SCHEME AND SYLLABUS FOR RECRUITMENT TO THE POST OF DEGREE COLLEGE LECTURERS IN GOVERNMENT DEGREE COLLEGES

(P.G. Standard)

<table>
<thead>
<tr>
<th>Papers</th>
<th>No. of Questions</th>
<th>Duration (Minutes)</th>
<th>Maximum Marks</th>
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<tr>
<td><strong>PART-A: Written Examination (Objective Type)</strong></td>
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<tr>
<td>Paper-1: General Studies</td>
<td>150</td>
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<td>Paper-2: Concerned Subject (One only)</td>
<td>150</td>
<td>150</td>
<td>300</td>
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<td><strong>PART-B: Interview (Oral Test)</strong></td>
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1. The Candidates have to choose one subject from the following for Paper-2:

1. English  
2. Commerce  
4. History  
5. Political Science  
7. Physics  
8. Botany  
10. Statistics

N.B:
1. The selections to these posts will be based on the total marks obtained by the candidates at the written examination and oral test taken together subject to the rule of reservation.
2. The eligible candidates will be called for an interview at the ratio of 1:2 with referenced to the number of vacancies duly following the special representation as laid down in General Rule-22 and 22-A of A.P. State and Subordinate Service Rules.
3. Appearance to Written Examination and Oral Test is compulsory for final selection.
4. For Paper-2 i.e., concerned subject the candidates have to write the subject of study at Post Graduate level but not other subject

SYLLABUS

PAPER-1: GENERAL STUDIES AND MENTAL ABILITY

1. General Science – Contemporary developments in Science and Technology and their implications including matters of every day observation and experience, as may be expected of a well-educated person who has not made a special study of any scientific discipline.

2. Current events of national and international importance.

3. History of India – emphasis will be on broad general understanding of the subject in its social, economic, cultural and political aspects with a focus on AP Indian National Movement.

4. World Geography and Geography of India with a focus on AP.

5. Indian polity and Economy – including the country’s political system- rural development – Planning and economic reforms in India.

ENGLISH

Detailed Study of literary age (19th Century) viz.,

The period of English Literature from 1798 to 1900 with special reference to the works of the major writers including Wordsworth, Coleridge, Byron, Keats, Shelley, Lamb, Hazlitt, Thackeray, Dickens, Tennyson, Browning, Arnold George Eliot, Calyle and Ruskin.

Study of the following Texts:

1. William Shakespeare     :  'Macbeth', 'Hamlet', 'Julius Vrdsst', 'Tempest'
2. John Milton             :  'Paradise Lost', -Books I & II
3. Alexander Pope          :  'The Rape of the Lock'
5. John Keats              :  'Ode to a Nightingale'
6. P.B. Shelley            :  'Ode to the West Wing'
7. Jane Austen             :  'Pride and Prejudice'
8. Charles Dickens         :  'A Tale of Two Cities'
9. Thomas Hardy            :  'The mayor of Casterbridge'
10. W.B. Yeats             :  'Byzantium', 'The Second Coming'.
12. D.H. Lawrence          :  'Sons and Lovers'.
I. Study of the following ten authors and poets:
1. Kabir
2. Tusidas
3. Bihari
4. Surdas
5. Acharya Ramachandra Shukla
6. Premchand
7. Prasad
8. Pant
9. Nirala
10. Dinakar

II. Appreciation of the popular couplets of Tulsi, Kabir, Rahim, Vrinda etc., and a few lines from modern poets of Prasad, Pant etc.

III. Origin and development of prominent literary genres in modern Hindi, e.g. Novel, Short Story, Drama, Criticism.

IV. The study of the following eight trends of the history of Hindi Literature.
1. Gyan Margi Shakha
2. Prem Margi Shakha
3. Ram Bhakti Shakha
4. Krishna Bhakti Shakha
5. Riti kavya
6. Chayavada
7. Pragativada
8. Nai Kavita

V. History of various aspects of Hindi Language, eg:
2. Evolution of Khari Boli Hindi as literary language during 19th Century
3. Development of Hindi as Rastra Bhasha during freedom struggle and as official language of Indian Union since Independence.
4. Major Dialects of Hindi and their inter-relationship
5. Functional and significant grammatical features of standard Hindi
01. The study of the following Ten Authors and Poets:
   1. Mohammad Quli Qutub Shah
   2. Wali.
   3. Meer.
   4. Anees.
   5. Ghalib.
   8. Iqbal.

