mobility, intergenerational mobility, Intra generational mobility, Horizontal mobility, open and closed models of mobility.
5. **Family, Marriage and Kinship:** Structure and functions of family; structural principles of kinship, family and descent. Types and forms of marriage Change in marriage and family, marriage and divorce.

6. **Formal organizations:** Elements of formal and informal structures; bureaucracy, modes of participation – democratic and authoritarian forms; voluntary associations.

7. **Economic System:** Concepts of property; social dimensions of division of labour and types of exchange; social aspects of pre-industrial and industrial economic system; Industrialization and change; Changes in the spheres of familial, educational, religious, political and stratificational, Social determinants and consequences of economic development

8. **Political System:** The nature of Social power – Community power structure, power of the elite, class power, organizational power, power of unorganized masses, power, authority and legitimacy, power in democracy and in totalitarian Society; Political parties and voting behaviour; Democratic and authoritarian modes of Political Participation.

9. **Educational System:** Social orgins of students and teachers, Stratification and education, equality of educational opportunity, Social aspects of mass education, Problems of Universalization of primary education; role of community and state intervention in education, education as a medium of cultural reproduction, Indoctrination, education and modernization, education and social control, education and social change.

10. **Religion:** Origins of religious beliefs in premodern Societies, the sacred and the profane; social functions and dysfunctions of religion. Religion, magic and science, Monistic and pluralistic religion, organized and unorganized religions and changes in religion; concept of secularization.

11. **Social change and Development:** Social structure and social change. Continuity and change as fact and as value. Processes of change, Factors of Social change, Theories of change; types of Social change, Social disorganization and social movement; Types of social movements, Social movement and change, Social policy and social development.

**SOCIETY OF INDIA**

1. **Historical Foundations of the Indian Society:** Traditional Hindu Social organization, Socio-cultural dynamics through the ages, especially the impact of Buddhism, Islam and modern West; factors in continuity and change.

2. **Social stratification:** Caste system and its transformation aspects of ritual, economic and caste status; cultural and structural views about caste, mobility in caste, issues of equality and social justice, caste among the Hindus and non-Hindus; casteism, the Backward Classes and the Scheduled Castes; untouchability and its eradication; agrarian and industrial class structure.

3. **Family, marriage and Kinship:** Religious variations in kinship system and its socio-cultural correlates; changing aspects of Kinship; The Joint family–its structural and functional aspects and its changing form and disorganization; Marriage among different ethnic groups and economic categories, its changing trend and its future; impact of legislation and socio-economic change upon family and Marriage; intergenerational gap and youth unrest; changing status of women.

4. **Economic System:** The Jajmani System and its bearing on the traditional society; market economy and its social consequences; Occupational diversification and social structure; professions, Trade Unions; Social determinants and consequences of economic development; economic inequalities; exploitation and corruption.

5. **Political System:** The functioning of the democratic political system in a traditional society; Political parties and their social composition; Social structural origins of political elites and their social orientations, decentralization of power and political participation. Panchayat Raj and Nagarpalikas and 73rd and 74th Constitutional amendments.

6. **Educational System:** Education and society in the traditional and in the modern contexts; Sociological factors for educational inequality; Education and social mobility; Educational problems of women, the Backward Classes, Scheduled Castes and Scheduled Tribes. Directive principles of State policy and Primary education, Total literacy campaigns.

7. **Religion:** Demographic dimensions, geographical distribution; and neighbourhood living pattern of major religious categories; interreligious interaction and its manifestation in the problems of conversion; Minority status and communal tensions; secularism; Tribal Societies and their integration; distinctive features of Tribal communities; Tribe and Caste; acculturation and integration.

8. **Rural social system and community development:** Socio-Cultural dimensions of the village community; Traditional Power structure, democratization and leadership, poverty, indebtedness and bonded labour, social consequences of land reforms. Community Development programmes and other planned development projects; Green Revolution; new strategies; to rural development.
9. **Urban social organisation:** Continuity and change in the traditional bases of social organisation namely family, marriage, kinship, caste and religions in the urban context; stratification and mobility in urban communities; ethnic diversity and community integration; urban neighbourhoods, rural-urban differences in demographic and socio-cultural characteristics and their social consequences. Urbanization in India, Urban environment, housing, slums and unemployment, programmes for urban development.

10. **Population Dynamics:** Socio-cultural aspects of sex and Age structure; Marital status, fertility and mortality: the problems of population explosion; Socio-psychological, cultural and economic factors in the adoption of family planning practices.

11. **Social change and modernization:** Problem of role conflict, youth unrest – intergenerational gap-changing status of women. Major sources of social change and Resistance to change; Impact of West, reform movements; social movements; industrialization and urbanization; pressure groups, factors of planned change – Five year plans, legislative and executive measures; process of change; sanskritization, Westernization and modernization – Means of Modernization, Mass media and education; problems of change and modernization – structural contradictions and breakdowns; current social Evils – Corruption and Nepotism, smuggling – Black money.

16. **AGRICULTURE**

Importance of agriculture in national economy. Agriculture development in India, Agro-climatic Zones of India and A.P. Major constraints in limiting to crop production, Ecology and relevance to Man-Management of national resources; Environmental variables and agro-ecosystem; Weather aberrations and their effect on crops, Environmental pollution – air water and soil – its effect on crops, animals and humans.

Cropping patterns in different agro-climatic zones of A.P. – concepts of multiple cropping, multistory, relay and intercropping – Farming systems – Planning of components and productivity. Sustainable agriculture and organic farming – relevance in modern agriculture – Principles and potentials to attain sustainability. Package of practices for production of important cereals, pulses, oilseeds, fibres, sugar and commercial crops grown in A.P.

Weeds-their characteristics, and dissemination, Crop-weed association and allelopathy, weed management in different crops.


Crop water requirements – methods of assessment – water use efficiency- water management practices in important field and horticultural crops of A.P. Drainage - water logging, methods of field drainage.

Importance of social, farm and agro forestry. Choice of tree species, Principles of general silviculture.


Farm management – importance, economic principles, farm planning and budgeting, farm business analysis and farm efficiency measures, Agricultural marketing institutions – commercial agricultural and agri-business management. International trade – nature and scope – GATT/WTO.

Concept, meaning, principles, scope and importance of Agriculture extension, Models of organizing Agriculture extension. Rural development and poverty alleviation programmes. Training to Extension workers, farmers, farm women and youth, Agricultural extension management.
PAPER - II

Physical and chemical basis of heredity, chromosomal structure, genes/operan concept; Mendelion laws of inheritance, cytoplasmic inheritance, Linkage and crossing over, Genetic mechanisms of sex determination, Inheritance of Quantitative characters, Mutations – spontaneous and induced.

Biodiversity and centres of origin of cultivated crops, Assessment of variability – additive, dominance and epistasis.


Seed technology and importance – seed quality concepts. Hybrid seed production in important crops. Seed certification standards, intellectual property rights, patency and plant breeders rights.

Importance of plant physiology in Agriculture, Physiological basis of crop yield; Structure and function of cell organelles; Photosynthesis, respiration and transpiration; structure and functions of proteins, nuclic acids, crop water relations, Role of macro and micro nutrients and their deficiency symptoms.

Plant biotechnology – Achievements and potentialities. Genetic engineering and production of transgenic plants.

Growth and development, photo periodism and vernalization. Hormones, plant growth regulators and their role in agriculture.

Role of fruits and vegetables in human nutrition and national economy; Climatic requirements and cultivation practices for major fruits, vegetables and plantation crops; Green house production of flowers and vegetable crops; Handling and marketing problems of fruits and vegetables; Principal methods of preservation of fruits and vegetables; Important fruit and vegetable products. Ornamental and landscape gardening – types of ornamental gardens, Design and layout of lawns and gardens.

Pests and diseases of field, vegetable, orchard and plantation crops and their management; Causes and classification of plant diseases. Principles of plant disease management – avoidance, exclusion, eradication, immunization and protection; Biological control of pests and diseases. Integrated management of pests and diseases; Pesticides – classification and their formulations; Recent methods of pest/disease control. Stored grain pests and their preventive and curative measures.

17. ANIMAL HUSBANDRY AND VETERINARY SCIENCE

General : Role of livestock in Indian Agriculture, Origin, domestication and classification of livestock, contribution of Livestock to state and National Economy.

Animal Nutrition:

Energy sources, energy metabolism and requirements for maintenance and production of milk, meat, eggs and wool as source of energy. Protein sources, protein metabolism and synthesis-Protein requirements, Energy Protein ratios, Role of minerals and trace elements – sources, functions and requirements, Role of vitamins, Hormones and growth stimulators – Sources, functions and requirements.

Ruminant Nutrition – Nutrient requirements for calves, heifers dry and mich cows and bufferloes, use of non protein nitrogenous substances in Ruminants.

Classification and evaluation of feeds and fodders roughages and Concentrates. Conservation of feeds and utilization of Agro Industrial by products. Feeding standards for different categories of livestock

Nutrients and their metalolism in poultry for egg and meat production.

Animal genetics and Breeding:


Qualitative Vs quantitative traits – Hardy-Weinberg law, gene and genotype frequency, Factors affecting gene frequency, random drift. Breeding value, dominance and epistatic deviations, partitioning of variance geno-type and environment interaction.


Livestock production and Management:


Transport of animals for different purposes.

Livestock Products Technology :


By product utilization Judging of milk products, PFA, BIS and Agmark standards for milk and milk products.

Meat and meat products – Antemortem, care and management of meat animals, Stunning, slaughter and dressing operations, Abattoir requirements and designs – Meat inspection procedures and judgement of meat cuts – Duties and functions of Veterinarians in wholesome meat production, spoilage of meat and control measures post slaughter physico chemical changes in meat and factors that influence them – Adulteration of meat and its detection – Regulatory provisions in meat trade and industry.


Anatomy and Physiology:


Pharmacology and Animal Re-production:


Veterinary public health:

Assessment of pollution of water, air and soil. Animal housing requirements for specific categories of domestic animals viz. pregnant cows and sows, milking cows and broiler birds. Importance of hygiene. Public health aspects of milk and meat production and processing.

Classification and definition of zoonoses, role of animals and birds in transmission of zoonotic diseases. Occupational zoonotic diseases. Principles of epidemiology. Application of epidemiological measures in the study of diseases and disease control, epidemiological features of air, water and food borne infections including milk and meat borne diseases.


Veterinary medicine, surgery and gynecology:


Anesthesia, local regional and general, preanesthetic mediation, symptoms and surgical interference in fractures and dislocation, hernia, choking, abomassal displacement, rumenotomy, castration, dystocia, caesarian operations.

Disease investigation techniques – Materials for laboratory investigation. Establishment of animal health centres and veterinary polyclinics.
18. BOTANY

Microbiology, Pathology, Algae, Fungi, Bryophytes, Pteridophytes, Gymnosperms, Taxonomy of Angiosperones, Anatomy, Morphogenesis, Embryology & Palynology.

MICROBIOLOGY:
Viruses, Bacteria, Plasmids, General account of infection and immunology, structure, classification, reproduction and physiology. Importance of microbes in agriculture, industry and medicine. Biological control of pollution using micro-organisms.

PATHOLOGY:
Plant diseases caused by viruses, bacteria, mycoplasma, actinomycetes, fungi and nematodes. Modes of infection, dissemination, Physiology of parasitism and methods of control. Different fungal toxins. Mechanism of action of Biocides.

ALGAE:

FUNGI:
General characters of fungi and their classification. Structure, reproduction, life cycles, phylogeny and inter-relations and affinities of the main groups of fungi viz., Myxomycetes, Oomycetes, Zygomycetes, Ascomycetes, Basidioymycetes, Deuteromycetes, Economic importance of fungi, Symbiotic fungi, the lichens, Mycorrhizae.

BRYOPHYTES:

PTERIDOPHYTES:

GYMNOSPERMS:
Classification and distribution of living gymnosperms, origin and evolutionary tendencies in gymnosperms vis-à-vis pteridophytes and angiosperms – General account of fossil gymnosperms; pteridospermales (Cycadofilicales), Corditales, Bennettitales and their affinities and inter relationship. Taxonomic and economic importance of gymnosperms.

TAMONOMY OF ANGIOSPERMS:
A comparative study of the systems of classification; Bentham and Hooker, Engler and Prantl and Hutchinson. Modern trends in biosystematics with reference to phytochemical, cytological, palynological, embryological and anatomical criteria. Taxonomic and economic importance of Magnoliaceae, Ranunculaceae Cruciferae, Malvaceae, Rosaceae, Leguminosas, Umbelliferae, Asclepiadaceae, Verbenaceae, Euphorbiaceae, Liliaceae, Orchidaceae, Palmae and Poaceae.

ANATOMY:

MORPHOGENESIS:
Polarity, symmetry and totipotency – Differentiation and dedifferentiation of cells and organs. Factors of morphogenesis. Methodology and applications of cell, tissue, organ and protoplast cultures from vegetative and reproductive parts; Somatic hybrids.

EMBRYOLOGY AND PALYNOLOGY:

CELL BIOLOGY:

GENETICS & EVOLUTION:
Pre and post Mendelian concept of genetics, development of gene concept Nucleic acids their structure and role in reproduction and protein synthesis, genetic code and gene regulation. Mechanism of microbial recombination, Mutation, Its roles in evolution; Multiple factor inheritance, linkage and crossing-over, methods of gene mapping, Sex chromosomes and sex linked inheritance, cytoplasmic inheritance, Genetic engineering, Organic evolution, evidence, mechanism and theories.

PHYSIOLOGY:

ECOLOGY:

ECONOMIC BOTANY:
Origin of cultivated plants. Study of plants as sources of food, fodder and forage, wood and timber, fibre, paper, rubber, beverages, drugs, narcotics, resins and gums essential oils, dyes, medicines, insecticides and pesticides. Energy plantation.

ETHNObOTANY:
Its scope. Medicoethnobotany and ethnoagriculture. Conservation and propagation of medicinal plants used by various tribal communities of A.P.

19. CHEMISTRY

1. Atomic structure and chemical bonding:
Quantum theory, Heisenberg’s uncertainty principle, Schrodinger’s wave equation (time independent), particle in a one dimensional box, quantum numbers, hydrogen atoms wave functions, shapes of orbitals. Valence bond and molecular orbital theories. Resonance and resonance energy Sigma and Pi bonds (non-mathematical approach).

2. Thermodynamics:

3. Solid State:

4. Chemical Kinetics:
5. **Photochemistry:**

6. **Ionic equilibria:**

7. **Electromotive force:**
   Reversible and irreversible cells. e.m.f. and its measurement. Types of cells. Single electrode potentials and their applications. Theory and applications of over voltages. Dropping Mercury Electrode (DME).

8. **Reactions in non-aqueous media:**
   Liquid ammonia and liquid sulphur dioxide. Pearson’s theory of hard and soft acids and bases.

9. **d-Block elements:**

   **Lanthanides and actinides:**
   Methods of separation of lanthanides. Oxidation states and magnetic properties. Synthesis of actinides and actinide contraction.

10. **Co-ordination chemistry:**

11. **Organometallic compounds:**
    Nature of the metal-carbon bond. Organometallic compounds of aluminium, Zinc and mercury. Olefinic complexes of palladium (II) and platinum (II). Their preparation, properties and bonding.

12. **Molecular spectroscopy:**
    Type of spectra and their origin. Measurement of spectra.

   a) **Vibrational spectroscopy:**

      ii) Raman spectra: Origin and measurement. Differences between IR and Raman spectra.

   b) **Electronic spectroscopy:**
      UV and visible spectra. Types of electronic transitions in molecules. Absorptions due to multiple bonds and the effect of conjugation on them. Applications of UV-visible spectroscopy in the study of organic molecules. Charge transfer spectra.

**PAPER-II**

1. **Structure, reactivity and nomenclature of organic molecules:**
   Covalent character of organic compounds. Single and multiple bonds. Types of organic reactions and reagents with examples. Homolytic and heterolytic cleavage of bonds.

   Inductive, electromeric, conjugative and hyperconjugative effects on the physical and chemical properties of organic compounds with suitable examples Dipole moments.

   IUPAC and Chemical Abstract systems of nomenclature of organic compounds.
2. **Stereo Chemistry:**


3. **Reaction mechanisms:**


   $S_n1$ and $S_n2$ mecanhisms. $E_1$, $E_2$ and $E_1 cb$ mechanism of elimination reactions. Electrophilic addition to carbon – carbon double bonds. Addition to carbon-oxygen double bonds. Michael addition. Aromatic electrophilic and nucleophilic substitution.

4. **Pericyclic reaction:**

   Classification and examples. An elementary study of woodward-Hofmann Rules.

5. **Carbohydrates:**


6. **Amino acids, polypeptides and proteins:**


7. **Aromatic and heterocyclic compounds:**


8. **Chemistry of the following name reactions:**

   Aldol condensation, dieckmann reaction, Claisen condensation, perkin reaction, Beckman rearrangement and Cannizaro reaction, reimer – Tiemann reaction.

9. **Reagents in organic synthesis:**

   Use of the following reagents in organic synthesis:
   Ozone, periodic acid, NBS, diborane, Sodium in liquid ammonia, NaBH₄ and LiAlH₄.

10. **Chemistry of Natural products:**

    Isolation and structural features of the following natural products:
    Citral, nicotine, papavarine and Vitamin-C.

11. **NMR Spectroscopy:**

    Introduction to proton ,magnetic Resonance spectroscopy – Principles. Chemical shifts, shielding and desheilding effects, Splitting of signals, Coupling constants.

    Application of PMR to the study of simple organic molecules.

12. **Polymer chemistry:**

20. GEOLOGY

(General Geology, Geo-morphology, Structural Geology, Stratigraphy and Palaeontology)

i) General Geology:


ii) Geomorphology:

Land forms, their types and development. Weathering, Transport and Erosion. Geomorphic processes, such as Fluvial, Fluviomarine, Marine, Glacias and Eolean. Topography and its relation to structures and lithology.

iii) Structural Geology:


iv) Stratigraphy:


v) Palaeontology:


PAPER-II

(Crystallography, Minerology, Petrology and Economic Geology)

i) Crystallography:

Crystalline and non-crystalline substances. Concept of symmetry, point group, lattice and space groups. 32 classes of crystal symmetry. Stereographic projections and their use. Twinning, crystal growth and irregularities.

ii) Mineralogy:


iii) Petrology:

Simple phase diagrams of single, binary, ternary and quarternary silicate systems, with reference to petrogenesis. Magnas, their generation in the crust and mantle their emplacement and their relation to paleo-tectonics. Magnatic crystallization, differenciation and assimilation. Bowen's Reaction principle classification of Ignous rocks.


