R3629

Sub. Code
530301

M.Sc. DEGREE EXAMINATION, NOVEMBER – 2025

Third Semester

Microbiology

MEDICAL MICROBIOLOGY

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** the following objective type questions by choosing the correct option.

1. Which biosafety level is appropriate for working with organisms that pose a moderate hazard to personnel and the environment? (CO1, K1)

   (a) Biosafety Level 1

   (b) Biosafety Level 2

   (c) Biosafety Level 3

   (d) Biosafety Level 4

2. Which is a key method to reduce nosocomial infections? (CO1, K3)

   (a) Routine use of antibiotics

   (b) Isolation of all patients

   (c) Proper hand hygiene by healthcare workers

   (d) Frequent disinfection of patient clothing

3. Which of the following is a primary virulence factor of Streptococcus pyogenes? (CO2, K1)

(a) Capsule (b) M protein

(c) Lipid A (d) Endotoxin

4. Which organism is responsible for gas gangrene? (CO2, K3)

(a) *Bacillus anthracis*

(b) *Clostridium perfringens*

(c) *Actinomyces israelii*

(d) *Corynebacterium dzphtheriae*

5. What is the primary mode of transmission for *Bordetella pertussis?* (CO3, K3)

(a) Contaminated food

(b) Aerosolized respiratory droplets

(c) Direct skin contact

(d) Fecal-oral route

6. What is the most common mode of transmission for *Yersinia enterocolitica?* (CO3, K4)

(a) Aerosolized respiratory droplets

(b) Contaminated food or water

(c) Direct skin contact

(d) Tick bites

7. Which of the following is a common clinical manifestation of blastomycosis? (CO4, K4)

(a) Chronic diarrhea

(b) Swollen lymph nodes

(c) Painful oral ulcers

(d) Pneumonia-like symptoms

8. Which condition is caused by the ingestion of *Taenia solium* eggs rather than larvae? (CO4, K4)

(a) Neurocysticercosis

(b) Tapeworm infection of the intestines

(c) Echinococcosis

(d) Ascariasis

9. For which neurological condition is Amantadine also prescribed? (CO5, K5)

(a) Alzheimer's disease

(b) Multiple sclerosis

(c) Epilepsy

(d) Parkinson's disease

10. What is the primary method of prevention against HPV-related diseases? (CO5, K5)

(a) Antiviral medications

(b) Routine blood testing

(c) Vaccination against HPV

(d) Antibiotics

Part B (5 × 5 = 25)

Answer **all** questions not more than 500 words each.

11. (a) List five general safety rules to be followed in a microbiology laboratory. (CO1, K2)

Or

(b) Explain the normal flora of the gastrointestinal tract and its functions. (CO1, K4)

12. (a) What are the laboratory methods for diagnosing Streptococcus pyogenes infections? (CO2, K5)

Or

(b) Describe the morphology, cultural characteristics, and laboratory diagnosis of *Staphylococcus aureus.* (CO2, K2)

13. (a) Write the control measures of the *Mycobacterium tuberculosis.* (CO3, K3)

Or

(b) Describe the general characteristics of the *Vibrio.* (CO3, K4)

14. (a) Discuss the laboratory diagnosis of *Cryptococcus neoformans.* (CO4, K3)

Or

(b) Explain the reproduction of *Entameoba histolytica.* CO4, K3)

15. (a) What are the control measures of Hepatitis B virus? (CO5, K4)

Or

(b) Discuss the mode of action of antiparasitic drug – Quinine. (CO5, K4)

Part C (5 × 8 = 40)

Answer **all** questions not more than 1000 words each.

16. (a) How are fecal samples processed for microbiological examination? (CO1, K4)

Or

(b) Outline the procedure for microbiological examination of a throat swab. (CO1, K6)

17. (a) Describe the morphology, pathogenecity and prevention of *Corynebacterium diphtheriae*. (CO2, K3)

Or

(b) Explain the morphology, cultural characteristics and diagnosis of *Bacillus anthracis*. (CO2, K6)

18. (a) Discuss the laboratory diagnosis and control measures for *Leptospirosis*. (CO3, K4)

Or

(b) Elaborate the general characters and pathogenesis of *Mycoplasma*. (CO3, K5)

19. (a) Explain the general characteristic of Intracellular parasites and laboratory diagnosis of *Cryptosporidium*. (CO4, K4)

Or

(b) Discuss the pathogenesis and control measures of *Candida* sp. (CO4, K3)

20. (a) Outline the national programs in prevention of infectious diseases and factors contributing to emergence. (CO5, K4)

Or

(b) Explain the diagnostic methods and control measures to detect the HIV. (CO5, K4)

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R3630

Sub. Code
530302

M.Sc. DEGREE EXAMINATION, NOVEMBER – 2025

Third Semester

Microbiology

IMMUNOBIOLOGY

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** the following objective type questions by choosing the correct option.