02. Appreciation of couplets of renowned poets.

03. The Study of the following eight trends of the History of Urdu Literature.
   1. Development of Urdu under the Qutubshahis, and the Adil Shahis.
   2. Delhi School.
   3. Lucknow School.
   4. Fort William College.
   5. Alighar movement.
   6. Iqbal and his Age.
   8. Impact of progressive movement.

04. Study of various aspects of Language and Literature.
TELUGU


b) Vemana, his philosophy – Observations and views on his times – his importance as commentator on contemporary times – his relevance now.


b) Classical and Neo-classical trends – Modern Age.


IV. Study of Telugu Grammar and General Prosody – Balavyakaranam and Praudha Vyakaranam.

V. Study of History and Evolution of Telugu language – From the early period of Modern period – The place of Telugu among the language families of India in general and the Drvidian family in particular Geographical positions and distribution – dialectal forms etc.

VI. Study of Philology – Linguistics and Semantics – Modern period: Evolution of Telugu through linguistic and literary movements (like the spoken Telugu movements, etc.)

VII. Study of Evolution of Telugu literature from the early period of Modern period covering all the ages.

VIII. Study of Aesthetics and Literary criticism (Eastern and Western outlook)

ECONOMICS


2. Price Theory: Law of Demand: Utility analysis and Indifference Curve techniques, Consumer equilibrium, Cost curves and their relationships; equilibrium of a firm under different market structures; pricing of factors of Production.

3. Money and Banking: Definitions and functions of money (M1, M2 M3): Credit creation; Credit; Sources, Costs and availability; theories of the Demand for money.

4. International Trade: The theory of comparative costs; Recardian Hockseher Ohlin; the balance of payments and the adjustment mechanism. Trade theory and economic growth and development.

5. Economic growth and development; Meaning and measurement; characteristics of under development; rate and pattern, Modern Growth; Sources of growth distribution and growth-problems of growth of developing economics.

II. Indian Economy-India's economy since Independence; trends in population growth since 1951, Population and poverty; general trends in National Income and related aggregates; Planning in India Objectives, Strategy and rate and pattern of growth; problems of Industrialization strategy; Agricultural growth since Independence with special reference to food-grains; unemployment; nature of the problem and possible solution, Public Finance and Economic Policy.

III. Identification of backward regions and the problems of regional development with special reference to Andhra Pradesh.
Financial Management:
Corporation Finance – Economic and Managerial Aspects – Finance Education
Financial Plan – Operating and Financial leverage – Capital Structure determinants
Internal Financial Control – Ratio Analysis – Break-even Analysis – Sources and uses of funds statements
Economics and Income retention – dividend policy - Financial aspects of expansion, reconstruction and recognition

Industrial Organisation:
Concepts of Industry, Firm and Plant
Size of Units – Optimum firm and representation firm – Size in private and Public Sectors in India-
Location – Concepts of location and localization – Location criteria – Factors influencing localization – Measures of localization – Localisation pattern in Indian industry – Balanced Regional Development – Location development of managers – Performance appraisal
State and Industry – Operational Control over Private Industry
Labour Economics and Industrial Relations.
Labour in Industrial Society – Man power problems of under-developed countries
Economics of the Labour Market – factors affecting supply and demand for labour – Concepts of full employment, unemployment – different types of unemployment – Causes – Effects and remedial measures, labour mobility – Absenteeism and turnover.
Social security and Labour welfare – Problems of Social security in a developing economy– Social Security in India; Settlement of Industrial disputes – Machinery for the same Collective bargaining – Objectives and methods – Issues in Bargaining
Tripartite bodies in Industrial Relations

