S–3217

Sub. Code
23MMI1C1

M.Sc. DEGREE EXAMINATION, APRIL 2024

First Semester

Microbiology

GENERAL MICROBIOLOGY AND MICROBIAL DIVERSITY

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** the questions.

1. Resolving power.
2. Antonie Van Leeuwenhoek
3. Laminar air flow chamber.
4. Cryopreservation
5. Rhodophyceae
6. Zoospore
7. Secondary metabolite
8. Lophotrichous
9. Extremophiles
10. Osmoregulation

Part B (5 × 5 = 25)

Answer **all** the questions choosing either (a) or (b).

11. (a) Write in detail about history and scope of Microbiology.

Or

(b) Summarize the principles and applications of bright field Microscopy.

12. (a) Briefly explain about disinfection and its validation.

Or

(b) Describe in detail cultivation of anaerobic organisms.

13. (a) Write briefly about economic importance of algae.

Or

(b) Discus about strain selection and cultivation of algae.

14. (a) Give a brief note on Actinomycetes.

Or

(b) Add short note on nutritional requirements of fungi.

15. (a) Explain about thermophilic Archaebacteria.

Or

(b) Briefly explain about applications of halophiles.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Discuss in detail about sample preparation for TEM and SEM.

17. Explain about maintenance and preservation of pure culture.

18. Summarize the life cycle of *Volvox*.

19. Write in detail about the biosynthesis of bacterial cell wall.

20. Discuss in detail about barophiles classification and its applications.

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S–3218

Sub. Code
23MMI1C2

M.Sc. DEGREE EXAMINATION, APRIL 2024

First Semester

Microbiology

MICROBIAL PHYSIOLOGY

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Chemotrophs
2. Autotrophs
3. Cell number
4. Asynchronous culture
5. Aerobic metabolism
6. Chemiosmosis
7. Methanogenesis
8. Triglycerides
9. Anoxygenic photosynthesis
10. Bioluminescence

Part B (5 × 5 = 25)

Answer **all** questions choosing either (a) or (b).

11. (a) Explain the nutritional classification of bacteria.

Or

(b) Write short notes on group translocation transport system.

12. (a) Differentiate between batch and continuous culture.

Or

(b) Write briefly about the factors affecting the growth of microorganism.

13. (a) Describe about the mechanism of pentose phosphate pathway.

Or

(b) Discuss briefly about metabolism of β-lipids oxidation.

14. (a) Give a brief account of methanogenesis.

Or

(b) Summarize about amino acid biosynthesis.

15. (a) Write a short note on photochemical reaction centers.

Or

(b) Outline briefly about Calvin – Benson cycle.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Elaborate about nutrient transport mechanism.

17. Discuss in detail about measurement of growth in bacteria.

18. Describe the steps involved in glycolysis pathway.

19. Summarize about anaerobic respiration.

20. Write in detail about photosynthetic electron transport chain.

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S–3219	Sub. Code
	23MMI1E1

M.Sc. DEGREE EXAMINATION, APRIL 2024

First Semester

Microbiology

Elective — FORENSIC SCIENCE

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. What is forensic ballistics?
2. Forensic anthropology.
3. Bioterrorism.
4. Geolocation.
5. Hair comparison microscopy.
6. What are the types of forensic serology tests?
7. Reverse paternity testing.
8. What are the steps in DNA typing?
9. Role of forensic toxicology.
10. Forensic drug analysis.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Sketch out the duties of a forensic scientist.

Or

(b) Write about the scope of forensic science.

12. (a) Summarize about mobile forensic lab and their categories.

Or

(b) List out the central forensic science laboratories.

13. (a) Explain briefly about sweat analysis and its role in identification.

Or

(b) Give an outline about forensic characterization of semen.

14. (a) Write a short note on history and development of DNA typing.

Or

(b) How the STRs are used in DNA profiling?

15. (a) Describe about the categories of action of poison.

Or

(b) Write about the limitations of forensic toxicology.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Elaborate about the digital forensic software tool and techniques.