1. Which organ is considered the primary site of T-cell maturation? (CO1, K1)
   (a) Spleen (b) Bone Marrow
   (c) Thymus (d) Lymph nodes

2. Which is a secondary lymphoid organ? (CO1, K3)
   (a) Bone Marrow (b) Thymus
   (c) Liver (d) Spleen

3. What is the smallest unit of an antigen that can bind to an antibody? (CO2, K1)
   (a) Hapten (b) Epitope
   (c) Paratope (d) Antigenic determinant

4. Which immunoglobulin can cross the placenta to provide passive immunity to the fetus? (CO2, K3)
   (a) IgA (b) IgE
   (c) IgG (d) IgM

5. Which disease is an example of Type III hypersensitivity? (CO3, K3)

(a) Asthma
(b) Rheumatoid arthritis
(c) Systemic lupus erythematosus (SLE)
(d) Type 1 diabetes

6. Autoimmunity is caused by a failure of which process? (CO3, K4)

(a) Innate immunity
(b) Peripheral and central tolerance
(c) Complement activation
(d) Antibody production

7. What is the role of adjuvants in vaccines? (CO4, K4)

(a) Enhance immune response
(b) Act as a primary antigen
(c) Neutralize the pathogen
(d) Prevent side effects

8. Which immune cells are crucial for defense against intracellular bacterial infections? (CO4, K4)

(a) B cells (b) T-helper cells
(c) Cytotoxic T cells (d) Dendritic cells

9. Which type of graft is transplanted between genetically identical individuals? (CO5, K5)

(a) Allograft (b) Xenograft
(c) Autograft (d) Syngraft

10. Which of the following is a tumor-associated antigen? (CO5, K5)

(a) HER2 (b) CD4
(c) MHC-I (d) TNF-α

Part B (5 × 5 = 25)

Answer **all** questions not more than 500 words each.

11. (a) Compare between Innate and Acquired immunity. (CO1, K2)

Or

(b) Narrate the structure and function of lymph nodes. (CO1, K4)

12. (a) Describe the structure of an immunoglobulin molecule. (CO2, K5)

Or

(b) Describe the role of thymus in T-cell maturation. (CO2, K2)

13. (a) Define cytokines and explain its properties and functions. (CO3, K3)

Or

(b) What are the main mechanisms of autoimmune disease development? (CO3, K4)

14. (a) Explain the mechanism of action of live-attenuated vaccines. (CO4, K3)

Or

(b) List the key challenges in developing vaccines for infectious diseases. (CO4, K3)

15. (a) Define graft rejection and explain its types. (CO5, K4)

Or

(b) Explain the principles of Enzyme-Linked Immuno Spot Assay technique. (CO5, K4)

Part C (5 × 8 = 40)

Answer **all** questions not more than 1000 words each.

16. (a) Discuss the physiology of the immune response. (CO1, K4)

Or

(b) Elaborate the role of cytokines in immune responses. (CO1, K6)

17. (a) What is monoclonal antibody production? Explain its process. (CO2, K3)

Or

(b) Narrate the antigen and antibody interactions. (CO2, K6)

18. (a) Summarise the Delayed-Type Hypersensitivity (DTH) response. Discuss the key immune cells involved and the underlying mechanism with examples of diseases or conditions that are associated with DTH reactions. (CO3, K4)

Or

(b) Enumerate the complement components activation pathways — Classical and Alternate pathways. (CO3, K5)

19. (a) What are the different types of vaccines, and how do they work? (CO4, K4)

Or

(b) Describe the structure of HIV and its replication cycle. Include the roles of key viral enzymes. (CO4, K3)

20. (a) Classify the structure, functions and types of MHC molecules. (CO5, K4)

Or

(b) Discuss the principles and applications of flow cytometry in immunodiagnosis. (CO5, K4)

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R3631

Sub. Code
530303

M.Sc. DEGREE EXAMINATION, NOVEMBER – 2025

Third Semester

Microbiology

INDUSTRIAL MICROBIOLOGY

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** the following objective questions by choosing the correct option.