Role of T P and fluids in metamorphism. Metamorphic facies. Relationship among metamorphism, anatexis and granitization. Types of metamorphism.
Petrogenic aspects of important rocks of India, such as Deccan Traps, the layered intrusions, charnoekites khondalites and gondites.

iv) Economic Geology:


Geological investigation for the construction of dams, Bridges, Highways and Tunnels.

Ground water exploration and management, water pollution.

Geological interpretation of air photos and imagery.

21. MATHEMATICS

The candidate has to answer 10 questions choosing at least 2 questions from each Sections I – IV. Five questions will be from each section. Each question carries 15 marks.

Section-I – Algebra:

Groups – subgroups – normal subgroups – quotient groups – homomorphism and isomorphism theorems – cyclic groups – permutation groups – Cayley’s theorem.


Section-II – Linear Algebra:


Linear transformations – Rank and nullity of a linear transformation – Cayley – Hamilton theorem – Matrix of a linear transformation – eigen values and eigen vectors – Canonical forms.

Inner product spaces – Orthonormal basis – Quadratic forms.

Section-III – Differential equations:


Formation of partial differential equations – Equations of first order – Charpit’s methods.

Section-IV – Geometry:

General equation of second degree in two variables – Tracing of conics.


The candidate has to answer 10 questions choosing at least TWO questions from each of the Sections 1 to IV. FOUR questions will be given from each of the Sections I,II and III and EIGHT questions will be given from Section IV with two questions from the four topics given in that section.

Section-I – Real Analysis:


Limits and continuity of a real valued function properties of continuous functions – Differentiation – Mean value theorems – Applications.

Riemann integration – conditions for Riemann integrability – improper integrals.
Section-II – Complex Analysis:

Complex numbers and their geometric representation – limits and continuity of functions of a Complex variable – Analytic functions – Cauchy Riemann equations – Complex integration – Cauchy’s theorem – Cauchy’s integral formula – Power series – Taylor’s and Laurent’s series – Types of singularities – Calculus of residues and application to evaluation of definite integrals.

Section-III – Vector calculus:

Differentiation of a vector valued function – Gradient of a scalar function – Divergence and curl of a vector function in Cartesian and polar coordinates.

Green’s theorem – Gauss and Stoke’s theorems and their applications to evaluation of double and triple integrals.

Section-IV:


22. PHYSICS

(Mechanics and relativity, Waves and Oscillations, Thermal Physics, Optics)

1. Mechanics and Relativity:


Galelean relativity, special theory of relativity – Time duration and length contraction Michelson – Morley experiment, Lorentz transformations, addition of velocities, variation of mass with velocity – mass energy equivalence.

2. Waves and Oscillations:

Oscillations, Simple harmonic motion, progressive and stationary waves. Damped harmonic Oscillator, Forced oscillations and resonance. Wave equation, harmonic solutions. Plane and spherical waves, superposition of waves and beats, phase velocity, group velocity, Doppler effect.

3. Thermal Physics:


4. Optics:

Huygens principle interference, young’s experiment interference in thin films, Newton’s rings. Michelson’s interferometer. Diffraction – Fresnel and Fraunhoffer diffraction. Diffraction by straight edge, circular and rectangular apperture, single and double slits, plane grating, Dispersive power

(Electricity & Magnetism, Modern Physics and Electronics)

1. Electricity and Magnetism:


- Magnetic materials – Dia, para, ferro, antiferro and ferri magnetism (Qualitative features only). Langevin's theory of paramagnetism, Weiss theory of ferromagnetism. Ferro magnetic Domains Hysteresis, Nuclear magnetism. Dielectric materials – Capacitive with dielectric material as medium; electric polarisation; electronic, ionic, electric polarisabilities and their variations with temperature.

2. Modern Physics:


3. Electronics:


23. STATISTICS

Attempt any 5 questions choosing at most 2 from each Section. Four questions of equal weightage will be set in each section.

Section-A: Probability and Distributions

Sample space and events, Probability space, Statistical independence, Random variable, Discrete and continuous random variables. Probability density and distribution functions, marginal and conditional distribution, functions of random variables, expectation and moments, conditional expectation, correlation co-efficient, convergence in probability, almost sure, Markov, Chebychev and Kolmoomov inequalities, Borel Centelli lemma, weak and strong Laws of large numbers, probability generating and characteristic functions; Uniqueness and continuity theorems. Lindeberg Levy Central limit theorem. Standard discrete and continuous probability distributions, their interrelations including limiting cases. Exact Sampling distributions – t, F and Chi-square, Distributions of order statistics.
Section-B: Statistical Inference


Simple and composite hypotheses, statistical tests, critical region, two kinds of error, power function unbiased tests, most powerful and uniformly most powerful tests, Neyman-pearson, Leanna, Optimal tests for simple hypotheses concerning one parameter, monotone likelihood ratio property and its use in constructing UMP test, likelihood ratio criterion and its asymptotic distribution, chi-square and Kolmogorov tests for goodness of fit. Run test for randomness, Sign test for Location, Wilcoxon-Mann-Whitney test and Kol mogor – Smimov test for the two sample problem and tests of independence based on sparments next correction Distribution-free confidence intervals for quantiles and confidence bands for ditribution functions.

Notions of a sequential test, Walds SPRT, its CC and ASN functions, with applications to standard distributions.

Section-C: Multivariate Analysis

Theory of least squares, Gauss-Markoff theory, normal equations, least square estimates and their precision, Tests of significance and intervals – estimates based on least square theory. Regression Analysis, linear regression, estimates and tests about correlation and regression coefficient, curvi-linear regression, and orthogonal polynomials, test for linearity of regression-Multivariate normal distribution, multiple regression, multiple and partial correlations and tests for them. Mahalanobis D^2 and Hotelling T^2 statistics and their applications (derivations of distribution of D^2 and T^2 excluded). Fisher's discriminant analyses.

Attempt any 5 questions choosing atleast one question from each section. Three questions of equal weight will be set in each section.

Section-A – Sampling Theory

Nature and scope of sampling, simple random sampling, sampling from finite population with a without replacement, estimation of the standard errors, sampling with equal probabilities, PPS sampling, Stratified random sampling, systematic sampling, two-stage and multistage sampling, multiphase and cluster sampling schemes.

Estimation of population total and mean, use of biased and unbiased estimates, Standard errors of estimates, cost and variance functions, ratio and regression estimates and their relative efficiency, planning and organization of sample survey with special reference to recent large scale surveys conducted in India.

Section-B – Design of Experiments

Analysis of variance of one way, two-way and three-way classified data with and without interactions. Principles of experimental designs, CRD, RBD, LSD, Missing-plot technique, Factorial experiments, 2^n and 3^n designs. General theory of total and partial confounding and fractional replication. Analysis of split-plot, BIBD and PBIBD.

Section-C – Industrial Statistics

Concept and importance of quality control, different types of control charts, X,R,P & C charts; cumulative-sum control charts.

Sampling inspection Vs 100 per cent inspection. Concepts of producer’s risk and consumer’s risk. Single, double, multiple and sequential sampling plans for attributes; OC, ASN curves, Rectifying sampling plans, AOQ and ATI curves; sampling plans for variables.

Definition of Reliability, Life distribution, failure rate and bath-tub failure curve; exponential and Weibull models. Reliability of series, Parallel and K out of n systems.
Section-D – Operations Research

Homogenous discrete-time Markov chains, transition probability matrix, classification of states; stationary distribution, Birth and death process. Elements of quitting theory, M/M/1 and M/M/K queues; G/M/1 and M/G/1 - queues.

The structure and formulation of linear programming problem. The simplex method, two phase simplex method and charne’s method with Artificial variables. Transportation and Assignment problems.

Introduction to computers and elements of Fortran IV Programming, Formats for input and output statements, specification and logical statements and sub-routines. Application to some simple statistical problems.

24. ZOOLOGY

(Non-Chordata, Chordata, ethology & Biostatistics)

Protozoa:
General Organisation and Classification; Locomotory organelles; Pathogenic protozoa of human importance (i.e.)

Trypanosoma, Leishmania, Enatamoeba, Histolytica, Giardia, Malarial Parasites.

Porifera:
Various types of canal system, Histological structure and their functions; Reproduction and development of sponges, systematic position and affinities of sponges; development of spicules.

Coelenterata:
General Organisation and Classification; Aurelia; Coral reef formation in Actinozoa, general organisation and phylogenetic relationship of ctenophore, polymorphism in Hydrozoa.

Platyhelminthes:
General Organisation and Classification; Planaria; Fasciola; Taenia, general outline of the life cycle of parasites of human importance, Host-parasitic interactions.

Nemathelmanthis:
Parasitic Nematodes of human importance i.e., Ascaris, Oxyunis Anncylostoma, Strongybovides plant parasitic nematodes with specific examples.

Annelia:
General Organisation and Classification; Neriais; Leech; types of Nephridia, Coelome and Coelomoducts; Regeneration in Polychaetes, affinities, Trochophore larva.

Arthopoda:
Outline classification (up to orders) palaemon; scorpion; Insect mouth parts, respiration, metamorphosis, social use in insects, harmful and useful insects and economic importance, vectors-flies, lice, bugs, ticks and mosquitoes; Structure and systematic position of onychophora.

Mollusca:
Classification, Unio; pilla; torsion and detorsion, Distinctive features of Cephalopoda; pearl formation in Mollusea.

Chinoderamata:
Classification; star fish; water vascular system, larval forms and their revolutionary significance.
Hermichodonta:

General organisation; systematic position and affinities of Balanoglossus.

Chordata:

Origin of Chordates, general organisation, Ascidian and classification of Urochordata, Sessile and Pelagic turnicates, Mucous and mode of feeding, affinities, Retrogressive metamorphosis.

General organisation of Cephalochordata; Branchiostoma.


Systematic position and significance of coelocanthini, Dipnoi, the conquest of land, origin and evolution of Amphibia and classification; Anatomical peculiarities and affinities of Urodele and parental care in Amphibia.

Reptiles:

Origin of reptiles general organisation of Chelonia, squamata, Rhynchocephalia and Crocodilia. Fossil Reptiles, poisonous and non-poisonous snakes of India.

Birds:

Origin and evolution of birds, migration of birds, adaption for flight, economic importance of birds.

Mammals:

Prototheria, Metatheria and Eutheria, phylogenetic relations of prototheria & Methatheria, adaptive radiations in marsupials, Aquatic and aerial adaptations in mammals, Oestrous cycle and Placentation in mammals, distinctive features of Primates.

Comparative account of various systems of vertebrates.

Ethology:

Introduction and History of ethology, Ethology Vs behaviourism; Instinct Vs learning, Communication by means of Pheromon Domec language of honey bees Forging and predation; Defensive secretions in insects. Social behaviour in insects.

Biostatistics:

Methods of sampling, frequency distribution and Measures of central tendency; Standard deviation, Standard error; correlation and regression and T-test, F-test, X 2 test.

(Cell Biology, Physiology, Genetics, Embryology, Histology, Evolution, Ecology and Zoogeography)

Cell Biology:

Prokaryotic and Eukaryotic cells, cell membrane, Endoplasmic reticulum, Golgi Complex, Lysosomes, Mitochondrion, Microsome, Peroxisomes, Nucleus, Nucleolus, Centrioles, Cilia, Flagella, Microtubules, Chemical components and molecular models of cell membrane. Passive active and ionic transport. Transport protiens, carrier and fixed pore mechanism cell coat and cell recognition. Cell surface receptors and mechanism of signal transduction (Steroid, Cyclic AMP and Ca^{2+}). Ultra structure of a muscle and nerve fibre, ultra structure and chemical composition of a chromosome, hetero and euchromatin, polytene and lambrush chromosomes, chromosomal aberration and variation cell cycle and chemical events of cell cycle, cell division mitosis & meiosis, cancerous cells and lymphocytes.

Physiology:


Genetics:

Principles of mendelian inheritance (mono, di and tri hybrid ratios) phenomenon of linkage and chromosome mapping, sex linkage, crossing over, sex determination and genetic balance, extra chromosomal inheritance, concept of multiple alleles, blood groups and RH factors; Inborn errors metabolism, one gene one polypeptide hypothesis, structure and chemistry of DNA and RNA, point mutation, genetic code and protein synthesis. Eugenics; Gene cloning, genetic engineering, gene transfer and immunogenetics.

Embryology:

Gametogenesis; Fertilization, Cleavage, Gastrulation, extra embryonic membranes, placenta, organogenesis of central nervous system, heart, kidney, Regeneration, Carcinogenic development.

Histology:

Histology of Blood, lymphoid tissues, cartilage, bone, skin, stomach, intestine, liver, pancreas, lung, kidney, testis and ovary of chordates.

Evolution:


Ecology:

Introduction of ecology, the scope of ecology, factors of the environment in relation to the organism, heat, light, mechanical factors oxygen and carbon dioxide, inorganic salts and biotic factors, the concept of an ecosystem fresh water, marine and terrestrial ecosystem, energy flow in eco-system, energy fixation by autotrophs, Food chains and Food Web, Biogeochemical cycles, Water cycle, carbon cycle, general features of community, Nitrogen cycle, population attributes, definition and size communities, ecological succession, pollution, ecology in relation to man.

Zoogeography:

General principles of animal distribution, Barriers, continuous and discontinuous, continental drift, zoogeographic realms, Insular, fauna, wildlife protection, mimicry and colouration.

25. CIVIL ENGINEERING

Note: Candidates shall have the option to answer questions from any two parts.


a) Strength of materials: Simple stresses and strains, principal stresses and strains, shear force and binding moment of beams, Derivation of M/I = f y=E/R, Deflection of beams, Direct and bending stresses, torsion of circular shafts, columns and struts.

b) Theory of structures: Castigliano's I and II theorems, slope deflection, moment distribution and Kani's methods of analysis applied for indeterminate beams and rigid frames.

Rolling loads: Propositions for the maximum bending moment at any given section and under any given load, Equivalent uniformly distributed load, influence line for uniformly distributed load shorter than span for maximum bending moment and shear force, Maximum bending moment for series of point loads travelling the girder, Influence lines for tresses.

Arches: Three hinged and two hinged parabolic arches influence lines for three hinged arches.

c) Steel structures: Design of simple, compound beams and laced and batened columns.

Design of column bases and footings, Design of highway and railway bridges through and deck type plate girders, warren girders and pratt truss.
d) Limit state method: Design of singly, doubly reinforced and T-beams, Design of lintel one way and two way slab, Design of long and short columns, design of rectangular and combined footings.
e) Pre-stressing concrete: Methods of pre-stressing, pre-tensioned and post-tensioned numbers, analysis and design of sections for flexures, losses in pre-stressing.

Section (B) Soil Mechanics and Foundation Engineering

a) Soil Mechanics: Definitions and relationships, particle size distribution, Atterburg limits, Permeability and permeability tests, Seepage pressure, quick sand condition, Laplace equation, Flow net, construction, properties, uses and applications.
b) One dimensional consolidation, co-efficient of compressibility consolidation settlement, pre-consolidation pressure, one dimensional consolidation equation, consolidation test, compaction, Field compaction method, proctor’s and modified compaction test, field compaction control, factors affecting compaction.
c) Shear strength, Mohr’s Coulomb failure theory, effective stress, Direct shear test, Triaxial compression test and vane shear test, Rankine’s theory of active and passive earth, pressures, Retaining walls, Horizontal and sloping back fill, Coulomb’s Wedge theory and Rohban’s construction.
d) Infinite and finite slopes, Swedish circle method, Friction circle method, Taylor’s Stability number, Bearing capacity, definitions, Terzaghi’s analysis for shallow footing, general and local shear failure, Terzaghi’s semi empirical equations for square and circular footings, effect of water table on bearing capacity.
e) Types of selection of footing, Raft, pile and floating foundations, settlement, computation for immediate and consolidation settlement, Boussarlugy equation for stress under point load and uniformly distributed load, pressure bulb, vertical pressure under uniformly distributed load on circular area, New mark influence chart.

Section (C) Fluid Mechanics:

Fluid properties, Fluid Statics – Forces on flat plate and curved surfaces.

Kinematics and Dynamics of Fluid flow, stream lines, equation of continuity, stream function and velocity potential function, flow nets, types of flows.

Euler’s equation of motion, Energy and Momentum equations and their applications to pipe flow, free and forced vertices, venturimeters, and Notches & Weirs.

Laminar flow through circular tubes, Reynold’s experiments, Flow through pipes, hydraulic gradient and total energy lines, pipes in series and parallel, syphon, Minor losses in pipes.

Open channel Flow, uniform and non-uniform flows, best hydraulic sections, specific energy and critical depth, Rapidly varied flow – hydraulic jump and its applications, Gradually varied flow – differential equations, classification of surface profiles.

Boundary layers – development of b.L. flow, laminar and turbulent boundary layers, laminar sub-layer, smooth and rough boundaries, drag and lift.

Dimensional analysis and similitude: Types of similarities, model studies, undistorted and distorted models, Buckingham II-theorem – applications.

Section (D): Computer Programming:

Type of computers – components of computer, historical development of computing systems. Different languages, Flow charts.

Fortran/Basic programming, constants & Variables, expressions, arithmetic statements, library functions.

Control statements, GO TO statements – Un conditional and computed, IF statements, DO statements.

Subroutines and Function sub-programmes – Arguments, CALL statement RETURN statement, Declaration statements.

Input and output statements, and Quoted Formats, FORMAT statements, Field specification, Stop and END statements.

Subscripted Variables, Arrays, DIMENSION statement, Simple applications of computer programming in civil engineering.

Note: A candidate shall answer questions from any two parts.
PART–A: Building Materials, Construction and Surveying:

Building materials: Timber, stones, bricks, sand, limes, cement, paints, varnishes and damp proofing material.

Brick work for walls, types of brick bonds, design of brick masonry walls as per IS code, detailing of walls, floors, roofs, ceilings, stair cases, doors and windows, finishing of buildings – plastering, pointing and painting – IS codes.

Use of Ferro cement, fiber – reinforced and polymer concrete in construction, building estimates and specifications.

Construction Scheduling, PERT and CPM methods.

General surveying – chain and compass survey, plane table survey – in combination with one another.