17. Give a detailed note on identification of microbial organisms of forensic significance.

18. Discuss about the presumptive and confirmatory tests for blood stains.

19. Explain in detail about various steps in PCR techniques.

20. Discuss about the medicolegal autopsy protocol and their importance.

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S–3220	Sub. Code
	23MMI1E2

M.Sc. DEGREE EXAMINATION, APRIL 2024

First Semester

Microbiology

Elective — NANOBIOTECHNOLOGY

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. What is meant by quantum confinement of nanoparticles?

2. Define nanowires.

3. Bottom up approach is convenient method for nanofabrication – Justify.

4. What is laser ablation?

5. What is Bragg's law?

6. Explain ED(A)X.

7. What are Niosomes?

8. Define MEMS.

9. Explain the basic principle of nanosensor.

10. Enlist the nanoparticles used in bioremediation.

Part B (5 × 5 = 25)

Answer **all** the questions, choosing either (a) or (b).

11. (a) Explain in brief the unique physiochemical properties of nanomaterials.

Or

(b) Briefly explain the harmful effects of nanomaterials to the environment.

12. (a) Explain the different types of ball-milling and their advantages.

Or

(b) Give a brief account on mycosynthesis of nanoparticles with suitable example.

13. (a) How will you determine the size and surface charge of nanoparticles?

Or

(b) Explain the significance of XRD analysis in nanomaterial characterisation.

14. (a) Enumerate the *in vitro* tests to evaluate the toxicity of nanoparticles.

Or

(b) Briefly discuss about the role of lipid nanoparticles in drug delivery applications.

15. (a) Explain the application of quantum dots in bioimaging and its advantages over flurophores.

Or

(b) Explain the working principle of DNA based biosensor and its potential role in disease diagnosis.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Elaborate in detail the classifications of nanomaterials based on dimension with suitable examples and its applications.

17. Discuss in detail PVD and CVD methods of nano synthesis of films, coatings and their relative merits.

18. Describe in detail the working principle, instrumentation, sample preparation of TEM and its application in nanomaterial characterization.

19. Outline the design flow in the fabrication of NEMS and MEMS. Add a note on its biomedical applications

20. Give a detailed account on mechanism behind nano-remediation of waste water.

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S–3221	Sub. Code 23MMI1E3

M.Sc. DEGREE EXAMINATION, APRIL 2024

First Semester

Microbiology

Elective — MICROALGAL TECHNOLOGY

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** the questions.

1. Chrysophyceae
2. Epizoic algae
3. Chlorella
4. FPA
5. Xanthophylls
6. *Dunaliella*
7. Algaecides
8. Activated sludge
9. Hydrothermal liquefaction
10. Green house gas remediation

Part B (5 × 5 = 25)

Answer **all** the questions, choosing either (a) or (b).

11. (a) Write a brief note on the fresh water algae.

Or

(b) Briefly explain about distribution of marine water algae.

12. (a) Describe about the cultivation of marine water microalgae.

Or

(b) Add short note on laboratory cultivation and maintenance of microalgae.

13. (a) Discuss in brief about microalgal biofertilizers.

Or

(b) Describe about the phycobili proteins.

14. (a) Illustrate on industrial waste water treatment.

Or

(b) Briefly explain surface immobilized system.

15. (a) Discuss about the production of biofuel by microalgae.

Or

(b) Describe the lipid rich algal strains.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Elaborate the identification methods for algae.

17. Write in detail about the harvesting of microalgae biomass.

18. Summarize the production of carotenoids and their uses.

19. Discuss the negative effects of algae.

20. Explain the biocrude synthesis from the microalgae.

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S–3222

Sub. Code
23MMI1E4

M.Sc. DEGREE EXAMINATION, APRIL 2024

First Semester

Microbiology

Elective — BIOINSTRUMENTATION

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Lyophilizer.
2. Sedimentation co-efficient.
3. Cations.
4. Paper chromatography.
5. Blotting.
6. Rf value.
7. GISH.
8. Spectroscopy.
9. Radioactive isotopes.
10. Radioactivity.