Management:
Organisation concept – different approaches to the study of Organisation. Constraints over organisational and managerial performance. Principles of organisation
Planning – Business Objectives – Social responsibilities of business
Authority, Power, Influence and the art of delegation, Span of Supervision
Line and Staff relationships
Bases and problems of departmentation
Centralisation and Decentralisation
Bureaucracy-Committee management
Top management functions and the role of the Board
Control functions in organisations
Group dynamics
MATHEMATICS


PHYSICS

I. Mathematical Physics:
Matrices: Quality, addition and subtraction, multiplication of matrices, inverse of a matrices, similarity and unitary transformation Characteristic equation of a matrix Eigen values – Eigen vectors Square, diagonal, unit, symmetric, and skewmatrix-Hermitian and unitary matrix.

II. Classical Mechanics:

III. Electromagnetic Theory:

IV. Special Theory of Relativity:

V. Statistical Mechanics:

VI. Quantum Mechanics:
Shordinger’s wave equation – Born interpretation of wave functions – Expectations values of dynamical variables – Ehrenfests’ Theorem - Uncertainty Principle – Application of Shordinger’s equation to (a) One dimensional squarewell potential (b) Simple harmonic Oscillator (c) Hydrogen atom.

VII. Electronics:

VIII. Solid State Physics:

IX. Nuclear Physics:

X. Spectroscopy:
CHEMISTRY

Inorganic Chemistry:
8. Study of the following elements and their modern Chemistry Be, Ti, Zr, Hf, V, Mo, W, U, and Th.

Physical Chemistry:
14. Entropy change in an isolated system for reversible and irreversible processes – Variation on entropy of a system with temperature and pressure.

Organic Chemistry:
14. Heterocyclic compounds and chemistry of nutral products – Importance of heterocyclic compounds – classification based on the nature of heterocetom, size of the ring and II excessive and II deficient nature of the ring.
A general and comparative study of Furan pyrole and thiophene Ring transformations. General comparison with benzenoid compounds, pyridine, quinoline, Isoquinoline and acrdine-deficient nature of heterocylic rings – case of nucleophilic substitution.
15. Methods of synthesis, reactivity and properties of the following polynuclear aromatic compounds: anthracene, Benzanthracene, Phenontherene Chryeneand picene.
20. Carbohydrates: General reactions of monosaccha rides – configurational studies on glucose, fructose, sucrose, Recent advances in the Chemistry of cellulose and starch.
22. General Ideas regarding the chemistry of vitamins & Harmones nicotine, B-Carotene and Vitamin C.


Physical Chemistry:


28. Surface Chemistry and catalysis – Absorption isotherms, surface area determination, heterogeneous catalysis, acid-base and enzyme cotolysis.
I. Bacteria and Viruses:
2. General account of bacteria – Characteristics, shape, ultrastructure of the cell, nutrition, reproduction, classification and importance.

II. Plant Pathology:
1. Disease symptoms produced by Bacteria, Fungi, and Viruses.
2. A general account of important diseases of crop plants and their control:
   a) Late blight of potato
   b) Smuts (Wheat, Jowar)
   c) Rust of wheat
   d) Leaf spot of groundnut.
   e) Paddy blast.
   f) Leaf spot of rice.
   g) Citrus cancer
   h) Bacterial blight of paddy.
   i) Angular leaf spot of cotton.
   j) Mosaic of Tobacco.
3. Mycoplasma.
4. Control of plant diseases (A general account)

III. Algae (Phycology)
1. Introduction and general classification of Algae.
2. Criteria for the classification.
3. Thallus organization in Algae.
4. Economic importance of Algae.
5. General characters, structure, Reproduction, pigments, phylogeny, life cycles etc., of main groups in Algae with reference to Genera Given:
   a) Cyanophyceae (Nostoc, Scytonema, Oscillatoria).
   b) Chlorophyceae (Chlamydomonas, Volvox, Cladeopora, Oedogonium, Coleochaete, Chara).
   c) Bacillariophyceae – General Account.
   d) Xanthophyceae – Vaultheria]
   (e) Phaeophyceae (Ectocarpus, Laminaria)
   (f) Rhedophyceae (Polysipheonia, Gracillaria)