Levelling and contouring: Fly levelling, reciprocal levelling, net levels, Reduction of levels, curvature and refraction corrections, characteristics of contours – estimation of earth work.

Theodolite survey: Temporary and Permanent adjustments, Traverse survey, computation of areas by co-ordinate system, theory of simple circular curve by linear and instrumental methods.

Tachometry: Stadia wires, Fixed and mobile wires, Tachometric tables, tachometric alidade, Reduction by calculations.

PART–B: Water resources and Irrigation Engineering:

Hydrology: Hydrologic cycle, precipitation, evaporation, transpiration, infiltration. Run-off hydrograph, unit hydrograph, flood estimation frequency analysis.

Ground Water: Ground water resources, specific yield, storage coefficient of permeability, confined and unconfined aquifers, radial flow into a well under confined and unconfined conditions, recuperation tests.

Water Resources Planning: Single and multipurpose projects, storage capacity, zones of storage, reservoir losses, reservoir survey, flood routing through reservoirs, economics of water resources projects.


Storage Works: Types of Dams and their characteristics, Gravity dams principles of design, criteria for stability, control of seepage, Earth dams – Design principles, spillways – types and their suitability, energy dissipation, crest gates.

Canals: Alignment of canals types of canals, design of unlined canals Lacey’s regime theory, cross masonry works – canal falls, Cross Drainage works – Aqueducts and super passages.

Diversion Works: Components of Diversion scheme, Weirs on permeable foundations – Bligh’s and Khosia’s theories – Design principles.

PART–C: Environmental Engineering:

a) Water Supply: Protected Water Supply Scheme, Rate of demand, Population forecast, Analysis of water, Hydrogen-ion concentration, Sedimentation, Coagulation Chlorination, Methods of disinfection, Break point chlorination, Slow sand, Rapid sand and Pressure filters.

b) Hardness of Water: Removal of temporary and permanent hardness, Distribution systems of water, pipe appurtenances, Analysis of distribution system using Hardy cross method, general principle of optimal design based on cost and head loss ratio criterion, Maintenances of distribution systems, pumping station and their operation.

c) Sanitary Engineering: Methods of carrying refuses, systems of swarage, Sewers of different materials and shapes, self cleansing velocity, purification of natural streams, empirical formulae used in the design of sewers, deep man holes and their location, Automatic flushing tank, Different types of traps and classification.

d) Quality of Sewage: Primary treatment to sewage, carbon cycle, B.O.D., C.O.D., and dissolved oxygen, Grit chamber, Detritus tank, skimming tank, sludge digestion process, contact beds, septic tank, imhoff tank, Activated sludge process, sludge volume index.

e) Sources, effects and remedial measures of water, Air and Noise pollutions, particulate and Dust collection devices like internal separators, wet collection devices and electrostatic precipitators.

PART–D: Transportation Engineering:

a) Road development in India, Road planning, High way alignments, width of pavement, camber, types of gradient, Resistance to traction, sight distances, Super elevation and centrifugal ratio, circular, compound, vertical, reverse and transition curves.

b) Types of Road: Water Bound Macadam Road, Bituminous and cement concrete Roads, Flexible and rigid pavements, types of study for traffic, Road parking, Road accidents and traffic regulation, inter sections and rotary.
c) Permanent Ways: Rails, creep of rails, blast, sleepers, Fastenings and Fixtures, Gauges, Trunouts, Crossings, Types of crossings, Railway track, drainage, Maintenance of track components, Traffic signals.
d) Station yards and Machinery, station buildings, Platform sidings, turn tables, signal and inter locking, level crossing and necessary precautions.
e) Development of Air Port: Take off and landing distances, characteristics of jet air craft, selection of site for air port, Survey for selection of site, Wind rose diagram, Run way width, length and design criteria, standard for general aviation.

**26. ELECTRICAL ENGINEERING**

I. Electrical Circuits:


II. E.M. Theory:

Electro static and electro magnetic fields, vector methods, Fields in dielectric, conducting and magnetic materials, Laplace and Poisson’s equation. Time varying fields, Maxwell’s equation, Poynting Theory, properties of transmission lines.

III. Electrical measurement and Instruments:

Electrical standards, Error analysis, Measurement of current, voltage, power, energy, power factor, resistance, inductance capacitance frequency and loss angle. Indicating instruments, extension of range of instruments, DC and AC bridges. Electronic measuring instruments. Electronic multimeter, CRÖ, frequency counter, digital voltmeter, transducers, Thermocouples, Thermistor, LVDT, strain gauges, Piezo electric crystal, Measurement of non-electrical quantities like, pressure, velocity, temperature, flow rate, displacement acceleration and strain.

IV. Control Systems

Open and closed loop control systems, Mathematical modeling, block diagram, signal flow graphs, time response and frequency response of linear systems, error constants and series Rootlocus technique, Bodeplot, polar plot, M-circles, N-circles, Nichol’s charts, stability, Routh Hurwitz criteria. Nyquist stability criteria, compensators, design in frequency domain. Control system components. Servo motors, synchros, tacho generator, error detector. State variable approach, modeling, state transition matrix, transfer function, response.

V. Electronics:

Solid state devices and circuits. Small and large signal-amplifiers with and without feedback at audio and radio frequency, multistage amplifiers. Operational amplifiers and applications. Integrated circuits oscillators, RC, LC and crystal oscillators wave form generators, multi-vibrators – Digital circuits, Logic gates, Boolean algebra combinational and sequential circuits. A to D and D to A converters Micro processors (8085) instruction set, memories, interfacing programmable peripheral devices – Number system flow charts – expressions and statements in C – language – simple programs for engineering application.

I. D.C. ELECTRICAL MACHINES:

Fundamentals of electro mechanical energy conversion, constructional features of D.C. Machines, emf equation types and characteristics of generators application, Torque in DC motor, types of DC motors, applications. Testing of D.C. motors, efficiency, and starting and speed control.

II. TRANSFORMERS:

III. INDUCTION MOTORS:

Production of rotating magnetic field, production of torque types of motors equivalent circuits, Circle diagram, torque slip characteristics, starting and maximum torque, speed control, principle of single phase induction motors, Applications.

IV. SYNCHRONOUS MACHINES:

Generation of emf in 3 phase AC Generator, Armature reaction, regulation by Synchronous impedance and Ampere turn methods, parallel operation, transient and sub-transient reactances, theory of salient pole machines.

Synchronous Motor: Torque production, performance characteristics, methods of starting, V-Curves, synchronous condenser.

Special Machines: Stepper motor, Methods of operation, Amplidyne and metadyne-applications.

V. ELECTRICAL POWER GENERATION:

General layout – Types of power stations, economics of different types, base load and peak load stations, load factor and its effects, pumped storage schemes.

VI. POWER TRANSMISSION:

Calculation of line parameters, concepts of short, medium and long transmission lines, ABCD parameters, insulators, Corona, P.U. quantities, fault calculations, symmetrical components load flow analysis using Gauss Seidal, New-ton Raphson, methods, economic operation, stability, steady state and transient stability, equal area criterion, ALFC and AVR control for real time operation of interconnected systems.

VII. POWER SYSTEM PROTECTION:


VIII. UTILISATION:


27. ELECTRONICS & TELECOMMUNICATIONS

A) Computer Programming: Number systems, Binary, Octal, Hexadecimal, Decimal and their conversions, fixed and floating point representation of numbers; concept of flow charts and Algorithms, Control and Decision Statements, Loops, Subroutines.


Network Functions, Driving point and Transfer functions, properties, Time domain response from pole zero plot. Complex frequency(s) plane. Characteristic impedance, image impedance, image transfer constant, insertions loss.

D) Semi Conductor Devices:
- PN Junction, NPN and PNP transistors, small signal model determination of h-parameters, Analysis using h-parameters, CE, CB and CC configurations, Transistor biasing circuits, Transistor as a switch.
- Field effect Transistor, JFET, MOSFET, Cathod. Ray Oscilloscope and applications. Transistor as amplifier, Gain Bandwidth, Three amplifier configurations, Multi stage amplifiers. Operational amplifiers, principles, characteristics, Comparator, Integrator, Differentiator, Summing, Adder, Subtractor, log amplifier.

A) Electromagnetic theory:

B) Pulse and Digital Circuits:
- Wave shaping, RC RL circuits, Non-linear diode wave shaping circuits, diode clamping. Multivibrator circuits, Astable, Monostable Schmitt Trigger Circuits, Blocking Oscillator.
- Sweep Generator, Bootstrap and Miller Voltage Sweep Circuits, Linear current sweeps.
- Logic Circuits: AND, OR, NOT, NAND and NOR gate circuits, DTL, TTL, MOS, CMOS, NAND, NOR circuits, realization of various flip flops. Square wave generator, pulse generator.

C) Communication Systems:
- Pulse Modulation, Sampling, TDM, PPM, PCM, Characteristics of ASK, FSK, PSK, Signals. AM and FM Transmitters and Receiver circuits, communication receivers, SSB transmitters and receivers, super heterodyne receivers, IF, AGC, tracking and alignment, receiver measurements.

D) Control Systems:
- Open loop and closed loop systems, signal flow graphs, Transfer functions and impulse response.
- Routh Hurwitz criterion for stability, Root locus, techniques, effect of location of roots in system response.

E) Transmission Lines & Antennas:
- Reflection of E.M. Waves, standing waves, transmission line equations, Input impedance, reflection coefficient, VSWR, properties of λ/4, λ/2 lines, short-circuited stubs, impedance matching.
- Principle of radiation, Vector potential, Linear Arrays, Broad Side and End fire Array, multiplication of Antenna patters.
- Antenna characteristics – Gain, radiation pattern, side lobe level directivity.

F) Microwaves:
28. MECHANICAL ENGINEERING

Theory of Machines

Constrained motion, plane mechanisms, velocity and acceleration analyses, instantaneous centre, flywheels and their applications, balancing of reciprocating and rotating masses, planar cams and followers, tooth profiles, types of gears, fixed axis and planetary gear, drives principles of gyroscope vibration of free and forced one degree of freedom systems with and without damping, transmissibility and vibration isolation, critical speed of shaft.

Mechanics of solids

Stress and strain in two dimensions, Mohr’s circle, theories of failure. Bending moment and shear force diagrams. Deflection of simple beams, Buckling of columns, torsion in shafts, thin and thick cylinders, shrink fit and thermal stresses.

Machine design

Material and manufacturing considerations in design, design for static and dynamic loading, fatigue strength, stress concentration, factor of safety, design of bolted riveted and welded joints, power screws, helical springs, hydrodynamic lubrication and journal bearing, rolling element bearings, design of spur gears, design of shifts, keys and couplings, clutches and brakes, belt and rope drives.

Manufacturing process


Metallurgy and Material Science


Production management

Production planning and control. Forecasting assembly line balancing Product, development. Production control charts. Break-even-analysis, PERT and CPM. Control operations: Inventory control – ABC analysis, EOQ model. MRP-II, JIT work study, value engineering. Linear programming, graphical and simplex methods and queuing (Single server, Poisson Queue) theory. Maintenance engineering. Quality assurance control charts for variables and attributes.

Thermodynamics


Tds relations, Properties of pure substances.

I.C. Engines. Fuels and Combustion


Heat Transfer, Refrigeration and Air Conditioning.

Modes of heat transfer, One dimensional steady and unsteady conduction, Heat transfer with fins, Convective heat transfer, Forced Convection over flat plate and through tubes, Free Convection over vertical flat plate and cylinders, Radiative heat transfer – Black and Gray surfaces, Shape factors. Heat Exchanger performance – LMTD and NTU method.


Fluid mechanics and turbomachinery


Energy Systems

POST CODE NO. 4 : ASST. DIRECTOR OF MARKETING.

SCHEME

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<tr>
<th>Part-A: Written (Objective type) Examination</th>
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<tr>
<td>Paper-1</td>
<td>General Studies</td>
<td>150 Marks</td>
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<tr>
<td>Paper-2</td>
<td>Subject (Economics OR Maths OR Statistics OR Commerce OR Agriculture OR Botany OR Chemistry OR Geology OR Physics OR Zoology)</td>
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Part-B: Oral Test (Interview) 50 Marks

SYLLABUS

PAPER-1 GENERAL STUDIES

1. SCIENCE AND TECHNOLOGY:
   c) General Science and Technology
d) Role and impact of science and Technology on India’s development.
   (Questions will cover general appreciation and understanding of matters of everyday observation and experience as may be expected of a well-educated person who has not made a special study of science and technology disciplines).

2. INDIAN HISTORY AND CULTURE:
e) Modern Indian History from 19th century to the present
f) Nationalist Movement and Constitutional development
g) Indian culture and Heritage including architecture, Fine Arts, dance forms, music, paintings, Folk arts and performing arts.
h) History of Andhradesa Society, Culture, Geography and Economic development.

3. INDIAN POLITY:
   General and broad understanding of the structural (institutions) and functional (processes) aspects of Indian Political system.

4. INDIAN ECONOMY AND GEOGRAPHY OF INDIA:
   (a) Structure of National economy
   (b) Economic development (including planning) since independence
   (c) Economic Reforms
   (d) Physical, economic and social Geography of India.

5. CURRENT EVENTS:
   Current Events of Regional, National and International importance.

6. GENERAL MENTAL ABILITY: (Reasoning and analytical abilities)

PAPER-2 SUBJECT

ACCOUNTING AND FINANCE

1. COMMERCE

Part-1: Accounting, Auditing and Taxation:

Accounting as a Financial and Management information system-Impact of behavioral sciences – Accounting Standards and conventions.

Methods of accounting of changing price levels with particular reference to current purchasing power (CPP) accounting Advanced problems of company accounting – Amalgamation absorption and reconstruction of companies-Accounting of holding Companies valuation of shares and goodwill-Human Resources Accounting.

Nature and functions of Cost Accounting-Classification of costs-techniques of segregating semi-variable costs into fixed and variable components-job costing-FIFO and weighted average methods of calculating equivalent units of production-Marginal costing Cost-Volume profit relationship their Algebraic formulae and graphical representation shut down points Reconciliation of cost and financial accounts-Techniques of cost control and cost reduction-Budgetary control-Flexible Budgets
standard costing and variance analysis – Responsibility accounting-Bases of charging over-heads and their inherent fallacy-costing for pricing decisions.


Auditing – Definition – Significance – Different types of Audit Programming the audit work – Vouching – Valuation and verification of all types of assets and liabilities – Audit of limited companies – Appointment, Status, Rights, Duties and Liabilities of an Auditor – Auditors report Investigation.

Part-II: Business Finance and Financial Institutions:


Indian money market – Constituents and their deficiencies – Reserve Bank of India – Functions – An assessment of its monetary and credit policies – Commercial Banks – Role and their functioning – Narasimham Committee Recommendations – Indian Capital Market – Constituents functions and working of All India term financial institutions such as IDBI, IFCI, ICICI, UTI – Stock Exchanges – Functions and their regulation by agencies like SBBI.

OGNAISATION THEORY AND INDUSTRIAL RELATIONS:

Part-I: Organisation Theory:


Conflicts and its management in organisation – Management of change – Resistance to change and Methods to overcome – Organisational change, adaptation, growth and development – Organisational control and effectiveness – Organisational culture and its significance

Part-II: Industrial Relations:


2. ECONOMICS


2. Economic Choice: Consumer behaviour, producer behaviour, market forms and distribution


4. Banking: Supply of money and near money; Central Banking – Objectives, instruments of credit policy in a developing economy.


   Magnitude and incidence of poverty (rural & urban)

2. Agriculture: Agricultural policy; Land Reforms – Technological change – Relationship with the industrial sector.


5. Budgetary trends and Fiscal policy.

6. Monetary and credit trends and policies – Banking and non-banking financial institutions.

7. Foreign trade and Balance of payments (Before and after economic reforms)

8. Indian Planning: Objectives, strategy, experience and problems.


3. AGRICULTURE

Importance of agriculture in national economy, Agriculture development in India, Agro-climatic Zones of India and A.P. Major constraints in limiting to crop production, Ecology and relevance to Man-Management of national resources; Environmental variables and agro-ecosystem; Weather aberrations and their effect on crops, Environmental pollution – air water and soil – its effect on crops, animals and humans.

Cropping patterns in different agro-climatic zones of A.P. – concepts of multiple cropping, multistory, relay and intercropping – Farming systems – Planning of components and productivity. Sustainable agriculture and organic farming – relevance in modern agriculture – Principles and potentials to attain sustainability, Package of practices for production of important cereals, pulses, oilseeds, fibres, sugar and commercial crops grown in A.P.

Weeds-their characteristics, and dissemination, Crop-weed association and allelopathy, weed management in different crops.

Crop water requirements – methods of assessment – water use efficiency- water management practices in important field and horticultural crops of A.P. Drainage - water logging, methods of field drainage.

Importance of social, farm and agro forestry. Choice of tree species, Principles of general silviculture.


Farm management – importance, economic principles, farm planning and budgeting, farm business analysis and farm efficiency measures, Agricultural marketing institutions – commercial agricultural and agri-business management. International trade – nature and scope – GATT/WTO.

Concept, meaning, principles, scope and importance of Agriculture extension, Models of organizing Agriculture extension. Rural development and poverty alleviation programmes. Training to Extension workers, farmers, farm women and youth, Agricultural extension management.

**PAPER - II**

Physical and chemical basis of heredity, chromosomal structure, genes/operan concept; Mendelion laws of inheritance, cytoplasmic inheritance, Linkage and crossing over, Genetic mechanisms of sex determination, Inheritance of Quantitative characters, Mutations – spontaneous and induced.

Biodiversity and centres of origin of cultivated crops, Assessment of variability – additive, dominance and epistasis.

Application of the Principles of plant breeding to the improvement of major field crops, methods of breeding self and cross-pollinated crops. Introduction, Selection, Hybridization, Heterosis and its exploitation. Male stability and self incompatibility, utilization of mutation and polyploidy in breeding, Breeding for biotic and abiotic stresses.

Seed technology and importance – seed quality concepts, Hybrid seed production in important crops, Seed certification standards, intellectual property rights, patency and plant breeders rights.

Importance of plant physiology in Agriculture, Physiological basis of crop yield; Structure and function of cell organells; Photosynthesis, respiration and transpiration; structure and functions of proteins, nuclic acids, crop water relations, Role of macro and micro nutrients and their deficiency symptoms.

Plant biotechnology – Achievements and potentialities. Genetic engineering and production of transgenic plants.

Growth and development, photo periodism and vernalization, Hormones, plant growth regulators and their role in agriculture.