1. The removal of the cell wall during protoplast fusion is achieved using _____. (CO1, K1)

   (a) Lysozyme (b) Alcohol

   (c) Detergents (d) Antibiotics

2. The enzyme used to cut DNA at specific sites is _____. (CO1, K1)

   (a) DNA ligase

   (b) RNA polymerase

   (c) Restriction endonuclease

   (d) Reverse transcriptase

3. Which of the following sensors is commonly used in bioreactors to monitor pH? (CO2, K3)

   (a) Optical sensor (b) Thermal sensor

   (c) Electrode sensor (d) Piezoelectric sensor

4. Which of the following is an example of a continuous bioreactor? (CO2, K3)

(a) Batch bioreactor

(b) Fed-batch bioreactor

(c) Chemostat

(d) Solid-state bioreactor

5. What happens if the dilution rate in a chemostat exceeds the maximum growth rate of the microorganisms? (CO3, K2)

(a) Achieves steady state

(b) Undergoes washout

(c) Increases productivity

(d) Becomes immobilized

6. Entrapment is a method of cell immobilization achieved by _____. (CO3, K4)

(a) Binding cells to a solid surface

(b) Encapsulating cells in a polymer matrix

(c) Growing cells within a carrier material

(d) Suspending cells in liquid media

7. The production of citric acid is typically carried out by (CO4, K1)

(a) *Aspergillus niger*

(b) *Penicillium notatum*

(c) *Clostridium acetobutylicum*

(d) *Saccharomyces cerevisiae*

8. Vinegar production involves the conversion of ethanol to acetic acid by _____. (CO4, K1)

(a) *Escherichia coli*

(b) *Saccharomyces cerevisiae*

(c) *Bacillus thurinisgiens*

(d) *Acetobacter aceti*

9. Which of the following is NOT a step in downstream processing? (CO5, K3)

(a) Fermentation

(b) Product recovery

(c) Purification

(d) Formulation

10. Which technique is commonly used for cell harvesting in downstream processing? (CO5, K3)

(a) Distillation

(b) Centrifugation

(c) Chromatography

(d) Gel electrophoresis

Part B (5 × 5 = 25)

Answer **all** questions not more than 500 words each.

11. (a) Comment on the types of fermentation based on mode of operations with example. (CO1, K2)

Or

(b) List out are the preservation methods used for the microbial Cultures? (CO1, K3)

12. (a) Explain the structure and design of Packed-bed bioreactors (PBRs). (CO2, K4)

Or

(b) Explain Newtonian behaviour of fluids with examples. (CO2, K4)

13. (a) How a Contour plot formulated and what are their applications? (CO3, K3)

Or

(b) Explain the growth rate parameters essential for maintaining a Chemostat. (CO3, K4)

14. (a) Explain the fermentation principle for Vitamin B12 Production. (CO4, K4)

Or

(b) Write a detailed note on Biogas production. (CO4, K3)

15. (a) Explain Ion Exchange Chromatography. (CO5, K5)

Or

(b) Explain Chemical methods for Cell disruption in Down streaming Processing. (CO5, K4)

Part C

(5 × 8 = 40)

Answer **all** questions not more than 1000 words each.

16. (a) Explain in detail about various methods used for the selection of microbial strains for fermenters. (CO1, K4)

Or

(b) Write a note on the recombinant DNA techniques for strain development. (CO1, K3)

17. (a) Discuss the types of bioreactors used in fermentation process. (CO2, K6)

Or

(b) Explain the instrumentations used in fermentation process. (CO2, K4)

18. (a) List out the methods used for the immobilisation of enzymes in the bio-fermenters? (CO3, K4)

Or

(b) Comment on the media optimisation methods used in Bioreactors. (CO3, K4)

19. (a) Explain antibiotic fermentation procedure with reference to Penicillin. (CO4, K4)

Or

(b) Discuss the importance of SCP with Examples. (CO4, K6)

20. (a) Explain the Chromatographic methods used in down streaming. (CO5, K4)

Or

(b) Elaborate on the quality control methods in down streaming of microbial fermentation. (CO5, K6)

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R3632	Sub. Code 530506

M.Sc. DEGREE EXAMINATION, NOVEMBER – 2025

Third Semester

Microbiology

Elective : APPLIED MICROBIOLOGY – I

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** the following objective type questions by choosing the correct option.