IV. Fungi (Mycology):
2. General characters, morphology, reproduction, phylogeny, affinities etc., of the following : main groups with special reference to Genera given below:
   a) Mytomycetes (stemonites).
   b) Plasmodiophoromycetes (Plasmodiphora).
   c) Mastigomycotina (Saprolegnia, Phytophthora).
   d) Zygomycotina (Mucor).
   e) Ascomycotina (Taphnia Euortium, Erysipe, Pleospora Neuropora).
   f) Basidiomycotina (Puccinia, Agaricus).
   g) Deuteromycotina (Cercospora, Colletotrichum, Phoma).
3. Economic importance of Fungi.

V. Bryophyta:
1. General characters of Bryophyta.
2. Sporophyte evolution in Bryophytes.
3. Classification of Bryophytes.
4. General account of the following main groups.
   a) Hepaticopsida,
   b) Anthoceratopsida,
   c) Bryopsida.
5. Structure, reproduction and systematics of the following genera:
   a) Marchantia,
   b) Anthoceros,
   c) Sphagnum
d) Funaria.
3. Economic importance of Fungi.

VI. Pteridophyta:
1. General characters of pteridophytes.
2. Classification of pteridophytes.
3. General characters of the following main groups:
   a) Psilopsida;
   b) Lycopsida;
   c) Sphenopsida (Eusporangiate and Leptosporangiates):
4. Morphology, anatomy, reproduction and affinities of the following genera:
   a) Psilotum;
   b) Lycopodium;
   c) Selaginella;
   d) Ophioglostum;
   e) Marsilea;
   f) Pteris.
VII. Palaeobotany:
1. Fossil pteridophytes.
2. Origin and evolution of land plants.
3. Homospory, Heterospory and Origin of Seed.
4. Telome theory and origin of sporophyte.
5. General account of the following fossil Gymnosperms.
   a) Pteridosperms; b) Bennittitales; c) Cordaitales; d) Pentoxylales.

VIII. Gymnosperms:
1. Gymnosperms.
2. Comparative account of morphology, life history, Affinities etc. of the following:
   a) Cycadophyta – Cycas, Zarnia,
   b) Coniferophyta – Pinus.
   c) Ginkgophyta – Gintgo.
   d) Chlamydospermatophyta : Ephedra, Welwetschia, Gnetum.
3. Classification of Gymnosperms.

IX. Taxonomy of Angiosperms:
3. International code of Botanical nomenclature, principles, Typification, Citation and authority.
4. Recent trends in Taxonomy:
   a) Biosystematics; b) Chemataxonomy; c) Serodiagnostic test and classification,
   d) Numerical taxonomy.
5. Study of the following families with reference to their characteristics, economic importance, attributes etc.,
   a) Ranuculacease, e) Malvaceae, i) Apocynaceae, m) Solanaceae,
   b) Caryophyllaceae, f) Tiliacee, j) Asclepiadaceae, n) Euphorbiaceae,
   c) Sterculiaceae, g) Rubiaceae, k) Boraginaceae, o) Poaceae.
   d) Sapotaceae, h) Compositae, l) Convolvulaceae.

X. Anatomy and Cell Biology:
1. Ultra structure of the cell and cell organelles along with their functions.
2. Cell wall structure.
3. Tissue and Tissue systems.

XI. Embryology:
1. Concept of primitive flower.
2. Development of anther and ovule.
3. General account of Embryosac and types of Embryo.
4. Fertilization.
5. Endosperm morphology and types.
6. Polyembryony and apomixis.

XII. Cytology, Genetics and Evolution:
1. Mitosis and Meiosis.
2. Chromosome (Morphology, Structures importance etc.).
4. Genetic code.
5. Linkage and crossing over.
6. Parasexuality.
7. General account of Mutations
8. Polyploidy and its role in crop improvement.