Role of fruits and vegetables in human nutrition and national economy; Climatic requirements and cultivation practices for major fruits, vegetables and plantation crops; Green house production of flowers and vegetable crops; Handling and marketing problems of fruits and vegetables; Principal methods of preservation of fruits and vegetables; Important fruit and vegetable products. Ornamental and landscape gardening – types of ornamental gardens, Design and layout of lawns and gardens.

Pests and diseases of field, vegetable, orchard and plantation crops and their management; Causes and classification of plant diseases. Principles of plant disease management – avoidance, exclusion, eradication, immunization and protection; Biological control of pests and diseases. Integrated management of pests and diseases; Pesticides – classification and their formulations; Recent methods of pest/disease control. Stored grain pests and their preventive and curative measures.
4. **BOTANY**

Microbiology, Pathology, Algae, Fungi, Bryophytes, Pteridophytes, Gymnosperms, Taxonomy of Angiosperomes, Anatomy, Morphogenesis, Embryology & Palynology.

**MICROBIOLOGY:**
Viruses, Bacteria, Plasmids, General account of infection and immunology, structure, classification, reproduction and physiology. Importance of microbes in agriculture, industry and medicine. Biological control of pollution using micro-organisms.

**PATHOLOGY:**
Plant diseases caused by viruses, bacteria, mycoplasma, actinomycetes, fungi and nematodes. Modes of infection, dissemination, Physiology of parasitism and methods of control. Different fungal toxins. Mechanism of action of Biocides.

**ALGAE:**

**FUNGI:**
General characters of fungi and their classification. Structure, reproduction, life cycles, phylogeny and inter-relationships and affinities of the main groups of fungi viz., Myxomycetes, Oomycetes, Zygomycetes, Ascomycetes, Basidiomycetes, Deuteromycetes, Economic importance of fungi, Symbiotic fungi, the lichens, Mycorrhizae.

**BRYOPHYTES:**

**PTERIDOPHYTES:**

**GYMNOSPERMS:**
Classification and distribution of living gymnosperms, origin and evolutionary tendencies in gymnosperms vis-à-vis pteridophytes and angiosperms – General account of fossil gymnosperms; pteridospermales (Cycadofilicales), Corditales, Bennettitales and their affinities and inter relationship. Taxonomic and economic importance of gymnosperms.

**TAXONOMY OF ANGIOSPERMS:**
A comparative study of the systems of classification; Bentham and Hooker, Engler and Prantl and Hutchinson. Modern trends in biosystematics with reference to phytochemical, cytological, palynological, embryological and anatomical criteria. Taxonomic and economic importance of Magnoliaceae, Ranunculaceae Cruciferae, Malvaceae, Rosaceae, Leguminosae, Umbelliferae, Asclepiadaceae, Verbenaceae, Euphorbiaceae, Liliaceae, Orchidaceae, Palmae and Poaceae.

**ANATOMY:**

**MORPHOGENESIS:**
Polarity, symmetry and totipotency – Differentiation and dedifferentiation of cells and organs. Factors of morphogenesis. Methodology and applications of cell, tissue, organ and protoplast cultures from vegetative and reproductive parts; Somatic hybrids.

**EMBRYOLOGY AND PALYNOLOGY:**

CELL BIOLOGY:

GENETICS & EVOLUTION:
Pre and post Mendelian concept of genetics, development of gene concept Nucleic acids their structure and role in reproduction and protein synthesis, genetic code and gene regulation. Mechanism of microbial recombination, Mutation, Its roles in evolution; Multiple factor inheritance, linkage and crossing-over, methods of gene mapping, Sex chromosomes and sex linked inheritance, cytological inheritance, Genetic engineering, Organic evolution, evidence, mechanism and theories.

PHYSIOLOGY:

ECOLOGY:

ECONOMIC BOTANY:
Origin of cultivated plants. Study of plants as sources of food, fodder and forage, wood and timber, fibre, paper, rubber, beverages, drugs, narcotics, resins and gums essential oils, dyes, medicines, insecticides and pesticides. Energy plantation.

ETHNOBOTANY:
Its scope. Medicocoethnobotany and ethnoagriculture. Conservation and propagation of medicinal plants used by various tribal communities of A.P.

5. CHEMISTRY

1. Atomic structure and chemical bonding:
   Quantum theory, Heisenberg’s uncertainty principle, Schrödinger’s wave equation (time independent), particle in a one dimensional box, quantum numbers, hydrogen atoms wave functions, shapes of orbitals. Valence bond and molecular orbital theories. Resonance and resonance energy Sigma and Pi bonds (non-mathematical approach).

2. Thermodynamics:

3. Solid State:

4. Chemical Kinetics:
5. **Photochemistry:**

6. **Ionic equilibria:**

7. **Electromotive force:**
   Reversible and irreversible cells. e.m.f. and its measurement. Types of cells. Single electrode potentials and their applications. Theory and applications of over voltages. Dropping Mercury Electrode (DME).

8. **Reactions in non-aqueous media:**
   Liquid ammonia and liquid sulphur dioxide. Pearson’s theory of hard and soft acids and bases.

9. **d-Block elements:**

   **Lanthanides and actinides:**
   Methods of separation of lanthanides. Oxidation states and magnetic properties. Synthesis of actinides and actinide contraction.

10. **Co-ordination chemistry:**

11. **Organometallic compounds:**
    Nature of the metal-carbon bond. Organometallic compounds of aluminium, Zinc and mercury. Olefinic complexes of palladium (II) and platinum (II). Their preparation, properties and bonding.

12. **Molecular spectroscopy:**
    Type of spectra and their origin. Measurement of spectra.
    a) Vibrational spectroscopy:
       ii) Raman spectra: Origin and measurement. Differences between IR and Raman spectra.
    b) Electronic spectroscopy:
       UV and visible spectra. Types of electronic transitions in molecules. Absorptions due to multiple bonds and the effect of conjugation on them. Applications of UV-visible spectroscopy in the study of organic molecules. Charge transfer spectra.

**PAPER-II**

1. **Structure, reactivity and nomenclature of organic molecules:**
   Covalent character of organic compounds. Single and multiple bonds. Types of organic reactions and reagents with examples. Homolytic and heterolytic cleavage of bonds.
   Inductive, electromeric, conjugative and hyperconjugative effects on the physical and chemical properties of organic compounds with suitable examples Dipole moments.
   IUPAC and Chemical Abstract systems of nomenclature of organic compounds.
2. Stereo Chemistry:


3. Reaction mechanisms:


4. Pericyclic reaction:

Classification and examples. An elementary study of woodward-Hofmann Rules.

5. Carbohydrates:


6. Amino acids, polypeptides and proteins:


7. Aromatic and heterocyclic compounds:


8. Chemistry of the following name reactions:

Aldol condensation, dieckmann reaction, Claisen condensation, perkin reaction, Beckman rearrangement and Cannizaro reaction, reimer – Tiemann reaction.

9. Reagents in organic synthesis:

Use of the following reagents in organic synthesis: Ozone, periodic acid, NBS, diborane, Sodium in liquid ammonia, NaBH4 and LiAlH4.

10. Chemistry of Natural products:

Isolation and structural features of the following natural products: Citral, nicotine, papavarine and Vitamin-C.

11. NMR Spectroscopy:

Introduction to proton ,magnetic Resonance spectroscopy – Principles. Chemical shifts, shielding and desheilding effects, Splitting of signals, Coupling constants.

Application of PMR to the study of simple organic molecules.

12. Polymer chemistry:

6. GEOLOGY

(General Geology, Geo-morphology, Structural Geology, Stratigraphy and Palaeontology)

i) General Geology:


ii) Geomorphology:

Land forms, their types and development. Weathering, Transport and Erosion. Geomorphic processes, such as Fluvial, Fluviomarine, Marine, Glacias and Eolean. Topography and its relation to structures and lithology.

iii) Structural Geology:


iv) Stratigraphy:


v) Palaeontology:


PAPER-II

(Crystallography, Minerology, Petrology and Economic Geology)

i) Crystallography:

Crystalline and non-crystalline substances. Concept of symmetry, point group, lattice and space groups. 32 classes of crystal symmetry. Stereographic projections and their use. Twinning, crystal growth and irregularities.

ii) Mineralogy:


iii) Petrology:

Simple phase diagrams of single, binary, ternary and quarternory silicate systems, with reference to petrogenesis. Magnas, their generation in the crust and mantle their emplacement and their relation to paleo-tectonics. Magnatic crystallization, differenciation and assimilation. Bowen's Reaction principle classification of igneous rocks.


Role of T P and fluids in metamorphism. Metamorphic facies. Relationship among metamorphism, anatexis and granitization. Types of metamorphism.
Petrogenic aspects of important rocks of India, such as Deccan Traps, the layered intrusions, charnoekites khondalites and gondites.

iv) **Economic Geology**:


Geological investigation for the construction of dams, Bridges, Highways and Tunnels.

Ground water exploration and management, water pollution.

Geological interpretation of air photos and imagery.

**7. MATHEMATICS**

*The candidate has to answer 10 questions choosing atleast 2 questions from each Sections I – IV. Five questions will be from each section. Each question carries 15 marks.*

**Section-I – Algebra:**

- Groups – subgroups – normal subgroups – quotient groups – homomorphism and isomorphism theorems – cyclic groups – permutation groups – Cayley’s theorem.

**Section-II – Linear Algebra:**

- Linear transformations – Rank and nullity of a linear transformation – Cayley – Hamilton theorem – Matrix of a linear transformation – eigen values and eigen vectors – Canonical forms.
- Inner product spaces – Orthonormal basis – Quadratic forms.

**Section-III – Differential equations:**


**Section-IV – Geometry:**

- General equation of second degree in two variables – Tracing of conics.
- Plane, straight lines in space – sphere – Cone.

*The candidate has to answer 10 questions choosing atleast TWO questions from each of the Sections 1 to IV. FOUR questions will be given from each of the Sections I,II and III and EIGHT questions will be given from Section IV with two questions from the four topics given in that section.*

**Section-I – Real Analysis:**

- Limits and continuity of a real valued function properties of continuous functions – Differentiation – Mean value theorems – Applications.
- Riemann integration – conditions for Reimann integrability – improper integrals.
Section-II – Complex Analysis:

Complex numbers and their geometric representation – limits and continuity of functions of a Complex variable – Analytic functions – Cauchy Riemann equations – Complex integration – Cauchy’s theorem – Cauchy’s integral formula – Power series – Taylor’s and Laurent’s series – Types of singularities – Calculus of residues and application to evaluation of definite integrals.

Section-III – Vector calculus:

Differentiation of a vector valued function – Gradient of a scalar function – Divergence and curl of a vector function in Cartesian and polar coordinates.

Green’s theorem – Gauss and Stoke’s theorems and their applications to evaluation of double and triple integrals.

Section-IV:


8. PHYSICS

(Mechanics and relativity, Waves and Oscillations, Thermal Physics, Optics)

1. Mechanics and Relativity:


Galelean relativity, special theory of relativity – Time duration and length contraction Michelson – Morley experiment, Lorentz transformations, addition of velocities, variation of mass with velocity – mass energy equivalence.

2. Waves and Oscillations:

Oscillations, Simple harmonic motion, progressive and stationary waves. Damped harmonic Oscillator, Forced oscillations and resonance. Wave equation, harmonic solutions. Plane and spherical waves, superposition of waves and beats, phase velocity, group velocity, Doppler effect.

3. Thermal Physics:


4. Optics:

Huygens principle interference, young’s experiment interference in thin films, Newton’s rings. Michelson’s interferometer. Diffraction – Fresnel and Fraunhoffer diffraction. Diffraction by straight edge, circular and rectangular apperture, single and double slits, plane grating, Dispersive power

(Electricity & Magnetism, Modern Physics and Electronics)

1. Electricity and Magnetism:
   
   Coulomb’s Law, Electric field, Gauss’s Law, electric potential. Poissons and Laplace equations and solutions for homogeneous dielectric, uncharged conducting sphere in a uniform field, point charge and infinite conducting plane. Magnetic shell, magnetic induction and field strength Biot savarts law and applications. Electromagnetic induction, Faradays and Lenz’s laws. Self and mutual inductance, induction coil and transformer.
   
   
   Magnetic materials – Dia, para, ferro, antiferro and ferri magnetism (Qualitative features only). Langevin’s theory of paramagnetism, Weiss theory of ferromagnetism. Ferro magnetic Domains Hysteresis, Nuclear magnetism. Dielectric materials – Capacitive with dielectric material as medium; electric polarisation; electronic, ionic, electric polarisabilities and their variations with temperature.

2. Modern Physics:
   
   
   

3. Electronics:
   

9. STATISTICS

Attempt any 5 questions choosing at most 2 from each Section. Four questions of equal weightage will be set in each section.

Section-A: Probability and Distributions

Sample space and events, Probability space, Statistical independence, Random variable, Discrete and continuous random variables. Probability density and distribution functions, marginal and conditional distribution, functions of random variables, expectation and moments, conditional expectation, correlation co-efficient, convergence in probability, almost sure, Markov, Chebychev and Kolmoorov inequalities, Borel Centelli lemma, weak and strong Laws of large numbers, probability generating and characteristic functions; Uniqueness and continuity theorems. Lindeberg Levy Central limit theorem. Standard discrete and continuous probability distributions, their interrelations including limiting cases. Exact Sampling distributions – t, F and Chi-square, Distributions of order statistics.
Section-B: Statistical Inference


Simple and composite hypotheses, statistical tests, critical region, two kinds of error, power function unbiased tests, most powerful and uniformly most powerful tests, Neyman-pearson, Lemma, Optimal tests for simple hypotheses concerning one parameter, monotone likelihood ratio property and its use in constructing UMP test, likelihood ratio criterion and its asymptotic distribution, chi-square and Kolmogorov tests for goodness of fit. Run test for randomness, Sign test for Location, Wilcoxon-Mann-Whitney test and Kolmogor – Smirnoff test for the two sample problem and tests of independence based on spearman's next correction Distribution-free confidence intervals for quantiles and confidence bands for distribution functions.

Notions of a sequential test, Wald's SPRT, its CC and ASN functions, with applications to standard distributions.

Section-C: Multivariate Analysis


Attempt any 5 questions choosing at least one question from each section. Three questions of equal weight will be set in each section.

Section-A – Sampling Theory

Nature and scope of sampling, simple random sampling, sampling from finite population with a without replacement, estimation of the standard errors, sampling with equal probabilities, PPS sampling, Stratified random sampling, systematic sampling, two-stage and multistage sampling, multiphase and cluster sampling schemes.

Estimation of population total and mean, use of biased and unbiased estimates, Standard errors of estimates, cost and variance functions, ratio and regression estimates and their relative efficiency, planning and organization of sample survey with special reference to recent large scale surveys conducted in India.

Section-B – Design of Experiments

Analysis of variance of one way, two-way and three-way classified data with and without interactions. Principles of experimental designs, CRD, RBD, LSD, Missing-plot technique, Factorial experiments, 2^n and 3^n designs. General theory of total and partial confounding and fractional replication. Analysis of split-plot, BIBD and PBIBD.

Section-C – Industrial Statistics

Concept and importance of quality control, different types of control charts, X,R,P & C charts; cumulative-sum control charts.

Sampling inspection Vs 100 per cent inspection. Concepts of producer’s risk and consumer’s risk. Single, double, multiple and sequential sampling plans for attributes; OC, ASN curves, Rectifying sampling plans, AOQ and ATI curves; sampling plans for variables.

Definition of Reliability, Life distribution, failure rate and bath-tub failure curve; exponential and Weibull models. Reliability of series, Parallel and K out of n systems.
Section-D – Operations Research

Homogenous discrete-time Markov chains, transition probability matrix, classification of states; stationary distribution, Birth and death process. Elements of quitting theory, M/M/1 and M/M/K queues; G/M/1 and M/G/1 - queues.

The structure and formulation of linear programming problem. The simplex method, two phase simplex method and charnes’s method with Artificial variables. Transportation and Assignment problems.

Introduction to computers and elements of Fortran IV Programming, Formats for input and output statements, specification and logical statements and sub-routines. Application to some simple statistical problems.

10. ZOOLOGY

(Non-Chordata, Chordata, ethology & Biostatistics)

Protozoa:
General Organisation and Classification; Locomotory organelles; Pathogenic protozoa of human importance (i.e.)

Trypanosoma, Leishmania, Enatamoeba, Histolytica, Giardia, Malarial Parasites.

Porifera:
Various types of canal system, Histological structure and their functions; Reproduction and development of sponges, systematic position and affinities of sponges; development of spicules.

Coelenterata:
General Organisation and Classification; Aurclia; Coral reef formation in Actinozoa, general organisation and phylogenetic relationship of ctenophore, polymorphism in Hydrozoa.

Platyhelminthes:
General Organisation and Classification; Planaria; Fasciola; Taenia, general outline of the life cycle of parasites of human importance, Host-parasitic interactions.

Nematelmanthis:
Parasitic Nematodes of human importance i.e., Ascaris, Oxyunis Annyclyostoma, Strongyboides plant parasitic nematodes with specific examples.

Annelia:
General Organisation and Classification; Neriais; Leech; types of Nephridia, Coelome and Coelomoducts; Regeneration in Polychaetes, affinities, Trochophore larva.

Arthropoda:
Outline classification (up to orders) palaemon; scorpion; Insect mouth parts, respiration, metamorphosis, social use in insects, harmful and useful insects and economic importance, vectors-flies, lice, bugs, ticks and mosquitoes; Structure and systematic position of onychophora.

Mollusca:
Classification, Unio; pilla; torsion and detorsion, Distinctive features of Cephalopoda; pearl formation in Mollusea.

Chinoderamata:
Classification; star fish; water vascular system, larval forms and their revolutionary significance.
Hermichodata:

General organisation; systematic position and affinities of Balanoglossus.

Chordata:

Origin of Chordates, general organisation, Ascidian and classification of Urochordata, Sessile and Pelagic turnicates, Mucous and mode of feeding, affinities, Retrogressive metamorphosis.

General organisation of Cephalochordata; Branchiostoma.


Systematic position and significance of coelocanthini, Dipnoi, the conquest of land, origin and evolution of Amphibia and classification; Anatomical peculiarities and affinities of Urodele and parental care in Amphibia.

Reptiles:

Origin of reptiles general organisation of Chelonia, squamata, Rhynchocephalia and Crocodilia. Fossil Reptiles, poisonous and non-poisonous snakes of India.

