

M.Sc. MEDICAL MICROBIOLOGY
SEMESTER -IV EXAMINATION, JUNE-2026

PAPER – II : APPLIED MICROBIOLOGY-II

[Time allotted: Three Hours]**[Max Marks: 100]****Note:** Read all the instructions carefully

Answer all questions in serial order, Draw suitable diagrams wherever necessary

Q. 1. Objective type questions: (Reasoning/ MCQ)**(10 x 01 = 10)**

- a. Which of the following is the most common causative organism of urinary tract infection (UTI)? (PO1, CO1)
- Staphylococcus aureus*
 - Escherichia coli*
 - Pseudomonas aeruginosa*
 - Streptococcus pyogenes*
- b. Which specimen is most appropriate for laboratory diagnosis of bacterial meningitis? (PO1, CO2)
- Urine
 - Blood
 - Cerebrospinal fluid (CSF)
 - Sputum
- c. Which laboratory test is commonly used for screening HIV infection? (PO1, CO2)
- ELISA
 - Gram staining
 - Widal test
 - Mantoux test
- d. *Mycobacterium tuberculosis* primarily affects which organ system? (PO1, CO1)
- Cardiovascular system
 - Respiratory system
 - Nervous system
 - Gastrointestinal system
- e. Which culture medium is commonly used for blood culture processing in septicemia diagnosis? (PO1, CO2)
- Sabouraud dextrose agar
 - Blood culture broth
 - Lowenstein–Jensen medium
 - TCBS agar
- f. The causative organism of typhoid fever is: (PO1, CO1)
- Salmonella Typhi*
 - Shigella dysenteriae*
 - Vibrio cholerae*
 - Klebsiella pneumoniae*
- g. Which staining method is routinely used for detection of acid-fast bacilli in tuberculosis? (PO1, CO2)
- Gram stain
 - Albert stain
 - Ziehl–Neelsen stain
 - India ink preparation
- h. Which of the following is an important virulence factor contributing to bacterial pathogenesis? (PO1, CO1)
- Capsule
 - Ribosome
 - Cytoplasm
 - Flagellar basal body
- i. Blood culture should ideally be collected: (PO1, CO2)
- After starting antibiotic therapy
 - Before initiation of antibiotic therapy
 - At patient discharge
 - Only during recovery phase
- j. Which diagnostic technique is based on amplification of microbial nucleic acids? (PO1, CO2)
- ELISA
 - Culture
 - PCR
 - Microscopy

Q. 2. Structured questions**(03 x 10 = 30)**

- a. A patient presents with fever, productive cough, breathlessness, and radiological evidence of lung consolidation. Discuss the following: (3+2+3+2) (PO1, CO1, 2)
- Explain the etiopathogenesis of lower respiratory tract infections and factors contributing to disease progression.
 - Describe common microbial pathogens associated with respiratory infections.
 - Discuss laboratory investigations used for diagnosis, including specimen collection and interpretation.
 - Explain preventive strategies to reduce respiratory infections.

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- b.** A hospitalized patient develops high-grade fever, hypotension, and signs of systemic inflammatory response syndrome (SIRS). (2+2+4+2) (PO1, CO1, 2)
- i.** Define bloodstream infection and explain its etiopathogenesis.
 - ii.** Describe risk factors associated with septicemia and bloodstream infections.
 - iii.** Explain the principles and methods of laboratory diagnosis of bloodstream infections, including blood culture.
 - iv.** Discuss the significance of early diagnosis in patient management.
- c.** A patient presents with headache, neck rigidity, altered sensorium, and fever, raising suspicion of central nervous system infection. (3+3+4) (PO1, CO1, 2)
- i.** Explain the etiopathogenesis and common causative agents of meningitis.
 - ii.** Describe cerebrospinal fluid (CSF) changes associated with bacterial, viral, and fungal meningitis.
 - iii.** Discuss laboratory diagnostic approaches for meningitis, including direct microscopy, culture, and molecular methods.

Q. 3. Short answer type questions

(06 x 05 = 30)

- a.** Explain the pathogenesis and laboratory diagnosis of urinary tract infections (UTIs). (PO1, CO1,2)
- b.** Write a short note on the role of biofilm formation in microbial pathogenesis and persistence of infections. (PO1, CO1)
- c.** Describe the principle, procedure, and interpretation of antimicrobial susceptibility testing (AST) in infectious diseases. (PO1, CO2)
- d.** Discuss the laboratory diagnosis of enteric fever with emphasis on specimen selection and diagnostic methods. (PO1, CO2)
- e.** Explain the virulence factors involved in the pathogenesis of hospital-acquired bacterial infections. (PO1, CO1)
- f.** Write a short note on the application of molecular diagnostic techniques in identification of infectious diseases. (PO1, CO2)

Q. 4. Long Answer type questions

(02 x 15 = 30)

- a.** Discuss the etiopathogenesis, risk factors, clinical manifestations, laboratory diagnosis, and complications of gastrointestinal infections caused by common bacterial pathogens, highlighting the role of microbiological investigations in patient management. (PO1, CO1, 2)
- b.** Explain the principles, advantages, limitations, and clinical applications of conventional and advanced diagnostic methods used for identification of infectious diseases, including culture-based, serological, and molecular techniques. (PO1, CO2)