XII. Ecology and Phytogeography:
1. Ecosystem: - Concept, botic and abiotic components, ecological pyramids, productivity.
2. Geo-chemical cycles.
   (Carbon, Nitrogen, Sulphur, Phosphorous cycles).
4. Floristic regions of the world.
5. Floristic zones of India.
XIV. Physiology:
1. Absorption and translocation of water.
2. Transpiration and stomatal behaviour.
3. Absorption and uptake of ions, Donnan’s equilibrium.
4. Role of micronutrients in plant growth.
5. Translocation of solutes.
6. Respiration (Glycolysis, pentose phosphate shunt, structure and role of mitochondria, Krebs cycle, Oxidative phosphorylation, Photorespiration, Respiratory quotient, Fermentation, Pasteur effect Factors affecting).
8. The enzymes: Nomenclature and classification, structure and composition, Mode of enzyme action, Factors affecting.
10. Plant hormones Auxins, Gibberellins, Cytokinins, Abscissic acid (General account).

XV. Economic Botany:
1. Cultivation, economic importance, systematic position and morphology of the following plants.
   (a) Rice    (e) Sugarcane   (l) Coffee    (m) Rauwolfia
   (b) Wheat  (f) Groundnut   (j) Tea       (n) Pigeon pea
   (c) Jowar   (g) Sunflower   (k) Jute      (o) Pearl millet.
   (d) Cotton  (h) Castor      (l) Cardamom

XVI. Recent Aspects of Botany:
1. Modern techniques
   a) Electron microscopy,  e) Electrophoresis
   b) Phase contrast microscopy  f) The tracer technique
   c) Spectro photometry  g) Auto radiography
   d) Chromatography  h) Sero-diagnostic methods.
2. Genetic engineering.
3. Plant tissue culture.
5. Social forestry.
6. Microorganisms as tools in understanding biological systems.
7. Environmental pollution (Water, soil, air) health hazards and control.
Non-chordata and Chordata:

Non-Chordata:
3. Cnidaria: Excretory system in coelenterates, Metagenesis, coral formation, etenopha.
5. Annelida: Excretory system in Annelida, Coelome formation.
7. Mollusca: Respiritation in Mollusca, Torsion and Detorsion, pearl formation and Pearl industry.

CHORDATA:
HISTORY

Ancient India:
1. Harappan Civilisation -- Extent, major cities, Characterstic features, social and economic conditions, script, religious paractices, causes for the decline.
2. Vedic Age: Importance of Vedic literature, political, social and economic conditions in the early and later vedic age.
4. Mauryan Age: political history of the Mauryans, Ashoka, Mauryan Administration, Social and economic conditions, decline of the Mauryan empire.
5. The Sathavhanas: political history, administration, contribution to the culture.
6. Gupta period: Political history, administration, social and economic conditions, growth of culture, decline of the empire.
7. India in the 7th Century A.D.: Harsha vardhana, Pallavas and Chalukyas, their political history and their contribution to culture.

Medieval India:
8. India between 650 and 1200 A.D. -- political, Social and economic conditions, Chola administration and culture, Sankaracharya.
10. The Vijayanagar Empire: Origin, History, Krishnadevaraya, Social and economic conditions, growth of culture, decline.
11. Mughal Age (1556-1707): political history, Akbar, Administration, Social and Economic conditions, culture, decline of the Mauryan empire Maharattas and Shivaji.

Modern India (1757-1947):
12. Historical forces and factors which led to the establishment of the British power in India -Early resistance to the British power in India - Hyder Ali, Tippu Sultan, causes for their failure.
15. Revolt of 1857: Causes, results, significance.
16. Rise and growth of the Indian National Movement: Birth of the Indian National Congress, the national movement from 1885 to 1905; movement from 1905 to 1920. Role of Tilak and Annie Besant; The movement from 1920 to 1947; Emergence of Gandhi; Non-cooperation movement, Salt Satyagraha and the Quit India Movement.

Freedom movement in Andhra Pradesh with special reference to the role ofAlluri Sitharama Raju and Tanguturi Prakasam, Revolt against the Nizam's rule in Telengana.