Birds:

Origin and evolution of birds, migration of birds, adaption for flight, economic importance of birds.

Mammals:

Protototheria, Metatheria and Eutheria, phylogenetic relations of prototheria & Methatheria, adaptive radiations in marsupials, Aquatic and aerial adaptations in mammals, Oestrous cycle and Placentation in mammals, distinctive features of Primates.

Comparative account of various systems of vertebrates.

Ethology:

Introduction and History of ethology, Ethology Vs behaviourism; Instinct Vs learning, Communication by means of Pheromon Domec language of honey bees Forging and predation; Defensive secretions in insects. Social behaviour in insects.

Biostatistics:

Methods of sampling, frequency distribution and Measures of central tendency; Standard deviation, Standard error; correlation and regression and T-test, F-test, X 2 test.

<Cell Biology, Physiology, Genetics, Embryology, Histology, Evolution, Ecology and Zoogeography>

Cell Biology:

Prokaryotic and Eukaryotic cells, cell membrane, Endoplasmic reticulum, Golgi Complex, Lysosomes, Mitochondrion, Microsome, Peroxisomes, Nucleus, Nucleolus, Centrioles, Cilia, Flagella, Microtubules, Chemical components and molecular models of cell membrane. Passive active and ionic transport. Transport protiens, carrier and fixed pore mechanism cell coat and cell recognition. Cell surface receptors and mechanism of signal transduction (Steroid, Cyclic AMP and Ca^{2+}). Ultra structure of a muscle and nerve fibre, ultra structure and chemical composition of a chromosome, hetero and euchromatin, polytene and lambrush chromosomes, chromosomal aberration and variation cell cycle and chemical events of cell cycle, cell division mitosis & meosis, cancerous cells and lymphocytes.

Physiology:


Genetics:

Principles of mendelian inheritance (mono, di and tri hybrid ratios) phenomenon of linkage and chromosome mapping, sex linkage, crossing over, sex determination and genic balance, extra chromosomal inheritance, concept of multiple alleles, blood groups and RH factors; Inborn errors metabolism, one gene one polypeptide hypothesis, structure and chemistry of DNA and RNA, point mutation, genetic code and protein synthesis. Eugenics; Gene cloning, genetic engineering, gene transfer and immunogenetics.

Embryology:

Gametogenesis; Fertilization, Cleavage, Gastrulation, extra embryonic membranes placenta, organogenesis of central nervous system, heart, kidney, Regeneration, Carcinogenic development.

Histology:

Histology of Blood, lymphoid tissues, cartilage, bone, skin, stomach, intestine, liver, pancreas, lung, kidney, testis and ovary of chordates.

Evolution:


Ecology:

Introduction of ecology, the scope of ecology, factors of the environment in relation to the organism, heat, light, mechanical factors oxygen and carbon dioxide, inorganic salts and biotic factors, the concept of an ecosystem fresh water, marine and terrestrial ecosystem, energy flow in eco-system, energy fixation by autotrophs, Food chains and Food Web, Biogeochemical cycles, Water cycle, carbon cycle, general features of community, Nitrogen cycle, population attributes, definition and size communities, ecological succession, pollution, ecology in relation to man.

Zoogeography:

General principles of animal distribution, Barriers, continuous and discontinuous, continental drift, zoogeographic realms, Insular, fauna, wildlife protection, mimicry and colouration.
POST CODE NO. 5 : ASST. DIRECTOR IN A.P. ECONOMICS & STATISTICS

SCHEME

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<th>Part-A: Written (Objective type) Examination</th>
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<td>Paper-1 General Studies</td>
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<tr>
<td>Paper-2 Subject (Economics OR Maths OR Statistics)</td>
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<tr>
<td>Part-B: Oral Test (Interview)</td>
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SYLLABUS

PAPER-1 GENERAL STUDIES

1. SCIENCE AND TECHNOLOGY:
   e) General Science and Technology
   f) Role and impact of science and Technology on India’s development.
      (Questions will cover general appreciation and understanding of matters of everyday observation and experience as may be expected of a well-educated person who has not made a special study of science and technology disciplines).

2. INDIAN HISTORY AND CULTURE:
   i) Modern Indian History from 19th century to the present
   j) Nationalist Movement and Constitutional development
   k) Indian culture and Heritage including architecture, Fine Arts, dance forms, music, paintings, Folk arts and performing arts.
   l) History of Andhradesa Society, Culture, Geography and Economic development.

3. INDIAN POLITY:
   General and broad understanding of the structural (institutions) and functional (processes) aspects of Indian Political system.

4. INDIAN ECONOMY AND GEOGRAPHY OF INDIA:
   a) Structure of National economy
   b) Economic development (including planning) since independence
   c) Economic Reforms
   d) Physical, economic and social Geography of India.

5. CURRENT EVENTS:
   Current Events of Regional, National and International importance.

6. GENERAL MENTAL ABILITY: (Reasoning and analytical abilities)

PAPER-2 SUBJECT

1. ECONOMICS


2. Economic Choice: Consumer behaviour, producer behaviour, market forms and distribution


4. Banking: Supply of money and near money; Central Banking – Objectives, instruments of credit policy in a developing economy.


2. Agriculture: Agricultural policy; Land Reforms – Technological change – Relationship with the industrial sector.


5. Budgetary trends and Fiscal policy.

6. Monetary and credit trends and policies – Banking and non-banking financial institutions.

7. Foreign trade and Balance of payments (Before and after economic reforms)

8. Indian Planning: Objectives, strategy, experience and problems.


2. MATHEMATICS

The candidate has to answer 10 questions choosing atleast 2 questions from each Sections I – IV. Five questions will be from each section. Each question carries 15 marks.

Section-I – Algebra:

Groups – subgroups – normal subgroups – quotient groups – homomorphism and isomorphism theorems – cyclic groups – permutation groups – Cayley’s theorem.


Section-II – Linear Algebra:


Linear transformations – Rank and nullity of a linear transformation – Cayley – Hamilton theorem – Matrix of a linear transformation – eigen values and eigen vectors – Canonical forms.

Inner product spaces – Orthonormal basis – Quadratic forms.

Section-III – Differential equations:


Formation of partial differential equations – Equations of first order – Charpit’s methods.

Section-IV – Geometry:

General equation of second degree in two variables – Tracing of conics.
Plane, straight lines in space – sphere – Cone.

The candidate has to answer 10 questions choosing atleast TWO questions from each of the Sections 1 to IV. FOUR questions will be given from each of the Sections I,II and III and EIGHT questions will be given from Section IV with two questions from the four topics given in that section.
Section-I – Real Analysis:

Real number system \( R \) – Open and closed sets in \( R \) - Compact sets – sequences in \( R \) and their convergence – Series of real numbers – Tests of convergence – absolute and conditional convergence – rearrangements of series.

Limits and continuity of a real valued function properties of continuous functions – Differentiation – Mean value theorems – Applications.

Riemann integration – conditions for Reimann integrability – improper integrals.

Section-II – Complex Analysis:

Complex numbers and their geometric representation – limits and continuity of functions of a Complex variable – Analytic functions – Couchy Riemann equations – Complex integration – Cauchy’s theorem – Cauchy’s integral formula – Power series – Taylor’s and Laurent’s series – Types of singularities – Calculus of residues and application to evaluation of definite integrals.

Section-III – Vector calculus:

Differentiation of a vector valued function – Gradient of a scalar function – Divergence and curl of a vector function in Cartesian and polar coordinates.

Green’s theorem – Gauss and Stoke’s theorems and their applications to evaluation of double and triple integrals.

Section-IV:


3. STATISTICS

Attempt any 5 questions choosing at most 2 from each Section. Four questions of equal weightage will be set in each section.

Section-A: Probability and Distributions

Sample space and events, Probability space, Statistical independence, Random variable, Discrete and continuous random variables. Probability density and distribution functions, marginal and conditional distribution, functions of random variables, expectation and moments, conditional expectation, correlation co-efficient, convergence in probability, almost sure, Markov, Chebychev and Kolmoor inequalities, Borel Centelli lemma, weak and strong Laws of large numbers, probability generating and characteristic functions; Uniqueness and continuity theorems. Lindeberg Levy Central limit theorem. Standard discrete and continuous probability distributions, their interrelations including limiting cases. Exact Sampling distributions – t, F and Chi-square, Distributions of order statistics.

Section-B: Statistical Inference


Simple and composite hypotheses, statistical tests, critical region, two kinds of error, power function unbiased tests, most powerful and uniformly most powerful tests, Neyman-pearson, Lemma, Optimal tests for simple hypotheses concerning one parameter, monotone likelihood ratio property and its use in constructing UMP test, likelihood ratio criterion and its asymptotic distribution, chi-
square and Kolmogorv tests for goodness of fit. Run test for randomness, Sign test for Location, Wilcoxon-Mann-Whitney test and Kolmogorov–Smirnov test for the two sample problem and tests of independence based on sparmants next correction Distribution-free confidence intervals for quantiles and confidence bands for distribution functions.

Notions of a sequential test, Wald's SPRT, its CC and ASN functions, with applications to standard distributions.

**Section-C: Multivariate Analysis**

Theory of least squares, Gauss-Markoff theory, normal equations, least square estimates and their precision. Tests of significance and intervals – estimates based on least square theory. Regression Analysis, linear regression, estimates and tests about correlation and regression coefficient, curvi-linear regression, and orthogonal polynomials, test for linearity of regression-Multivariate normal distribution, multiple regression, multiple and partial correlations and tests for them. Mahalanobis \( D^2 \) and Hotelling \( T^2 \) statistics and their applications (derivations of distribution of \( D^2 \) and \( T^2 \) excluded). Fisher's discriminant analyses.

**Attempt any 5 questions choosing at least one question from each section. Three questions of equal weight will be set in each section.**

**Section-A – Sampling Theory**

Nature and scope of sampling, simple random sampling, sampling from finite population with a without replacement, estimation of the standard errors, sampling with equal probabilities, PPS sampling, Stratified random sampling, systematic sampling, two-stage and multistage sampling, multphase and cluster sampling schemes.

Estimation of population total and mean, use of biased and unbiased estimates, Standard errors of estimates, cost and variance functions, ratio and regression estimates and their relative efficiency, planning and organization of sample survey with special reference to recent large scale surveys conducted in India.

**Section-B – Design of Experiments**

Analysis of variance of one way, two-way and three-way classified data with and without interactions. Principles of experimental designs, CRD, RBD, LSD, Missing-plot technique, Factorial experiments, \( 2^n \) and \( 3^n \) designs. General theory of total and partial confounding and fractional replication. Analysis of split-plot, BIBD and PBIBD.

**Section-C – Industrial Statistics**

Concept and importance of quality control, different types of control charts, X, R, P & C charts; cumulative-sum control charts.

Sampling inspection Vs 100 per cent inspection. Concepts of producer’s risk and consumer’s risk. Single, double, multiple and sequential sampling plans for attributes; OC, ASN curves, Rectifying sampling plans, AOQ and ATI curves; sampling plans for variables.

Definition of Reliability, Life distribution, failure rate and bath-tub failure curve; exponential and Weibull models. Reliability of series, Parallel and \( K \) out of \( n \) systems.

**Section-D – Operations Research**

Homogenous discrete-time Markov chains, transition probability matrix, classification of states; stationary distribution, Birth and death process. Elements of quitting theory, M/M/1 and M/M/K queues; G/M/1 and M/G/1 - queues.

The structure and formulation of linear programming problem. The simplex method, two phase simplex method and chame’s method with Artificial variables. Transportation and Assignment problems.

Introduction to computers and elements of Fortran IV Programming, Formats for input and output statements, specification and logical statements and sub-routines. Application to some simple statistical problems.
### POST CODE NO. 6 : ASST. DIRECTOR IN A.P. TOWN PLANNING SERVICE

#### SCHEME

<table>
<thead>
<tr>
<th>Part-A: Written (Objective type) Examination</th>
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<tr>
<td>Paper-1 General Studies</td>
<td>150 Marks</td>
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<tr>
<td>Paper-2 Subject (Town Planning)</td>
<td>300 Marks</td>
</tr>
<tr>
<td>Part-B: Oral Test (Interview)</td>
<td>50 Marks</td>
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</tbody>
</table>

#### SYLLABUS

**PAPER-1 GENERAL STUDIES**

1. **SCIENCE AND TECHNOLOGY:**
   - g) General Science and Technology
   - h) Role and impact of science and technology on India’s development.
   (Questions will cover general appreciation and understanding of matters of everyday observation and experience as may be expected of a well-educated person who has not made a special study of science and technology disciplines).

2. **INDIAN HISTORY AND CULTURE:**
   - m) Modern Indian History from 19th century to the present
   - n) Nationalist Movement and Constitutional development
   - o) Indian culture and Heritage including architecture, Fine Arts, dance forms, music, paintings, Folk arts and performing arts.

3. **INDIAN POLITY:**
   General and broad understanding of the structural (institutions) and functional (processes) aspects of Indian Political system.

4. **INDIAN ECONOMY AND GEOGRAPHY OF INDIA:**
   - (a) Structure of National economy
   - (b) Economic development (including planning) since independence
   - (c) Economic Reforms
   - (d) Physical, economic and social Geography of India.

5. **CURRENT EVENTS:**
   Current Events of Regional, National and International importance.

6. **GENERAL MENTAL ABILITY:** (Reasoning and analytical abilities)

**PAPER-2 SUBJECT**

1. **TOWN PLANNING**


2. Planning techniques and its implementation: Basic methods of various types of surveys, collection of data, Methods adopted to collect data, standards for development and re-development of residential commercial industrial and re-creational areas, land use planning, socio economic data for urban planning.

3. Master plan and Zoning: Master plan objects and necessity, stages in preparation of master plan, principles of zoning, objects and importance of zoning, Aspects, uses and economy of zoning, site for buildings, requirements of residential buildings classification of residential buildings, design of residential areas.

4. Slum and re-development of existing towns:
   - Slum: Causes, growth, characteristics, effects, slum clearance and re-housing, prevention of slum ornament, financial assistance for slum clearance, objects of re-planmnning, defects of existing terms, urbane renewal projects.
5. Housing: Housing policy, different types of housing Agencies involved in housing, affordability of housing, infrastructure available in housing, different categories of houses as per HUDCO norms.


8. Traffic planning and regulation: Principles of traffic planning, classification of roads, principles of segregation of traffic, types of streets, road system, road junctions, parking facilities, traffic signals, street lightings, traffic management.


10. Regional Planning: Concept of Regional planning, principle involved, delimitation of region, Factors influencing, Regional planning, principle involved, delimitation of region, Factors influencing, Regional planning, Methods of regional planning.
POST CODE NO. 7 : ASST. CONTROLLER OF LEGAL METROLOGY

SCHEME

Part-A: Written (Objective type) Examination

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<tr>
<td>Paper-2</td>
<td>Subject (Botany OR Zoology OR Chemistry OR Physics OR Geology OR Mathematics OR Civil Engg OR Mechanical Engg. OR Electrical Engg. OR Electronics &amp; Telecommunications Engg.)</td>
<td>300 Marks</td>
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Part-B: Oral Test (Interview) 50 Marks

SYLLABUS

PAPER-1 GENERAL STUDIES

1. SCIENCE AND TECHNOLOGY:
   i) General Science and Technology
   ii) Role and impact of science and Technology on India’s development.
   (Questions will cover general appreciation and understanding of matters of everyday observation and experience as may be expected of a well-educated person who has not made a special study of science and technology disciplines).

2. INDIAN HISTORY AND CULTURE:
   q) Modern Indian History from 19th century to the present
   r) Nationalist Movement and Constitutional development
   s) Indian culture and Heritage including architecture, Fine Arts, dance forms, music, paintings, Folk arts and performing arts.
   t) History of Andhradesa Society, Culture, Geography and Economic development.

3. INDIAN POLITY:
   General and broad understanding of the structural (institutions) and functional (processes) aspects of Indian Political system.

4. INDIAN ECONOMY AND GEOGRAPHY OF INDIA:
   (a) Structure of National economy
   (b) Economic development (including planning) since independence
   (c) Economic Reforms
   (d) Physical, economic and social Geography of India.

5. CURRENT EVENTS:
   Current Events of Regional, National and International importance.

6. GENERAL MENTAL ABILITY: (Reasoning and analytical abilities)

PAPER-2 SUBJECT

1. BOTANY

Microbiology, Pathology, Algae, Fungi, Bryophytes, Pteridophytes, Gymnosperms, Taxonomy of Angiosperones, Anatomy, Morphogenesis, Embryology & Palynology.

MICROBIOLOGY:
Viruses, Bacteria, Plasmids, General account of infection and immunology, structure, classification, reproduction and physiology. Importance of microbes in agriculture, industry and medicine. Biological control of pollution using micro-organisms.

PATHOLOGY:

ALGAE:
FUNGI:
General characters of fungi and their classification. Structure, reproduction, life cycles, phylogeny and inter-relationships and affinities of the main groups of fungi viz., Myxomycetes, Oomyctes, Zygomycetes, Ascomycetes, Basidiomycetes, Deuteromycetes, Economic importance of fungi, Symbiotic fungi, the lichens, Mycorrhizae.

BRYOPHYTES:

PTERIDOPHYTES:

GYMNOSPERMS:
Classification and distribution of living gymnosperms, origin and evolutionary tendencies in gymnosperms vis-à-vis pteridophytes and angiosperms – General account of fossil gymnosperms; pteridospermales (Cycadofilicales), Corditales, Bennettitales and their affinities and inter relationship. Taxonomic and economic importance of gymnosperms.

TAMONOMY OF ANGIOSPERMS:
A comparative study of the systems of classification; Bentham and Hooker, Engler and Prantl and Hutchinson. Modern trends in biosystematics with reference to phytochemical, cytological, palynological, embryological and anatomical criteria. Taxonomic and economic importance of Magnoliaceae, Ranunculaceae Cruciferae, Malvaceae, Leguminosae, Umpelliferae, Asclepiadaceae, Verbenaceae, Euphorbiaceae, Liliaceae, Orchidaceae, Palmae and Poaceae.

ANATOMY:

MORPHOGENESIS:
Polarity, symmetry and totipotency – Differentiation and dedifferentiation of cells and organs. Factors of morphogenesis. Methodology and applications of cell, tissue, organ and protoplast cultures from vegetative and reproductive parts; Somatic hybrids.

