Syllabus

Screening Test for Microbiology Laboratory Assistant Post

The syllabus is purposefully designed for screening test, emphasizing core concepts, laboratory skills, safety, diagnostics, and routine microbiological techniques. Focuses on daily duties of a **Microbiology Laboratory Assistant,** including media preparation, sterilization, staining, microbial identification, and basic diagnostics. It integrates medical, industrial, environmental, and diagnostic aspects while integrating balanced theory and practice from the M.Sc. curriculum. 10 credits with 50 targeted topics ensure thorough coverage of essential practical competencies and quality control.

The examination comprises **100 multiple-choice questions (MCQs),** with 10 questions per credit, evenly distributed across the 10-credit syllabus (50 topics). Each question will carry equal marks (1 mark/ MCQ) and total marks will be 100. The **total duration of the examination will be 120 minutes (2 hrs)** and all questions must be attempted within the stipulated time.

Credit 1: History, scope and laboratory safety

1. Historical milestones in microbiology (Pasteur, Koch, Jenner and Fleming)
2. Scope and branches of microbiology
3. Principles of microbial growth and nutrition
4. Handling and disposal of microbiological waste
5. Biosafety concepts and biosafety levels (BSL-I to BSL-IV)

Credit 2: Microscopy, staining, sterilization and aseptic techniques

1. Principles and working of light, bright-field, dark-field and phase-contrast microscopy
2. Electron and fluorescence microscopy
3. Staining techniques: simple, Gram, acid-fast
4. Aseptic techniques and working in laminar airflow
5. Sterilization methods and quality control

Credit 3: Culture media and microbial cultivation

1. Types and classification of culture media (natural, synthetic, selective, differential, enrichment)
2. Preparation and sterilization of culture media
3. Inoculation techniques: streak, spread, pour and slab plate
4. Anaerobic culture techniques
5. Pure culture techniques, Preservation and maintenance of cultures (sub-culturing, glycerol stocks, lyophilization)

Credit 4: Microbial identification, diversity and growth

1. Principles of microbial taxonomy and nomenclature
2. Bacterial growth curve and factors affecting growth
3. Colony morphology and cultural characteristics of bacteria and fungi
4. Motility testing (hanging drop, semi-solid media) and IMViC tests
5. Biochemical tests: Catalase, oxidase, coagulase, urease

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Credit 5: Basic diagnostic microbiology

1. Collection, transport and processing of clinical specimens (urine, sputum, stool, blood)
2. Direct microscopic examination of clinical samples
3. Antibiotic sensitivity testing (Kirby-Bauer disc diffusion method)
4. Interpretation of antibiotic susceptibility results
5. Detection of coliforms and faecal contamination (presumptive, confirmed tests)

Credit 6: Advance diagnostic microbiology

1. Identification of common bacterial pathogens (Staphylococcus, Streptococcus, E. coli, Pseudomonas)
2. Blood culture techniques and processing
3. Widal test for typhoid fever
4. VDRL/RPR test for syphilis
5. Basic fungal identification (KOH mount, lactophenol cotton blue)

Credit 7: Laboratory-relevant concepts on immunology

1. Cells and organs of the immune system
2. Antigens and antibodies: structure and functions
3. Antigen–antibody reactions (agglutination, precipitation)
4. Hypersensitivity and immunodeficiency (overview)
5. Immunodiagnostic techniques (ELISA, rapid tests)

Credit 8: Biochemistry, enzymology and microbial metabolism

1. Carbohydrates, lipids, proteins: structure and functions
2. Enzymes: classification and properties
3. Enzyme kinetics and inhibition
4. Fermentation vs respiration
5. Role of microbes in biogeochemical cycles

Credit 9: Basic biochemical and molecular techniques

1. Estimation of proteins (Lowry/ Bradford method)
2. Estimation of carbohydrates and lipids
3. Isolation of genomic/plasmid DNA from bacteria
4. Agarose gel electrophoresis of DNA
5. Basic PCR setup and visualization of PCR products

Credit 10: Applied, environmental and industrial microbiology

1. Water, soil, and food microbiology
2. Microbes in waste management and bioremediation
3. Industrial microbiology: enzymes, antibiotics, fermentation
4. Food spoilage, preservation, and safety
5. Laboratory ethics, safety, record keeping, and quality control