Modern world:
17. Industrial Revolution - Significance and results.
18. American war of Independence courses, significance and results.
19. French Revolution - Courses, significance and effects.
20. National Liberation movements in Italy and Germany in the 19th Century - Mazzini, Cavour, Garivildi, Bismark.
22. The Russian Revolution of 1917 - Causes, importance and results.
23. The World between the two world wars - Nazisms in Germany, Fascism in Italy. Turkey under Mustafa Kamal Pasha
25. II World War -- Causes and effects.
POLITICAL SCIENCE

6. Problems of Third World. New Colonialism – Non-alignment India’s role in world affairs.
PUBLIC ADMINISTRATION

2. Theories of Administration – Classical, Human Relations, Ecological, Systems approach – Decision-making
3. Concept of Development - Administration and Comparative Administration
6. Administrative adjudications, Delegated Legislation
7. Controls over Administration – Legislative, Executive, Judicial
10. Centre- State and State-Local Relations in India
11. Planning in India – Planning Commission, Planning Process at National and State levels – Concept of Block Planning
12. State Administration – Organisation, Secretariat, Minister – Civil Servant relations – Directorates – Boards of Revenue, Functional Commissioners, Regional Administration, Divisional Commissioners, District Administration
01. PROBABILITY AND STATISTICS:

Sample space, events: Classical, Axiomatic and statistical definition of probability of an event. Addition and multiplication theorems of probability; conditional probability and Bayes theorem.


Bionomial, Poisson, Geometric and Negative binomial distributions and their simple properties (such as mean, variance, characteristic function inter-relationship if any)

Normal, exponential, gamma and beta distributions and sampling distributions; their inter-relationships and their simple properties.

Collection, classification and analysis of statistical data. Measures of location and dispersion, moments-raw and central. Correlation and regression; regression lines. Curve fitting by the method of least squares, for the types:
(i) $Y=a+bx^2$; (ii) $Y = a+bx+cx^2$; (iii) $Yx=ab$; and (iv) $Yb=axb$

02. INFEERENCE:


Test of significance, statistical hypothesis, types of errors, level of significance, power of a test, large sample tests for means and proportions (one sample and two sample case). Small sample tests (t-test for one and two sample case). Chi-square tests-testing of goodness of fit, testing independence of attributes.

Run test for randomness, Sign test for location, Wilcoxin-Mann-Whitney test and Kolmogorov-Smirnov test.


03. SAMPLING TECHNIQUES:


Regression Estimators: Regression estimates with preassigned value of b.estimates when b. is computed from sample estimate of variance. Linear regression estimator under a linear regression model.

Regression estimates in stratified sampling Regression coefficient estimated from sample.


Sections: Ch. 2:2.1 to 2.8
Ch. 3:3.1 to 3.2
Ch. 4:4.4 to 4.6
Ch. 5:5.1 to 5.12
Ch. 7:7.1 to 7.4
Ch. 7:8 to 7.10
04. EXPERIMENTAL DESIGNS:

Advantages, disadvantages, layout of the design analysis of the design and missing experimental unit analysis (where applicable) in case of the following design:

Completely Randomised design, Randomised Block design, Latin square design and the Factorial design (22 and 23 factorial designs only)


Chapter IV : IV-1-1 to IV-1-5
Chapter V : V-1-1 to V-1-4, V-1-6-1
Chapter VI : VI-1-1 to VI-6, VI-1-9-1
Chapter VII : 4-1, VII-1-2

Sd/- Secretary
01/07/2008
COMPUTER SCIENCE


Principles of Programming Languages: BNF, Variables, Data Types, Control Structures, Scope and Extent, Data Abstraction, Concurrency concepts, Exception Handling, Functional Programming, and Logic Programming.

Compiler Design: Types of grammar, Phases of compiler, Lexical Analysis, Parsing Techniques, Code generation and Optimization.