EMBRYOLOGY AND PALYNOLOGY:
Development of male and female gametophyte, double fertilization, endosperm formation, embryo, and its main types. Apomixis and polyembryony. Seed structure. Palynology with reference to overall Pollen morphology of angiosperms. Aspects and applications of aerology and Mellitopalynology.

CELL BIOLOGY:

GENETICS & EVOLUTION:
Pre and post Mendelian concept of genetics, development of gene concept Nucleic acids their structure and role in reproduction and protein synthesis, genetic code and gene regulation. Mechanism of microbial recombinaion, Mutation, its roles in evolution; Multiple factor inheritance, linkage and crossing-over, methods of gene mapping, Sex chromosomes and sex linked inheritance, cytoplasmic inheritance, Genetic engineering, Organic evolution, evidence, mechanism and theories.

PHYSIOLOGY:
ECOLOGY:

ECONOMIC BOTANY:
Origin of cultivated plants. Study of plants as sources of food, fodder and forage, wood and timber, fibre, paper, rubber, beverages, drugs, narcotics, resins and gums essential oils, dyes, medicines, insecticides and pesticides. Energy plantation.

ETHNOBOTANY:
Its scope. Medicoethnobotany and ethnoagriculture. Conservation and propagation of medicinal plants used by various tribal communities of A.P.

2. CHEMISTRY

1. Atomic structure and chemical bonding:
Quantum theory, Heisenberg’s uncertainty principle, Schrodinger’s wave equation (time independent), particle in a one dimensional box, quantum numbers, hydrogen atoms wave functions, shapes of orbitals. Valence bond and molecular orbital theories. Resonance and resonance energy Sigma and Pi bonds (non-mathematical approach).

2. Thermodynamics:

3. Solid State:

4. Chemical Kinetics:

5. Photochemistry:

6. Ionic equilibria:

7. Electromotive force:
Reversible and irreversible cells. e.m.f. and its measurement. Types of cells. Single electrode potentials and their applications. Theory and applications of over voltages. Dropping Mercury Electrode (DME).

8. Reactions in non-aqueous media:
Liquid ammonia and liquid sulphur dioxide. Pearson’s theory of hard and soft acids and bases.

9. d-Block elements:
Lanthanides and actinides:
Methods of separation of lanthanides. Oxidation states and magnetic properties. Synthesis of actinides and actinide contraction.

10. Co-ordination chemistry:

11. Organometallic compounds:
Nature of the metal-carbon bond. Organometallic compounds of aluminium, Zinc and mercury. Olefinic complexes of palladium (II) and platinum (II). Their preparation, properties and bonding.

12. Molecular spectroscopy:
Type of spectra and their origin. Measurement of spectra.

a) Vibrational spectroscopy:

ii) Raman spectra: Origin and measurement. Differences between IR and Raman spectra.

b) Electronic spectroscopy:
UV and visible spectra. Types of electronic transitions in molecules. Absorptions due to multiple bonds and the effect of conjugation on them. Applications of UV-visible spectroscopy in the study of organic molecules. Charge transfer spectra.

PAPER-II

1. Structure, reactivity and nomenclature of organic molecules:
Covalent character of organic compounds. Single and multiple bonds. Types of organic reactions and reagents with examples. Homolytic and heterolytic cleavage of bonds.

Inductive, electromeric, conjugative and hyperconjugative effects on the physical and chemical properties of organic compounds with suitable examples Dipole moments.

IUPAC and Chemical Abstract systems of nomenclature of organic compounds.

2. Stereo Chemistry:


3. Reaction mechanisms:


4. Pericyclic reaction:
Classification and examples. An elementary study of woodward-Hofmann Rules.
5. Carbohydrates:
   Classification. Structure elucidation of open chain and cyclic structures of D-glucose and D-fructose. Inter-conversion of monosaccharides. Determination of the configuration of D-glucose.

6. Amino acids, polypeptides and proteins:

7. Aromatic and heterocyclic compounds:

8. Chemistry of the following name reactions:
   Aldol condensation, dieckmann reaction, Claisen condensation, perkin reaction, Beckman rearrangement and Cannizaro reaction, reimer – Tiemann reaction.

9. Reagents in organic synthesis:
   Use of the following reagents in organic synthesis: Ozone, periodic acid, NBS, diborane, Sodium in liquid ammonia, NaBH₄ and LiAlH₄.

10. Chemistry of Natural products:
    Isolation and structural features of the following natural products: Citral, nicotine, papavarine and Vitamin-C.

11. NMR Spectroscopy:
    Introduction to proton, magnetic Resonance spectroscopy – Principles. Chemical shifts, shielding and deshielding effects, Splitting of signals, Coupling constants.
    Application of PMR to the study of simple organic molecules.

12. Polymer chemistry:

3. GEOLOGY
   (General Geology, Geo-morphology, Structural Geology, Stratigraphy and Palaeontology)

i) General Geology:

ii) Geomorphology:
    Land forms, their types and development. Weathering, Transport and Erosion. Geomorphic processes, such as Fluvial, Fluviomarine, Marine, Glascias and Eolean. Topography and its relation to structures and lithology.

iii) Structural Geology:
iv) **Stratigraphy:**


v) **Palaeontology:**


**PAPER-II**

(Crystallography, Minerology, Petrology and Economic Geology)

i) **Crystallography:**

Crystalline and non-crystalline substances. Concept of symmetry, point group, lattice and space groups. 32 classes of crystal symmetry. Stereographic projections and their use. Twinning, crystal growth and irregularities.

ii) **Mineralogy:**


iii) **Petrology:**

Simple phase diagrams of single, binary, ternary and quaternary silicate systems, with reference to petrogenesis. Magmas, their generation in the crust and mantle their emplacement and their relation to paleo-tectonics. Magnatic crystallization, differenciation and assimilation. Bowen's Reaction principle classification of igneous rocks.


Role of T P and fluids in metamorphism. Metamorphic facies. Relationship among metamorphism, anatexis and granitization. Types of metamorphism.

Petrogenic aspects of important rocks of India, such as Deccan Traps, the layered intrusions, charnoekites khondalites and gondites.

iv) **Economic Geology:**


4. MATHEMATICS

The candidate has to answer 10 questions choosing atleast 2 questions from each Sections I – IV. Five questions will be from each section. Each question carries 15 marks.

Section-I – Algebra:

Groups – subgroups – normal subgroups – quotient groups – homomorphism and isomorphism theorems – cyclic groups – permutation groups – Cayley’s theorem.


Section-II – Linear Algebra:


Linear transformations – Rank and nullity of a linear transformation – Cayley – Hamilton theorem – Matrix of a linear transformation – eigen values and eigen vectors – Canonical forms.

Inner product spaces – Orthonormal basis – Quadratic forms.

Section-III – Differential equations:


Formation of partial differential equations – Equations of first order – Charpit’s methods.

Section-IV – Geometry:

General equation of second degree in two variables – Tracing of conics.

Plane, straight lines in space – sphere – Cone.


The candidate has to answer 10 questions choosing atleast TWO questions from each of the Sections I to IV. FOUR questions will be given from each of the Sections I,II and III and EIGHT questions will be given from Section IV with two questions from the four topics given in that section.

Section-I – Real Analysis:


Limits and continuity of a real valued function properties of continuous functions – Differentiation – Mean value theorems – Applications.

Riemann integration – conditions for Reimann integrability – improper integrals.

Section-II – Complex Analysis:

Complex numbers and their geometric representation – limits and continuity of functions of a Complex variable – Analytic functions – Couchy Riemann equations – Complex integration – Cauchy’s theorem – Cauchy’s integral formula – Power series – Taylor’s and Laurent’s series – Types of singularities – Calculus of residues and application to evaluation of definite integrals.

Section-III – Vector calculus:

Differentiation of a vector valued function – Gradient of a scalar function – Divergence and curl of a vector function in Cartesian and polar coordinates.

Green’s theorem – Gauss and Stoke’s theorems and their applications to evaluation of double and triple integrals.
Section-IV:


5. PHYSICS

(Mechanics and relativity, Waves and Oscillations, Thermal Physics, Optics)

1. Mechanics and Relativity:


Galelean relativity, special theory of relativity – Time duration and length contraction Michelson – Morley experiment, Lorentz transformations, addition of velocities, variation of mass with velocity – mass energy equivalence.

2. Waves and Oscillations:

Oscillations, Simple harmonic motion, progressive and stationary waves. Damped harmonic Oscillator, Forced oscillations and resonance. Wave equation, harmonic solutions. Plane and spherical waves, superposition of waves and beats, phase velocity, group velocity, Doppler effect.

3. Thermal Physics:


4. Optics:


(Electricity & Magnetism, Modern Physics and Electornics)

1. Electricity and Magnetism:

Coulomb’s Law, Electric field, Gauss’s Law, electric potential. Poissons and Laplace equations and solutions for homogeneous dielectric, uncharged conducting sphere in a uniform field, point charge and infinite conducting plane. Magnetic shell, magnetic induction and field strength Biot savarts law and applications. Electromagnetic induction, Faradays and Lenz’s laws. Self and mutual inductance, induction coil and transformer.

Magnetic materials – Dia, para, ferro, antiferro and ferri magnetism (Qualitative features only). Langevin’s theory of paramagnetism, Weiss theory of ferromagnetism. Ferro magnetic Domains Hysterisis, Nuclear magnetism. Dielectric materials – Capacitive with dielectric material as medium; electric polarisation; electronic, ionic, electric polarisabilities and their variations with temperature.

2. Modern Physics:


3. Electronics:


6. ZOOLOGY

(Non-Chordata, Chordata, ethology & Biostatistics)

Protozoa:

General Organisation and Classification; Locomotory organelles; Pathogenic protozoa of human importance (i.e.)

Trypanosoma, Leishmania, Enatamoeba, Histolytica, Giardia, Malarial Parasites.

Porifera:

Various types of canal system, Histological structure and their functions; Reproduction and development of sponges, systematic position and affinities of sponges; development of spicules.

Coelenterata:

General Organisation and Classification; Aurclia; Coral reef formation in Actinozoa, general organisation and phylogenetic relationship of ctenophore, polymorphism in Hydrozoa.

Platyhelminthes:

General Organisation and Classification; Planaria; Fasciola; Taenia, general outline of the life cycle of parasites of human importance, Host-parasitic interactions.

Nemathelmanthis:

Parasitic Nematodes of human importance i.e., Ascaris, Oxyunis Annyclystoma, Strongyboildes plant parasitic nematodes with specific examples.
Annelia:

General Organisation and Classification; Neriais; Leech; types of Nephridia, Coelome and Coelomoducts; Regeneration in Polychaetes, affinities, Trochophore larva.

Arthropoda:

Outline classification (up to orders) palaemon; scorpion; Insect mouth parts, respiration, metamorphosis, social use in insects, harmful and useful insects and economic importance, vectors—flies, lice, bugs, ticks and mosquitoes; Structure and systematic position of onychophora.

Mollusca:

Classification, Unio; pilla; torsion and detorsion, Distinctive features of Cephalopoda; pearl formation in Mollusea.

Chinoderamata:

Classification; star fish; water vascular system, larval forms and their revolutionary significance.

Hermichodata:

General organisation; systematic position and affinities of Balanoglossus.

Chordata:

Origin of Chordates, general organisation, Ascidian and classification of Urochordata, Sessile and Pelagic turnicates, Mucous and mode of feeding, affinities, Retrogressive metamorphosis.

General organisation of Cephalochordata; Branchiostoma.


Systematic position and significance of coelocanthini, Dipnoi, the conquest of land, origin and evolution of Amphibia and classification; Anatomical peculiarities and affinities of Urodele and parental care in Amphibia.

Reptiles:

Origin of reptiles general organisation of Chelonia, squamata, Rhynchocephalia and Crocodilia. Fossil Reptiles, poisonous and non-poisonous snakes of India.

Birds:

Origin and evolution of birds, migration of birds, adaption for flight, economic importance of birds.

Mammals:

Prototheria, Metatheria and Eutheria, phylogenetic relations of prototheria & Methatheria, adaptive radiations in marsupials, Aquatic and aerial adaptations in mammals, Oestrous cycle and Placentation in mammals, distinctive features of Primates.

Comparative account of various systems of vertebrates.

Ethology:

Introduction and History of ethology, Ethology Vs behaviourism; Instinct Vs learning, Communication by means of Pheromon Domec language of honey bees Forging and predation; Defensive secretions in insects. Social behaviour in insects.

Biostatistics:

Methods of sampling, frequency distribution and Measures of central tendency; Standard deviation, Standard error; correlation and regression and T-test, F-test, X^2 test.
Cell Biology:

Prokaryotic and Eukaryotic cells, cell membrane, Endoplasmic reticulum, Golgi Complex, Lysosomes, Mitochondrion, Microsome, Peroxisomes, Nucleus, Nucleolus, Centrioles, Cilia, Flagella, Microtubules, Chemical components and molecular models of cell membrane. Passive active and ionic transport. Transport proteins, carrier and fixed pore mechanism cell coat and cell recognition. Cell surface receptors and mechanism of signal transduction (Steroid, Cyclic AMP and Ca^{2+}). Ultra structure of a muscle and nerve fibre, ultra structure and chemical composition of a chromosome, hetero and euchromatin, polytene and lambrush chromosomes, chromosomal aberration and variation cell cycle and chemical events of cell cycle, cell division mitosis & meiosis, cancerous cells and lymphocytes.

Physiology:


Genetics:

Principles of mendelian inheritance (mono, di and tri hybrid ratios) phenomenon of linkage and chromosome mapping, sex linkage, crossing over, sex determination and genic balance, extra chromosomal inheritance, concept of multiple alleles, blood groups and RH factors; Inborn errors metabolism, one gene one polypeptide hypothesis, structure and chemistry of DNA and RNA, point mutation, genetic code and protein synthesis. Eugenics; Gene cloning, genetic engineering, gene transfer and immunogenetics.

Embryology:

Gametogenesis; Fertilization, Cleavage, Gastruclation, extra embryonic membranes placenta, organogenesis of central nervous system, heart, kidney, Regeneration, Carcinogenic development.

Histology:

Histology of Blood, lymphoid tissues, cartilage, bone, skin, stomach, intestine, liver, pancreas, lung, kidney, testis and ovary of chordates.

Evolution:


Ecology:

Introduction of ecology, the scope of ecology, factors of the environment in relation to the organism, heat, light, mechanical factors oxygen and carbon dioxide, inorganic salts and biotic factors, the concept of an ecosystem fresh water, marine and terrestrial ecosystem, energy flow in eco-system, energy fixation by autotrophs, Food chains and Food Web, Biogeochemical cycles, Water cycle, carbon cycle, general features of community, Nitrogen cycle, population attributes, definition and size communities, ecological succession, pollution, ecology in relation to man.

Zoogeography:

General principles of animal distribution, Barriers, continuous and discontinuous, continental drift, zoogeographic realms, Insular, fauna, wildlife protection, mimicry and colouration.
Note: Candidates shall have the option to answer questions from any two parts.


f) Strength of materials: Simple stresses and strains, principal stresses and strains, shear force and binding moment of beams, Derivation of \( M/I = f/\gamma = E/R \), Deflection of beams, Direct and bending stresses, torsion of circular shafts, columns and struts.

g) Theory of structures: Castigliano’s I and II theorems, slope deflection, moment distribution and Kani’s methods of analysis applied for indeterminate beams and rigid frames. Rolling loads: Propositions for the maximum bending moment at any given section and under any given load, Equivalent uniformly distributed load, influence line for uniformly distributed load shorter than span for maximum bending moment and shear force, Maximum bending moment for series of point loads travelling the girder, Influence lines for tresses.

h) Steel structures: Design of simple, compound beams and laced and batened columns. Design of column bases and footings, Design of highway and railway bridges through and deck type plate girders, warren girders and Pratt truss.

i) Limit state method: Design of singly, doubly reinforced and T-beams, Design of lintel one way and two way slab, Design of long and short columns, design of rectangular and combined footings.

j) Pre-stressing concrete: Methods of pre-stressing, pre-tensioned and post-tensioned numbers, analysis and design of sections for flexures, losses in pre-stressing.

Section (B) Soil Mechanics and Foundation Engineering

f) Soil Mechanics: Definitions and relationships, particle size distribution, Atterburg limits, Permeability and permeability tests, Seepage pressure, quick sand condition, Laplace equation, Flow net, construction, properties, uses and applications.

g) One dimensional consolidation, co-efficient of compressibility consolidation settlement, pre-consolidation pressure, one dimensional consolidation equation, consolidation test, compaction, Field compaction method, proctor’s and modified compaction test, field compaction control, factors affecting compaction.

h) Shear strength, Moher’s Coulomb failure theory, effective stress, Direct shear test, Triaxial compression test and vane shear test, Rankine’s theory of active and passive earth, pressures, Retaining walls, Horizontal and sloping back fill, Coulomb’s Wedge theory and Rohban’s construction.

i) Infinite and finite slopes, Swedish circle method, Friction circle method, Taylor’s Stability number, Bearing capacity, definitions, Terzaghi’s analysis for shallow footing, general and local shear failure, Terzaghi’s semi empirical equations for square and circular footings, effect of water table on bearing capacity.

j) Types of selection of footing, Raft, pile and floating foundations, settlement, computation for immediate and consolidation settlement, Boussarlugy equation for stress under point load and uniformly distributed load, pressure bulb, vertical pressure under uniformly distributed load on circular area, New mark influence chart.

Section (C) Fluid Mechanics:

Fluid properties, Fluid Statics – Forces on flat plate and curved surfaces.

Kinematics and Dynamics of Fluid flow, stream lines, equation of continuity, stream function and velocity potential function, flow nets, types of flows.

Euler’s equation of motion, Energy and Momentum equations and their applications to pipe flow, free and forced vertices, venturimeters, and Notches & Weirs.

Laminar flow through circular tubes, Reynold’s experiments, Flow through pipes, hydraulic gradient and total energy lines, pipes in series and parallel, syphom, Minor losses in pipes.

Open channel Flow, uniform and non-uniform flows, best hydraulic sections, specific energy and critical depth, Rapidly varied flow – hydraulic jump and its applications, Gradually varied flow – differential equations, classification of surface profiles.

Boundary layers – development of b.L. flow, laminar and turbulent boundary layers, laminar sub-layer, smooth and rough boundaries, drag and lift.
Dimensional analysis and similitude: Types of similarities, model studies, undistorted and distorted models, Buckingham II-theorem – applications.

