

જાહેરાત ક્રમાંક - ૮૨/૨૦૧૮-૧૯

સરકારી વિનયન, વાણિજ્ય અને વિજ્ઞાન કોલેજો ખાતે માઈક્રોબાયોલોજી વિષયના મદદનીશ પ્રાધ્યાપક, વર્ગ-૨ પ્રાથમિક કસોટીનો અભ્યાસક્રમ ભાગ -૧

માધ્યમ:ગુજરાતી

કુલ ગુણ :૧૦૦

૧	ભારતની ભૂગોળ - ભૌગોલિક, આર્થિક, સામાજિક, કુદરતી સંસાધન અને વસ્તી અંગેની બાબતો- ગુજરાતના ખાસ સંદર્ભ સાથે
૨	ભારતનો સાંસ્કૃતિક વારસો- સાહિત્ય, કલા, ધર્મ અને સ્થાપત્યો- ગુજરાતના ખાસ સંદર્ભ સાથે
૩	ભારતનો ઇતિહાસ- ગુજરાતના ખાસ સંદર્ભ સાથે
૪	ભારતની અર્થવ્યવસ્થા અને આયોજન
૫	<p><u>ભારતીય રાજનીતિ અને ભારતનું બંધારણ:</u></p> <p>(૧) આમુખ (૨) મૂળભૂત અધિકારો અને ફરજો (૩) રાજ્યનીતિના માર્ગદર્શક સિદ્ધાંતો (૪) સંસદની રચના (૫) રાષ્ટ્રપતિની સત્તા (૬) રાજ્યપાલની સત્તા (૭) ન્યાયતંત્ર (૮) અનુસૂચિત જાતિ, અનુસૂચિત જનજાતિ અને સમાજના પછાત વર્ગો માટેની જોગવાઈઓ (૯) એટર્ની જનરલ (૧૦) નીતિ આયોગ (૧૧) પંચાયતી રાજ (૧૨) નાણા પંચ (૧૩) બંધારણીય તથા વૈધનિક સંસ્થાઓ- ભારતનું ચૂંટણી પંચ, સંઘ લોક સેવા આયોગ, રાજ્ય લોક સેવા આયોગ, કોમ્પ્યુટર એન્ડ ઓડિટર જનરલ; કેન્દ્રીય સતર્કતા આયોગ, લોકપાલ તથા લોકાયુક્ત અને કેન્દ્રીય માહિતી આયોગ</p>
૬	સામાન્ય બૌદ્ધિક ક્ષમતા કસોટી
૭	સામાન્ય વિજ્ઞાન, પર્યાવરણ અને ઈન્ફર્મેશન એન્ડ કોમ્યુનિકેશન ટેકનોલોજી
૮	ખેલ જગત સહિત રોજબરોજના પ્રાદેશિક, રાષ્ટ્રીય અને આંતરરાષ્ટ્રીય મહત્વના બનાવો

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Assistant Professor of Microbiology in Govt. Arts, Science, Commerce College
Class-II

Syllabus of Preliminary Test
Paper-1

Medium:Gujarati

Total Marks- 100

1	Geography of India-Physical, Economic, Social, Natural Resources and population related topics- with special reference to Gujarat
2	Cultural heritage of India-Literature, Art, Religion and Architecture- with special reference to Gujarat
3	History of India with special reference to Gujarat
4	Indian Economy and Planning
5	<u>Indian Polity and the Constitution of India:</u> (1) Preamble (2) Fundamental Rights and Fundamental Duties (3) Directive Principles of State Policy (4) Composition of Parliament (5) Powers of the President of India (6) Powers of Governor (7) Judiciary (8) Provisions for Scheduled Castes, Scheduled Tribes and backward classes of the society (9) Attorney General (10) NITIAayog (11) Panchayati Raj Institutions (12) Finance Commission (13) Constitutional and Statutory Bodies: Election Commission of India, Union Public Service Commission, State Public Service Commission, Comptroller and Auditor General; Central Vigilance Commission, Lokpal and Lokayukta, Central Information Commission
6	General Mental Ability
7	General Science, Environment and Information & Communication Technology
8	Daily events of Regional, National and International Importance including Sports

**Syllabus for the Preliminary Examination for the
recruitment of Assistant Professor (Microbiology), Class-II**

Medium: English

1. 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.