Network Security: Data Encryption and Decryption, Symmetric Key algorithms like DES, IDEA and AES, Public Key Cryptography, RSA algorithm, Digital Signatures & Authentication, Firewalls and VPN.
COMPUTER APPLICATIONS


**BIOTECHNOLOGY**


**MICROBIOLOGY:** Discovery of the microbial world; Distinguishing features of prokaryotes and eukaryotes; General role of microorganisms in transformation of organic matter and in the causation of diseases; Microbial taxonomy, classification, nomenclature and new approaches to microbial taxonomy; Pure culture methods; sterilization methods; Principles of microbial nutrition and construction of culture media; Enrichment culture techniques; Growth and its mathematical expression; Culture collection and maintenance of cultures; Purple and green bacterial; Ricketsias; Chlamydia and Mycoplasma. Archea; Viruses: structure and replication of viruses; DNA viruses and RNA viruses; Viroids and Prions; Virus and their Genetic System; Bacteriophages; RNA phages; Retroviruses.

**IMMUNOLOGY:** Phylogeny of Immune System; Innate and acquired immunity; Hematopoiesis and differentiation, Cells and organs of the immune system; Lymphocyte trafficking; Antigenicity and super antigens; Antibody structure and function, Antigen – antibody interactions; Major histocompatibility complex, BCR & TCR and generation of diversity; Complement system, Antigen processing and presentation, generation of humoral and cell mediated immune responses: Activation of B-and T-lymphocytes, Cytokines and their role in immune regulation; Cell mediated cytotoxicity, Hypersensitivity, Autoimmunity, Transplantation, Tumor Immunology, AIDS and other Immunodeficiencies; Hybridoma Technology.

**BIOPROCESS ENGINEERING:** Engineering calculations, SiT units, Dimensional analysis, presentation and analysis of data, fermenters and bioreactors, Friction factor, pressure drop, Fluid flow and mixing, Material balances, Energy Balances and heat transfer, calculation of heat transfer coefficients, cell concentration and stirring. Boiling and evaporation, Mass transfer, unit operations: Filtration, centrifugation, cell disruption. Downstream processing, industrial applications of bioprocessing.

ENVIRONMENTAL BIOTECHNOLOGY: Ecological balance, resiliency of ecosystem and sustainable development, environmental pollution and global problems, water, air, soil pollution and their impacts on environment and biotechnological approaches for management, waste water treatment: aerobic and anaerobic processes, bioremediation of contaminated soils and waste land, biotechnological treatment for industrial effluents and solid wastes.


BIOINFORMATICS: Biological databases, ORF finding, EST analysis, gene identification, micro satellite repeat patterns, Blast all flavors, mutation matrix, global Vs local alignments, Dot plots, PAM and BLOSUM matrices, Multiple sequence alignments, dendrograms, phylograms, protein structure prediction methods, molecular modeling, Primer design, QSAR, Drug design.


GENERAL MICROBIOLOGY

General Microbiology: History of Microbiology, Microscopy, Structure of microbial cells, Spontaneous generation and germ theory of diseases, Prokaryotic cell, Eukaryotic cell, Organization and function of cellular organelles, Methods of sterilization, Isolation methods (Methods of pure culture isolation, Enrichment culturing techniques, single cell isolation, and pure culture development). Microbiological media and its types, culturing and cultivation of microorganisms. Preservation and Maintenance of Microbial cultures. Identification methods and classification of principles of bacterial taxonomy and classification, Importance of Algae and Fungi, Applications of microbiology in Industry, Agriculture and medicine.


Microbial Physiology: Microbial nutrition, Respiration and fermentation, Bacterial growth and growth curve.

Immunology: T cell, B cell, Immune response, Types of immunity, prophylaxis, vaccines. Major histocompatibility, complex and immunoglobulins. Immunological methods, Antigen- Antibody reactions, Adjuvants, Tumors, Hybridoma technology.

Chemotherapy: Types of antimicrobial agents and mode of action. Therapeutic agents, Chemical, non-medicinal antimicrobials- sanitizers, disinfectants, antiseptics, Antibiotics.

Biochemical Techniques: Enzymes, Enzymes nomenclature, Enzyme kinetics, Regulation of enzyme activity, Optical methods, Separation methods.


Medical Microbiology: Normal flora, Bacterial and viral infections (Air born, water born, food born, insect born and zoonotic), Mycosis, Medical diagnostics and Toxins.