Section (D): Computer Programming:

Type of computers – components of computer, historical development of computing systems. Different languages, Flow charts.

Fortran/Basic programming, constants & Variables, expressions, arithmetic statements, library functions.

Control statements, GO TO statements – Unconditional and computed, IF statements, DO statements.

Subroutines and Function sub-programmes – Arguments, CALL statement RETURN statement, Declaration statements.

Input and output statements, and Quoted Formats, FORMAT statements, Field specification, Stop and END statements.

Subscripted Variables, Arrays, DIMENSION statement, Simple applications of computer programming in civil engineering.

Note: A candidate shall answer questions from any two parts.

PART–A: Building Materials, Construction and Surveying:

Building materials: Timber, stones, bricks, sand, limes, cement, paints, varnishes and damp proofing material.

Brick work for walls, types of brick bonds, design of brick masonry walls as per IS code, detailing of walls, floors, roofs, ceilings, stair cases, doors and windows, finishing of buildings – plastering, pointing and painting – IS codes.

Use of Ferro cement, fiber – reinforced and polymer concrete in construction, building estimates and specifications.

Construction Scheduling, PERT and CPM methods.

General surveying – chain and compass survey, plane table survey – in combination with one another.

Levelling and contouring:- Fly levelling, reciprocal levelling, net levels, Reduction of levels, curvature and refraction corrections, characteristics of contours – estimation of earth work.

Theodolite survey: Temporary and Permanent adjustments, Traverse survey, computation of areas by co-ordinate system, theory of simple circular curve by linear and instrumental methods.

Tachometry: Stadia wires, Fixed and mobile wires, Tachometric tables, tachometric alidade, Reduction by calculations.

PART–B: Water resources and Irrigation Engineering:

Hydrology: Hydrologic cycle, precipitation, evaporation, transpiration, infiltration. Run-off hydrograph, unit hydrograph, flood estimation frequency analysis.

Ground Water: Ground water resources, specific yield, storage coefficient of permeability, confined and unconfined aquifers, radial flow into a well under confined and unconfined conditions, recuperation tests.

Water Resources Planning: Single and multipurpose projects, storage capacity, zones of storage, reservoir losses, reservoir sedimentation, flood routing through reservoirs, economics of water resources projects.


Storage Works: Types of Dams and their characteristics, Gravity dams principles of design, criteria for stability, control of seepage, Earth dams – Design principles, spillways – types and their suitability, energy dissipation, crest gates.

Canals: Alignment of canals types of canals, design of unlined canals Lacey’s regime theory, cross masonry works – canal falls, Cross Drainage works – Aqueducts and super passages.

Diversion Works: Components of Diversion scheme, Weirs on permeable foundations – Bligh’s and Khosia’s theories – Design principles.

PART–C: Environmental Engineering:

f) Water Supply: Protected Water Supply Scheme, Rate of demand, Population forecast, Analysis of water, Hydrogen-ion concentration, Sedimentation, Coagulation Chlorination, Methods of disinfection, Break point chlorination, Slow sand, Rapid sand and Pressure filters.

g) Hardness of Water: Removal of temporary and permanent hardness, Distribution systems of water, pipe appurtenances, Analysis of distribution system using Hardy cross method, general principle of optimal design based on cost and head loss ratio criterion, Maintenances of distribution systems, pumping station and their operation.
h) Sanitary Engineering: Methods of carrying refuses, systems of swarage, Sewers of different materials and shapes, self cleansing velocity, purification of natural streams, empirical formulae used in the design of sewers, deep man holes and their location, Automatic flushing tank, Different types of traps and classification.

i) Quality of Sewage: Primary treatment to sewage, carbon cycle, B.O.D., C.O.D., and dissolved oxygen, Grit chamber, Detritus tank, skimming tank, sludge digestion process, contact beds, septic tank, imhoff tank, Activated sludge process, sludge volume index.

j) Sources, effects and remedial measures of water, Air and Noise pollutions, particulate and Dust collection devices like internal separators, wet collection devices and electrostatic precipitators.

PART–D: Transportation Engineering:

f) Road development in India, Road planning, High way alignments, width of pavement, camber, types of gradient, Resistance to traction, sight distances, Super elevation and centrifugal ratio, circular, compound, vertical, reverse and transition curves.

g) Types of Road: Water Bound Macadam Road, Bituminous and cement concrete Roads, Flexible and rigid pavements, types of study for traffic, Road parking, Road accidents and traffic regulation, inter sections and rotary.

h) Permanent Ways: Rails, creep of rails, blast, sleepers, Fastings and Fixtures, Gauges, Trunouts, Crossings, Types of crossings, Railway track, drainage, Maintenance of track components, Traffic signals.

i) Station yards and Machinery, station buildings, Platform sidings, turn tables, signal and inter locking, level crossing and necessary precautions.

j) Development of Air Port: Take off and landing distances, characteristics of jet air craft, selection of site for air port, Survey for selection of site, Wind rose diagram, Run way width, length and design criteria, standard for general aviation.

8. ELECTRICAL ENGINEERING

I. Electrical Circuits:


II. E.M. Theory:

Electro static and electro magnetic fields, vector methods, Fields in dielectric, conducting and magnetic materials, Laplace and Poisson’s equation. Time varying fields, Maxwell’s equation, Poynting Theory, properties of transmission lines.

III. Electrical measurement and Instruments:

Electrical standards, Error analysis, Measurement of current, voltage, power, energy, power factor, resistance, inductance capacitance frequency and loss angle. Indicating instruments, extension of range of instruments, DC and AC bridges. Electronic measuring instruments. Electronic multimeter, CRO, frequency counter, digital voltmeter, transducers, Thermocouples, Thermistor, LVDT, strain gauges, Piezo electric crystal, Measurement of non-electrical quantities like, pressure, velocity, temperature, flow rate, displacement acceleration and strain.

IV. Control Systems

Open and closed loop control systems, Mathematical modeling, block diagram, signal flow graphs, time response and frequency response of linerar systems, error constants and series Rootlocus technique, Bodeplot, polar plot, M-circles, N-circles, Nichol’s charts, stability, Routh Hurwitz criteria. Nyquist stability criteria, compensators, design in frequency domain. Control system components. Servo motors, synchros, tacho generator, error detector. State variable approach, modeling, state transition matrix, transfer function, response.

V. Electronics:

Solid state devices and circuits. Small and large signal-amplifiers with and without feedback at audio and radio frequency, multistage amplifiers. Operational amplifiers and applications. Integrated circuits oscillators, RC, LC and crystal oscillators wave form generators, multi-vibrators – Digital circuits, Logic gates, Boolean algebra combinational and sequential circuits. A to D and D to A converters Micro processors (8085) instruction set, memories, interfacing programmable peripheral
devices – Number system flow charts – expressions and statements in C – language – simple
programs for engineering application.

I. D.C. ELECTRICAL MACHINES :

Fundamentals of electro mechanical energy conversion, constructional features of D.C. 
Machines, emf equation types and characteristics of generators application, Torque in DC motor, 
types of DC motors, applications. Testing of D.C. motors, efficiency, and starting and speed control.

II. TRANSFORMERS:

Construction – Principle of operation of 1-phase transformers – Vector diagram on No Load 
and – Load – Parallel operation – Regulation – efficiency – Equivalent circuit 3 phase transformer 
connections – Scott connection.

III. INDUCTION MOTORS:

Production of rotating magnetic field, production of torque types of motors equivalent circuits, 
circle diagram, torque slip characteristics, starting and maximum torque, speed control, principle of 
single phase induction motors, Applications.

IV. SYNCHRONOUS MACHINES :

Generation of emf in 3 phase AC Generator, Armature reaction, regulation by Synchronous 
impedance and Ampere turn methods, parallel operation, transient and sub-transient reactances, 
theory of salient pole machines. 
Synchronous Motor: Torque production, performance characteristics, methods of starting, V- 
Curves, synchronous condenser. 
Special Machines: Stepper motor, Methods of operation, Amplidyne and metadyne-
applications.

V. ELECTRICAL POWER GENERATION:

General layout – Types of power stations, economics of different types, base load and peak 
load stations, load factor and its effects, pumped storage schemes.

VI. POWER TRANSMISSION :

Calculation of line parameters, concepts of short, medium and long transmission lines, ABCD 
parameters, insulators, Corona, P.U. quantities, fault calculations, symmetrical components load flow 
analysis using Gauss Seidal, New-ton Raphson, methods, economic operation, stability, steady state 
and transient stability, equal area criterion, ALFC and AVR control for real time operation of 
interconnected systems.

VII. POWER SYSTEM PROTECTION :

Principles of arc quenching, circuit breaker classification, Recovery and restriking voltages, 
relaying principles over current, directional over current relays-generator and transformer protection 
using differential relays-line protection using distance relays Surgeo phenomena in transmission lines 
– Travelling wave theory, protection against surges.

VIII. UTILISATION :

Industrial Drives – Motors for various drives – Braking methods – Speed control of motors – 
Economics of rail traction – Mechanics of train movement – Estimation of power and energy 
requirements – Illumination – Laws Factory lighting – Street lighting – Induction and dielectric heating.

9. ELECTRONICS & TELECOMMUNICATIONS

A) Computer Programming: Number systems, Binary, Octal, Hexadecimal, Decimal and their 
conversions, fixed and floating point representation of numbers; concept of flow charts and 
Algorithms, Control and Decision Statements, Loops, Subroutines.

E) Network Theory: Kircheff’s Laws, Node and Loop analysis, Ideal sources, Network Theorems, 
Thevinin’s, Norton’s Reciprocity, Superposition and Max. Power Transfer Theorems, 
Applications to simple R.L.C. Networks.
Linear time invariant circuits, Integro differential equations equations in RLC networks, Initial 
conditions for inductors and capacitors, Response of networks to step, impulse, sinusoidal and
exponential excitations, steady state analysis, Vector representation, series and parallel
resonance, Quality factor and bandwidth.
Problems with initial conditions and switches, zero input and zero state response, Time
constants for RC and RL networks.

F) Network solutions using laplace Transform Techniques, complex frequency, properties of
Laplace Transforms, initial and final value theorems, Laplace Transforms of periodic signals,
Inverse Laplace Transform.
Fourier series, Exponential and Trignometric Fourier series, Fourier Transforms, Properties,
Parseval’s Theorem.
Convolution integral, Response to arbitrary excitation, Graphical representation of convolution
integral.
Two port network parameters, Z, Y, Z ABCD parameters, applications to Network Analysis,
Interconnection of two port networks, services parallel and cascade connections.
Network Functions, Driving point and Transfer functions, properties, Time domain response
from pole zero plot. Complex frequency(s) plane.
Characteristic impedance, image impedance, image transfer constant, inserties loss.

G) Semi Conductor Devices:
PN Junction, NPN and PNP transistors, small signal model determination of h-parameters,
Analysis using h-parameters, CE, CB and CC configurations, Transistor biasing circuits,
Transistor as a switch.
Field effect Transistor, JFET, MOSFET, Cathod. Ray Oscilloscope and applications.
Transistor as amplifier, Gain Bandwidth, Three amplifier configurations, Multi stage amplifiers.
Operational amplifiers, principles, characteristics, Comparator, Integrator, Differentiator,
Summing, Adder, Subtractor, log amplifier.

G) Electromagnetic theory :
Coulomb’s Law, Gauss’s Law, Electric field due to charge, Electric flux density, Poisson’s and
Laplace’s equations, Energy and potential, conductors, Dielectric, Boundary conditions.
Biot Savort’s Law, Amper’s Law, Stokes Theorem, Faraday’s Law.
Maxwell’s equations, interpretation, uniform plane wave, wave motion in free space, pointing
vector.

H) Pulse and Digital Circuits :
Wave shaping, RC RL circuits, Non-linear diode wave shaping circuits, diode clamping.
Multivibrator circuits, Astable, Monostable Schmitt Trigger Circuits, Blocking Oscillator.
Sweep Generator, Bootstrap and Miller Voltage Sweep Circuits, Linear current sweeps.
Logic Circuits : AND, OR, NOT, NAND and NOR gate circuits, DTL, TTL, MOS, CMOS,
NAND, NOR circuits, realization of various flip flops.
Square wave generator, pulse generator.

I) Communication Systems:
Modulation techniques, Amplitude, Modulation, generation and demodulation, DSB Waves.
Phase and Frequency modulation, narrow band and wide band FM, transmission bandwidth,
generation and demodulation of FM Waves.
Pulse Modulation, Sampling, TDM, PPM, PCM, Characteristics of ASK, FSK, PSK, Signals.
AM and FM Transmitters and Receiver circuits, communication receivers, SSB transmitters
and receivers, super heterodyne receivers, IF, AGC, tracking and alignment, receiver
measurements.

J) Control Systems:
Open loop and closed loop systems, signal flow graphs, Transfer functions and impulse
response.
Routh Hurwitz criterion for stability, Root locus, techniques, effect of location of roots in
system response.
Frequency Response Plots, Bode Plots, Nyquist criterion for stability. Gain and phase margin,
Compensation, using Bode Plots, Lag and Lead compensation.
Effect of feed back, sensitivity. Control system components; potetnio meters, servomotors,
synchros, error-sensing devices.
K) **Transmission Lines & Antennas:**

Reflection of E.M. Waves, standing waves, transmission line equations, Input impedance, reflection coefficient, VSWR, properties of \( \frac{\lambda}{4}, \frac{\lambda}{2} \) lines, short-circuited stubs, impedance matching.

Principle of radiation, Vector potential, Linear Arrays, Broad Side and End fire Array, multiplication of Antenna patterns.

Antenna characteristics – Gain, radiation pattern, side lobe level directivity.

L) **Microwaves:**


Microwave Tubes, Klystron Amplifier, Reflex, Klystron, Magnetron, Travelling wave Tube.

Microwave components – Directional couplers, circulators, isolators, Ferrite Components.

Microwave Measurements – VSWR, Impedance and Reflection measurements, slotted line techniques.

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**10. MECHANICAL ENGINEERING**

**Theory of Machines**

Constrained motion, plane mechanisms, velocity and acceleration analyses, instantaneous centre, flywheels and their applications, balancing of reciprocating and rotating masses, planar cams and followers, tooth profiles, types of gears, fixed axis and planetary gear, drives principles of gyroscopic vibration of free and forced one degree of freedom systems with and without damping, transmissibility and vibration isolation, critical speed of shaft.

**Mechanics of solids**

Stress and strain in two dimensions, Mohr’s circle, theories of failure. Bending moment and shear force diagrams. Deflection of simple beams, Buckling of columns, torsion in shafts, thin and thick cylinders, shrink fit and thermal stresses.

**Machine design**

Material and manufacturing considerations in design, design for static and dynamic loading, fatigue strength, stress concentration, factor of safety, design of bolted riveted and welded joints, power screws, helical springs, hydrodynamic lubrication and journal bearing, rolling element bearings, design of spur gears, design of shifts, keys and couplings, clutches and brakes, belt and rope drives.

**Manufacturing process**


**Metallurgy and Material Science**


**Production management**

Production planning and control, Forecasting assembly line balancing Product, development. Production control charts. Break-even-analysis, PERT and CPM. Control operations: Inventory control – ABC analysis, EOQ model. MRP-II, JIT work study, value engineering. Linear programming, graphical and simplex methods and queuing (Single server, Poisson Queue) theory. Maintenance engineering Quality assurance control charts for variables and attributes.
Thermodynamics


Tds relations, Properties of pure substances.

I.C. Engines. Fuels and Combustion


Heat Transfer, Refrigeration and Air Conditioning.

Modes of heat transfer, One dimensional steady and unsteady conduction, Heat transfer with fins, Convective heat transfer, Forced Convection over flat plate and through tubes, Free Convection over vertical flat plate and cylinders, Radiative heat transfer – Black and Gray surfaces, Shape factors. Heat Exchanger performance – LMTD and NTU method.


Fluid mechanics and turbomachinery


Energy Systems

POST CODE NO.8 : INSPECTOR OF FACTORIES

SCHEME

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<th>Part-A: Written (Objective type) Examination</th>
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<td>Paper-1</td>
<td>General Studies</td>
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<tr>
<td>Paper-2</td>
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<td>Part-B: Oral Test (Interview)</td>
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SYLLABUS

PAPER-1 GENERAL STUDIES

1. SCIENCE AND TECHNOLOGY:
   k) General Science and Technology
   l) Role and impact of science and Technology on India’s development.
   (Questions will cover general appreciation and understanding of matters of everyday observation and experience as may be expected of a well-educated person who has not made a special study of science and technology disciplines).

2. INDIAN HISTORY AND CULTURE:
   u) Modern Indian History from 19th century to the present
   v) Nationalist Movement and Constitutional development
   w) Indian culture and Heritage including architecture, Fine Arts, dance forms, music, paintings, Folk arts and performing arts.
   x) History of Andhradesa Society, Culture, Geography and Economic development.

3. INDIAN POLITY:
   General and broad understanding of the structural (institutions) and functional (processes) aspects of Indian Political system.

4. INDIAN ECONOMY AND GEOGRAPHY OF INDIA:
   (a) Structure of National economy
   (b) Economic development (including planning) since independence
   (c) Economic Reforms
   (d) Physical, economic and social Geography of India.

5. CURRENT EVENTS:
   Current Events of Regional, National and International importance.

6. GENERAL MENTAL ABILITY: (Reasoning and analytical abilities)

PAPER-2 SUBJECT

1. ELECTRICAL ENGINEERING

I. Electrical Circuits:


II. E.M. Theory:

 Electro static and electro magnetic fields, vector methods, Fields in dielectric, conducting and magnetic materials, Laplace and Poisson's equation. Time varying fields, Maxwell's equation, Poynting Theory, properties of transmission lines.

III. Electrical measurement and Instruments:

Electrical standards, Error analysis, Measurement of current, voltage, power, energy, power factor, resistance, inductance capacitance frequency and loss angle. Indicating instruments, extension of range of instruments, DC and AC bridges. Electronic measuring instruments. Electronic multimeter, CRO, frequency counter, digital voltmeter, transducers, Thermocouples, Thermistor, LVDT, strain gauges, Piezo electric crystal, Measurement of non-electrical quantities like, pressure, velocity, temperature, flow rate, displacement acceleration and strain.
IV. Control Systems

Open and closed loop control systems, Mathematical modeling, block diagram, signal flow graphs, time response and frequency response of linear systems, error constants and series Rootlocus technique, Bodeplot, polar plot, M-circles, N-circles, Nichol's charts, stability, Routh Hurwitz criteria. Nyquist stability criteria, compensators, design in frequency domain. Control system components. Servo motors, synchros, tacho generator, error detector. State variable approach, modeling, state transition matrix, transfer function, response.