1. According to ISO/IEC 17025, laboratories must establish and maintain: (CO1, K1)

   (a) An environmental management system

   (b) A safety compliance program

   (c) A quality management system

   (d) A marketing strategy

2. The key technical requirement in ISO/IEC 17025 is: (CO1, K1)

   (a) Customer satisfaction survey

   (b) Internal audit

   (c) Validation of test methods

   (d) Staff performance reviews

3. The sterilization technique most suitable for heat-sensitive and moisture-sensitive medical devices is: (CO2, K1)

(a) Ethylene Oxide Sterilization

(b) Autoclaving

(c) Dry Heat Sterilization

(d) Steam Sterilization

4. Plasma sterilization uses which gas for sterilization purposes? (CO2, K2)

(a) Ethylene oxide

(b) Hydrogen peroxide

(c) Carbon dioxide

(d) Nitrogen

5. The rapid enumeration technique that uses fluorescence to detect viable microorganisms is: (CO3, K2)

(a) Plate Counting

(b) Flow Cytometry

(c) Turbidity Measurement

(d) Membrane Filtration

6. The minimum temperature required for effective pasteurization of milk to kill most pathogenic microorganisms: (CO3, K1)

(a) 30°C

(b) 60°C

(c) 72°C

(d) 100°C

7. The piece of personal protective equipment (PPE) essential for cleanroom entry is: (CO4, K3)

(a) Safety goggles

(b) Gown or coverall

(c) Steel-toed boots

(d) Hard hat

8. The microorganism often used as an indicator of poor hygiene practices in dairy processing is: (CO4, K2)

(a) *Clostridium botulinum*

(b) Salmonella

(c) Coliforms

(d) *Aspergillus niger*

9. Quantum dots are widely used in biosensors for which type of detection: (CO5, K4)

(a) Electrochemical

(b) Optical

(c) Mechanical

(d) Thermal

10. The nanomaterial commonly used in electrochemical biosensors for glucose monitoring is: (CO5, K3)

(a) Gold nanoparticles

(b) Silver nanoparticles

(c) Carbon nanotubes

(d) Quantum dots

Part B (5 × 5 = 25)

Answer **all** questions not more than 500 words each.

11. (a) Interpret the resource requirements mentioned in ISO/IEC 17025. (CO1, K4)

Or

(b) Outline the Quality Management Systems mentioned by ISO for Medical devices. (CO1, K2)

12. (a) Explain the various tests for *in-vitro* cytotoxicity studies. (CO2, K4)

Or

(b) List out microbiological methods for sterilization of medical devices. (CO2, K4)

13. (a) Illustrate the hygiene indicator organisms in a diary plant with examples. (CO3, K3)

Or

(b) Explain the Microbiological risk profiling of food products. (CO3, K4)

14. (a) List out the disinfection agents used in Pharmaceutical industry (CO4, K4)

Or

(b) Interpret the personal qualification procedures for clean area entry to a lab. (CO4, K4)

15. (a) Differentiate nanodots and nanowires. (CO5, K2)

Or

(b) Examine the methods used for the characterization of biosynthesized nanoparticles. (CO5, K4)

Part C (5 × 8 = 40)

Answer **all** questions not more than 1000 words each.

16. (a) List out the general requirements for the competence of testing and calibration laboratories in the International Standard ISO/IEC 17025. (CO1, K4)

Or

(b) Explain the International Standard on Medical Devices. (CO1, K4)

17. (a) Elaborate the Microbiological methods on sterilization of healthcare products. (CO2, K5)

Or

(b) Discuss the biological evaluation methods of medical devices. (CO2, K6)

18. (a) Give note on the rapid enumeration techniques for the pathogens in food plants. (CO3, K4)

Or

(b) Explain the biosafety concepts in handling of diary pathogens. (CO3, K5)

19. (a) Elaborate on selection and use of cleaning and disinfection agents in pharmaceuticals. (CO4, K5)

Or

(b) Give a detailed account on International disinfectant testing Protocols. (CO4, K4)

20. (a) Explain the biosynthesis of nanoparticles using the microbes. (CO5, K5)

Or

(b) Discuss the use of nanomaterials in drug delivery. (CO5, K6)

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