2. Virology

Structure and Classification of bacterial, plant and animal viruses, Methods of cultivation, detection, Propagation and maintenance of viruses. Some important viruses: TMV, HBV, HIV, T2 phase. Replication of viruses, Tumor viruses, Interferon.

3. Mycology

General characters of Fungi, Somatic structure, ultra-structure of fungal cell, hyphal modification, Cultivation of fungi, Importance of fungi, Diseases caused by fungi in plants and animals, Reproduction in fungi: Asexual and sexual methods of reproduction, parasexuality among fungi, fruiting bodies in fungi, Fungal classification, Brief outline of different classes of fungi:

(Structure, habitat, reproduction/life cycle and economic importance in general)

4. Microbial Physiology

Microbial nutrition and factors affecting, Enzymes, Respiration and fermentation, Microbial growth and growth curve, Evolution of energy metabolism; Bioluminescence; Quorum sensing; Bacterial differentiation: endospore formation and spore germination; Cell division and microbial response to stresses; Mechanism of antibiotic resistance; Membrane structure and transport mechanism; Cell signal and signal transduction; Biomolecules and Metabolism, Oxidative phosphorylation.

5. Immunology

Immunity and Immune response, T cell, B cell, Types of immunity, prophylaxis, vaccines. Major histocompatibility, complex and immunoglobulin. Immunological methods, Antigens, Antibodies and their Reaction, Adjuvants, Tumors, Hybridoma technology. Immune Disorders, Immunohaematology and Immunoprophylaxis, Cells and molecules involved in innate and adaptive immunity

6. Chemotherapy

Types of antimicrobial agents and mode of action. Therapeutic agents, Chemical, nonmedicinal antimicrobials - sanitizers, disinfectants, antiseptics. Antibiotics.

7. Biochemical Techniques

Enzymes, Enzymes nomenclature, Enzyme kinetics, Regulation of enzyme activity, Optical methods, Separation methods

Energy: its generation & conservation, Chemoheterotrophic Metabolism: Utilizable substrates, Catabolism of glucose, Tricarboxylic acid (TCA) cycle, Catabolism of fatty acids and

proteins, Chemoautotrophic and Phototrophic metabolism: Physiological groups of chemolithotrophs, Generation of ATP & reducing power in chemoautotrophs (forward and reverse etc), Phototrophic metabolism.

Biosynthesis: Principles governing biosynthesis, Assimilation of ammonia, nitrate, molecular nitrogen and sulfate, Biosynthesis of saturated and unsaturated fatty acids, Polymerization of Amino acids into polypeptides, Nucleotides into polynucleotide, Fatty acids into lipids, Biosynthesis of peptidoglycan, Methods of studying biosynthesis

8. Microbial genetics

Nucleic acids Structure and Replication. Transcription. Translation. Mutation and DNA Repair, Benzer's fine structure. Bacterial Transformation, transduction and conjugation, Plasmids, PCR, Cloning, Recombination, Recombinants

Agrobacterium genetics: Ti-plasmid, Interkingdom gene transfer (Key early experiments, vir regulon, protein secretion apparatus, conjugation model of T-DNA transfer, Integration products).

Viral genetics: Bacteriophages, Bacteriophage recombination (complementation, fine structure analysis).