V. Electronics:

Solid state devices and circuits. Small and large signal-amplifiers with and without feedback at audio and radio frequency, multistage amplifiers. Operational amplifiers and applications. Integrated circuits oscillators, RC, LC and crystal oscillators wave form generators, multi-vibrators -- Digital circuits, Logic gates, Boolean algebra combinational and sequential circuits. A to D and D to A converters Micro processors (8085) instruction set, memories, interfacing programmable peripheral devices – Number system flow charts – expressions and statements in C – language – simple programs for engineering application.

I. D.C. ELECTRICAL MACHINES:

Fundamentals of electro mechanical energy conversion, constructional features of D.C. Machines, emf equation types and characteristics of generators application, Torque in DC motor, types of DC motors, applications. Testing of D.C. motors, efficiency, and starting and speed control.

II. TRANSFORMERS:


III. INDUCTION MOTORS:

Production of rotating magnetic field, production of torque types of motors equivalent circuits, Circle diagram, torque slip characteristics, starting and maximum torque, speed control, principle of single phase induction motors, Applications.

IV. SYNCHRONOUS MACHINES:


V. ELECTRICAL POWER GENERATION:

General layout – Types of power stations, economics of different types, base load and peak load stations, load factor and its effects, pumped storage schemes.

VI. POWER TRANSMISSION:

Calculation of line parameters, concepts of short, medium and long transmission lines, ABCD parameters, insulators, Corona, P.U. quantities, fault calculations, symmetrical components load flow analysis using Gauss Seidal, New-ton Raphson, methods, economic operation, stability, steady state and transient stability, equal area criterion, ALFC and AVR control for real time operation of interconnected systems.

VII. POWER SYSTEM PROTECTION:

VIII. UTILISATION:


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B) Computer Programming: Number systems, Binary, Octal, Hexadecimal, Decimal and their conversions, fixed and floating point representation of numbers; concept of flow charts and Algorithms, Control and Decision Statements, Loops, Subroutines.


J) Semi Conductor Devices:

K) Electromagnetic theory:

L) Pulse and Digital Circuits:

M) Communication Systems:
AM and FM Transmitters and Receiver circuits, communication receivers, SSB transmitters and receivers, super heterodyne receivers, IF, AGC, tracking and alignment, receiver measurements.

P) Control Systems:
- Open loop and closed loop systems, signal flow graphs, Transfer functions and impulse response.
- Routh Hurwitz criterion for stability, Root locus, techniques, effect of location of roots in system response.
- Effect of feedback, sensitivity. Control system components; potentiometers, servomotors, synchros, error-sensing devices.

Q) Transmission Lines & Antennas:
- Reflection of E.M. Waves, standing waves, transmission line equations, Input impedance, reflection coefficient, VSWR, properties of $\lambda/4$, $\lambda/2$ lines, short-circuited stubs, impedance matching.
- Principle of radiation, Vector potential, Linear Arrays, Broad Side and End fire Array, multiplication of Antenna patterns.
- Antenna characteristics – Gain, radiation pattern, side lobe level directivity.

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- Microwave components – Directional couplers, circulators, isolators, ferrite components.
- Microwave Measurements – VSWR, Impedance and Reflection measurements, slotted line techniques.

3. MECHANICAL ENGINEERING

Theory of Machines
- Constrained motion, plane mechanisms, velocity and acceleration analyses, instantaneous centre, flywheels and their applications, balancing of reciprocating and rotating masses, planar cams and followers, tooth profiles, types of gears, fixed axis and planetary gear, drives principles of gyroscope vibration of free and forced one degree of freedom systems with and without damping, transmissibility and vibration isolation, critical speed of shaft.

Mechanics of solids
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Machine design
- Material and manufacturing considerations in design, design for static and dynamic loading, fatigue strength, stress concentration, factor of safety, design of bolted riveted and welded joints, power screws, helical springs, hydrodynamic lubrication and journal bearing, rolling element bearings, design of spur gears, design of shafts, keys and couplings, clutches and brakes, belt and rope drives.

Manufacturing process
Metallurgy and Material Science


Production management

Production planning and control, Forecasting assembly line balancing. Production control charts. Break-even-analysis, PERT and CPM. Control operations: Inventory control – ABC analysis, EOQ model. MRP-II, JIT work study, value engineering. Linear programming, graphical and simplex methods and queuing (Single server, Poisson Queue) theory. Maintenance engineering Quality assurance control charts for variables and attributes.

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Heat Transfer, Refrigeration and Air Conditioning.

Modes of heat transfer, One dimensional steady and unsteady conduction, Heat transfer with fins, Convective heat transfer, Forced Convection over flat plate and through tubes, Free Convection over vertical flat plate and cylinders, Radiative heat transfer – Black and Gray surfaces, Shape factors. Heat Exchanger performance – LMTD and NTU method.


Fluid mechanics and turbomachinery


Energy Systems


4. CHEMICAL ENGINEERING

Section – A


Section – B


Section – A


Section – B


5. INDUSTRIAL ENGINEERING

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

2. Mechanics of Solids
   Stress and strain in two dimensions. Principal stresses and strains, Mohr’s construction, linear elastic materials, isotropy and an isotropy, Stress-strain relations, uniaxial loading, thermal stresses. Beams: banding moment and shear force diagrams, bending stresses and deflection of beams, shear stress distribution. Torsion of shafts, helical springs. Combined stresses, Thick and thin walled pressure vessels. Struts and columns, strain energy concepts and theories of failure. Rotating discs, Shrink fits.

3. Engineering Materials
   Basic concepts on structure of solids, Crystalline materials, Defects in crystalline materials, Alloys and binary phase diagrams, structure and properties of common engineering materials, Heat treatment of steels, Plastics, Ceramics and composite Materials, common applications of various materials.

4. Manufacturing Science
   Merchant’s force analysis, Taylor’s tool life equation, machine ability and machining economics, Rigid small and flexible automation, NC, CNC, Recent machining methods – EDM, ECM and ultra sonics. Application of lasers and plasmas, analysis of forming processes. High-energy rate forming jigs, fixtures, tools and gauges, inspection of length, position, profile and surface finish.

5. METROLOGY AND INSTRUMENTATION


   Taylor’s principle for plain limit gauges. Use of plug, Ring and Snap gauges. Indicating type limit gauges. Gauge material and step in gauge manufacture. General geometric tests for testing machine tools.

   Elements of instrumentation system. Static and dynamic characteristics. Dynamic response of first order and second order instruments. Types of error. Displacement transducers LVDT.

1. Production Management:
   Production planning and control, Forecasting Moving average, exponential smoothing, Operations scheduling; assembly line balancing. Product development Breakeven analysis, Capacity planning PERT and CPM.
2. **Operations Research:**

   Linear programming – graphical method, Simplex, Revised Simplex and Dual Simplex methods. Duality and economic interpretation of dual variables.


   Dynamic programming – capital budgeting problem. Game theory. Waiting lines – single server and multiple server models based on Poisson’s arrivals.

3. **Material Management:** Role of material planning. EOQ inventory, control (deterministic and probabilistic models) MRP – 1 (Inputs & Outputs) MRP-2 Material handling equipment (Selection, Classification, types) ABC analysis. Industrial Robots.

4. **Work Study:** Procedure of method study, various charts used in method study principals of motion of economy. Work place design, egonomics.

   **Time Study:** Calculation of standard time. Performance rating types of ratings, work sampling, types of incentive financial and non-financial. Different wage payment plans.


   **Costing:** Elements of costs. Types over heads and overhead distribution. Break even analysis and its calculation. Description and its methods.

6. **Plant maintenance (objective importance).** Types of maintenance (break down, preventive, scheduled, predictive) plant maintenance schedule. Recent development in plant maintenance techniques, conditioning monitoring.

   Replacement analysis (Reasons and factors considered for equipment replacement) methods like MAPI.

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VII. POWER SYSTEM PROTECTION:


VIII. UTILISATION:

POST CODE NO. 10 : ASST .DIRECTOR OF HORTICULTURE

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<th>Part-A: Written (Objective type) Examination</th>
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SYLLABUS

PAPER-1 GENERAL STUDIES

1. SCIENCE AND TECHNOLOGY:
   o) General Science and Technology
   p) Role and impact of science and Technology on India’s development.
   (Questions will cover general appreciation and understanding of matters of everyday observation and experience as may be expected of a well-educated person who has not made a special study of science and technology disciplines).

2. INDIAN HISTORY AND CULTURE:
   cc) Modern Indian History from 19th century to the present
   dd) Nationalist Movement and Constitutional development
   ee) Indian culture and Heritage including architecture, Fine Arts, dance forms, music, paintings, Folk arts and performing arts.
   ff) History of Andhradesa Society, Culture, Geography and Economic development.

3. INDIAN POLITY:
   General and broad understanding of the structural (institutions) and functional (processes) aspects of Indian Political system.

4. INDIAN ECONOMY AND GEOGRAPHY OF INDIA:
   (a) Structure of National economy
   (b) Economic development (including planning) since independence
   (c) Economic Reforms
   (d) Physical, economic and social Geography of India.

5. CURRENT EVENTS:
   Current Events of Regional, National and International importance.

6. GENERAL MENTAL ABILITY: (Reasoning and analytical abilities)

PAPER-2 SUBJECT

HORTICULTURE

PART – A

FUNDAMENTALS OF HORTICULTURE


Temperature, light, humidity, rainfall and soil requirements for horticultural crops. Selection of site for establishing an orchard, orchard plan, systems of planting and establishment of an orchard. Importance, scope and practicing of organic farming in horticultural crop production.

Nutrition of horticultural crops – assessment of nutritional requirements based on soil, tissue analysis, and field experiments. Identification of deficiency symptoms of various nutrients and methods of nutrient application. Assessment of irrigation requirements for different horticultural crops and different methods of irrigation. Pruning and training, their objectives and methods. Pollination and fruit set, problems and requirements, flower and fruit drop, stages, causes and remedial measures. Fruit thinning, objectives, advantages and disadvantages. Unfruitfulness, reasons and remedial measures.
2. PLANT PROPAGATION AND NURSERY MANAGEMENT


Sexual propagation and its importance. Seed germination, process of seed germination. Factors affecting seed germination and pre-germination treatments and viability tests.


Importance of micro propagation of plants. Types of asceptic cultures. Types of media, preparation of media and inoculation of explants, establishment, sub culture and rooting of explants. Establishing of in vitro rooted cuttings in growing media and hardening.

3. FRUIT CROPS

Area, production, importance, uses, origin, distribution, botany, classification of varieties, use of rootstocks, high density planting, climate, soils, planting methods, training and pruning, nutrition, irrigation scheduling, intercrops, weed control, problems in orchard management, flowering, fruit set, problems in fruit set, harvesting indices, harvesting, preharvest treatments, use of growth regulators, yield, grading, packing for internal and export markets, ripening methods and storage in respect of mango, banana, citrus, grape, pineapple, guava, papaya and sapota.

PART – B

4. VEGETABLE CROPS

Importance of vegetables in human diet and national economy. Detailed study regarding origin and distribution, area and production, importance, nutritive value, botany, varieties, soil and climatic requirements, seed treatment, seed sowing/nursery raising, transplanting, nutrition, irrigation, intercultural operations, physiological disorders, harvest indices, harvesting, post harvest handling, curing, storage and usage of plant growth regulators in vegetable crops like tomato, brinjal, chillies, sweet pepper, potato, okra, cucurbitaceous crops like cucumber, pumpkin, ridge gourd, snake gourd, bitter gourd, bottle gourd, melons like water melon and must melon, leguminous vegetables like cluster bean, French bean, dolichos bean, pea and broad bean, cole crops like cabbage, cauliflower and knolhol, root crops like radish, carrot, beetroot and turnip, bulb crops like onion and garlic, tuber crops like sweet potato, tapioca, amorphophallus, colocasia, dioscorea and yam, leafy vegetables like amaranthus, palak, Roselle, perennial vegetables like drumstick, coccinia and murraya.

5. PRESERVATION OF FRUITS AND VEGETABLES

Importance and scope of fruit and vegetable preservation in India. Principles of preservation by heat, low temperature, chemicals and various methods of preservation. Selection of site for processing, processing unit layout and precautions for hygienic conditions of the unit. Preservation of fruits and vegetables through canning, bottling, freezing, dehydration, drying, ultraviolet and ionizing radiations.

Micro-organisms associated with spoilage of fruit and vegetable products. Spoilage of canned products-hydrogen swell, filipper, dent, leak etc., Biochemical changes associated with spoilage of fruit and vegetable products. Preservatives and colours permitted and prohibited in India.

Different kinds of equipments used in processing. Preparation of jams, jellies, marmalades, candies, crystallized and glazed fruits, preserves, chutneys, pickles, ketchup, sauce, puree, syrups, juices, squashes and cordials.

6. PLANT PHYSIOLOGY (INCLUDING C3 & C4 PLANT) PHOTOSYTHESIS RESPIRATION ETC. GROWTH REGULATION & HORMONES


Role of plant growth regulators in seed and bud dormancy, juvenility, maturity and senescence, flowering, pollination, fruitset including parthenocarpy, fruit growth, fruit drop and fruit ripening (climacteric and non-climacteric) and fruit colour development, tuber and bulb formation and
sex expression and extension of shelf life in fruits, vegetables and flowers. Role of growth regulators in plant propagation.

6(a) ENTOMOLOGY

Commonly occurring pests, life cycle of pests, control measures.

6(b) PATHOLOGY

Commonly occurring diseases, life cycle of bacteria, fungal parasites, control measures.

PART – A

1. COMMERCIAL FLORICULTURE

Area, production, importance, uses, origin, distribution, classification of varieties, propagation, environmental factors affecting growth and flowering, soils, nutrition, irrigation, weeding, special techniques of production such as controlling growth and production of flowers, use of growth regulators, harvesting, postharvest handling, extension of shelf life of flowers of commercial flower crops such as rose, chrysanthemum, jasmine, carnations, gladiolus, anthurium, tuberose, china aster, marigold, crossandra and gerbera.

2. GREENHOUSE MANAGEMENT OF HORTICULTURAL CROPS

Importance, uses, scope and production of horticultural crops in greenhouse. Status and development of greenhouse production of horticultural crops in the world and India. Development, constraints, research needs and future of protected culture of horticultural crops in India and A.P. Points to be considered before establishing a greenhouse. Types of greenhouses, classification of greenhouses based on the shapes, material used, utility and cladding material used. Size and arrangement of greenhouses and characteristics of various greenhouse cladding materials, greenhouse benches etc.,

Management of light, temperature (greenhouse heating and cooling), CO₂ and relative humidity inside the greenhouse.

Various types of growing media used and their suitability for different horticultural crops. Preparation of growing media and its pasteurization. Management of nutrients through fertigation.

Detailed production technology in respect of tomato, cucumber, rose, carnation, gerbera, chrysanthemum and anthurium under greenhouse/polyhouse.

3. MEDICAL, AROMATIC, SPICE, CONDIMENT AND PLANTATION CROPS

Origin, importance, export potential, varieties, climate, soil requirements, propagation and planting and after care, mauring, irrigation, training, pruning, harvesting, yield and post harvest handling, curing and processing practices, storage methods, and distillation of essential oils of the following crops.

Medicinal Plants

Aloe, amla(aonla), stevia, ashwagandha, dioscorea, opium poppy, sarpangandha, steroids bearing solanum, Phyllanthus amarus, chakramani, madhunasaini, sweet flag, Catharanthus, roseus, isabgol, fox glove, belladona, senna, tinospora, annatto, coleus, safed musli and asparagus.

Aromatic Crops

Citronella, lemon grass, palmarosa, vetiver, geranium, davana, mint lavender and vanilla.

Spices and condiments

Turmeric, ginger, coriander, fenugreek, cardamom, pepper, cinnamon, clove, nutmeg and cumin.

Plantation Crops

Coconut, cashewnut, oil palm, betelvine, coffee, tea, cacao, arecanut and rubber.

PART – B

4. ORNAMENTAL GARDENING AND LANDSCAPE ARCHITECTURE
Need for bioaesthetic planning, places suitable for bioaesthetic planning—towns, cities, villages, schools, temples, road side, parks, ghats of rivers and canals, platforms, railway lines, public and private buildings, institutes and places of worship. Study of ornamental trees, shrubs and climbers used in bioaesthetic or landscape gardening. Study of cacti, succulents and bonsai. Principles of garden designs, types of gardens—Japanese, English and Moghul gardens. Various features of gardens such as paths, garden walls, fencing, steps, edges, hedges, arches, pergolas, shrubbery, topiary, rockery, flower beds, lawns, fountains, statues, water garden, conservatory and glass or greenhouse. Indoor plants, and their management.

Flower arrangement—principles, styles, containers and holding solutions.

5. DRY LAND HORTICULTURE AND WATERSHED MANAGEMENT

Dry land horticulture farming, introduction, definition, dry climate and their classifications with reference to India in general and Andhra Pradesh in particular. Importance of horticultural crops in dry land, yield potential of agriculture and horticulture crops in dry lands. Fruits and vegetables crops suitable for dry land farming. Adaptive features of dry land fruit crops for drought and salinity.

Watershed management, objectives, approaches, steps in watershed development planning, land use capability, classification, soil and rain water conservation, water harvesting measures in watershed area. Problems and prospects under water shed. Alternate water use system.

Cultural practices like planting, training, pruning, nutrition and water management and harvesting of important dry land fruits viz., ber, pomegranate, custard apple, phalsa, fig, aonla, jamun and tamarind.

6. SOCIAL AND FARM FORESTRY

Introduction—forests in India, forest policy and law, gap between demand and supply of forest products. Principles of general silviculture.

Social forestry—need, objectives and scope, choice of species for fuelwood, fodder, smaller timber and timber, their culture, propagation, application of agro-techniques and economic benefits, management of social forestry plantations nurseries and their practices.

Afforestation on different problematic sites. Voluntary organizations and their role in promoting afforestation programmes. Maintenance and conservation of village woodlots. Energy plantations. Social forestry for watershed management.

Farm forestry—objectives and role, need for shelter belts and wind breaks, types of farm forestry.

Agro forestry—need, objectives, scope, principles and practices of agro forestry systems, choice of the tree species, and management implications.

Forest products, their processing and use.