Fungal genetics: Tetrad analysis and Mitotic recombination

Restriction-Modification systems, Transposable elements, Molecular markers, Gene chip and microarrays, Molecular biology of tumor, Apoptosis

9. Industrial microbiology

Exploitation of microbes in industry. Screening, Fermentation, fermenters, Fermentation media, Bioreactor Design and Fermentation Economics, Modes of Operations and Control parameters, Types of fermentations processes Scale-up of fermentations. Up and Down stream process. Strain improvement

and development. Fermentation productions-Ethanol, Beer, Wine and other alcoholic drinks, aminoacids, antibiotics, organic acids, vitamins, enzymes, biotransformations, probiotics, and solvents. Principles of vaccine production and types of vaccines. Industrial Quality control, quality assurance and Safety Measurement.

Typical Fermentation Processes: Penicillin, Citric acid, Ethanol, Vitamin B12, Lysine, Amylase

10. Agricultural and soil microbiology

Ecological significance. Soil Microorganisms, Mineralization, Soil humus formation, Nitrogen metabolism, Phosphate solubilization. Role of Microorganisms in Soil fertility and control of Plant Pathogens and Pematodes, Bio-fertilizers, Biopesticides, Rumen microbiology, termite microbial communities, Microbes in the production of energy from agricultural and domestic wastes. Rhizosphere, Mycorrhizae, Phyllospheree, Nitrogen Cycle, Sulphur Cycle, Carbon Cycle, Iron Cycle, Phosphorus Cycle, Plant Pathology

11. Medical Microbiology

Normal flora, Microbiota of Human Body and Epidemiology, Bacterial and viral infections (Air born, water born, food born, insect born and zoonotic), Mycosis, Medical diagnostics and Toxins. Host-Parasite Relationship. Clinical Microbiology: Types of specimen, method of collection, storage and transport, Methods used for diagnosis and identification of pathogen

12. Microbiology of Food

Fermented foods, Spoilage of foods, Food preservation methods, Food poisoning, Mycotoxins. Microbial degradation, Microbes as Food and Food Products: Fermented dairy products, Starter culture, Cheese: Types, curdling, processing, ripening, other fermented

dairy products, Introduction to probiotics, prebiotics and synbiotics,

Indian fermented food products, Microbes as food: Mushrooms, spirulina and yeasts, Methods in Food Microbiology: Biological methods, Bacteriological analysis of milk, Microbiological criteria of food safety

13. Microbiology of Water and Wastewater

Microbiology of Drinking Water: Natural waters, Microbial indicators of fecal pollution, Nuisance organisms in water, Water-borne diseases, Bacteriological examination of drinking water, Purification of drinking water: Sedimentation, filtration and disinfection

Microbiology of Wastewater: Types of wastewater, chemical and microbiological characteristics of waste water, BOD, COD and TOD as indicators of strength of wastewater, pollution, problems due to disposal of untreated wastewater, Methods of wastewater treatment

14. Microbial Biodiversity

Introduction, Methods of Assessing Biodiversity, Biodiversity among Bacteria & Archaea, Biodiversity among Eukaryotic and Acellular Microorganisms

15. Geomicrobiology

Microbial Habitats and Zonation, Methods in Geomicrobiology and Geomicrobial Processes: Non-molecular methods for geomicrobially important microorganisms, Molecular methods for geomicrobially important microorganisms, Geomicrobially important physiological groups of prokaryotes and their activity, Introduction of microbes as catalysts of geochemical processes

Geomicrobial Interactions: Biogenesis of minerals, Biodegradation of minerals, Biobeneficiation

Geomicrobiology of Fossil Fuel: Natural fossil fuels, Geomicrobiology of methane, Role of microbes in peat formation and conversion, Role of microbes in coal formation and desulphurization

16. Biostatistics, Bioinformatics and Bioinstrumentation

Principles of biostatistics, use of biostatistics in microbiology, determination of central tendency and dispersion of data, test of significance, correlation and regression analysis. Various biological databases. Sequence analysis microbial genomics, proteomics and phylogenetic analysis. Basic principles and applications of microscopy, spectroscopy, chromatography, electrophoresis, and centrifugation in microbiology.

17. Current Trends and Recent Advancements in Microbiology