Part B (5 × 5 = 25)

Answer **all** the questions, choosing either (a) or (b).

11. (a) Elaborate in brief about biosafety cabinets.

Or

(b) What is the difference between rate zonal and isopycnic centrifugation?

12. (a) Summarize about two dimensional chromatography.

Or

(b) Sketch out the principle, components and steps involved in affinity chromatography.

13. (a) Briefly explain about starch gel electrophoresis.

Or

(b) Elaborate in brief about the steps involved southern blotting.

14. (a) Narrate the separation process and principle behind FISH.

Or

(b) How does FTIR spectroscopy works?

15. (a) Give a neat sketch on the working principle of scintillation counter.

Or

(b) Discuss about the types of radioactive decay.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Explain briefly about the basic laboratory instruments and their uses.

17. Explain in detail about the principle, techniques and applications of ion-exchange chromatography.

18. Give a detailed note on western blotting techniques.

19. Explain the working principle, instrumentation and applications of NMR spectroscopy

20. Write an essay on detection and measurement of radioactivity using ionization chamber.

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S–3223	Sub. Code
	23MMI1E5

M.Sc. DEGREE EXAMINATION, APRIL 2024

First Semester

Microbiology

Elective — HERBAL TECHNOLOGY AND COSMETIC MICROBIOLOGY

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Phytomedicine.
2. Write any two medicinal plants and their uses.
3. Maceration.
4. Stock solution.
5. List out some names of antiviral drugs.
6. MIC.
7. *Aloe vera*.
8. Uses of turmeric.
9. How microorganisms get into cosmetics?
10. Define FDA.

Part B (5 × 5 = 25)

Answer **all** the questions, choosing either (a) or (b).

11. (a) Narrate the basic principles involved in homeopathy medicine.

Or

(b) Discuss about Ayurvedha medicine.

12. (a) Give a brief note on collection and authentication of *Phyllanthus amarus* plant.

Or

(b) Briefly explain about the medicinal uses of *Ocimum sanctum*.

13. (a) Discuss about the MTT method of cytotoxicity assay.

Or

(b) Give a brief account on well dilution technique.

14. (a) Sketch out the antimicrobial properties of garlic and tulsi.

Or

(b) Illustrate about the scope of cosmetic microbiology.

15. (a) Discuss the principle and procedure involved in cylinder plate or cup plate method of pharmacopeial microbial assay.

Or

(b) Write short notes on microbial content testing in cosmetics.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Elaborate about the treatment of viral diseases using medicinal plants.

17. Write an essay on collection. authentication and uses of *Azadirachta indica*.

18. Elaborate about the types of cytopathic effects.

19. Give a detailed note on HACCP guidelines in cosmetic microbiology.

20. Explain in detail about the toxicological aspect of cosmetic preservatives.

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S–3224

Sub. Code
23MMI1E6

M.Sc. DEGREE EXAMINATION, APRIL 2024

First Semester

Microbiology

Elective — ESSENTIALS OF LABORATORY MANAGEMENT AND BIOSAFETY

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Draw Diagram if Necessary

Part A (10 × 2 = 20)

Answer **all** the questions.

1. Laboratory hazards.
2. Animal bites.
3. Fume hood.
4. Fire extinguishers.
5. Acid splash.
6. Emergency response.
7. Biohazards.
8. Sterilization.
9. RDAC
10. NIH

Part B (5 × 5 = 25)

Answer **all** the questions, choosing either (a) or (b).

11. (a) Explain the importance of GLP.

Or

(b) Write a note on toxic fume inhibition.

12. (a) Write a note on physical agent data sheets.

Or

(b) Explain the guidelines adopted for disposal of chemical waste.

13. (a) Write the importance of personal protective equipment.

Or

(b) Explain the emergency equipment safety.

14. (a) Illustrate the importance of Class III biological safety cabinet.

Or

(b) Justify hand hygiene with suitable case study.

15. (a) Write a note on review committee on genetic manipulation.

Or

(b) Explain the steps involved in the implementation of biosafety guidelines.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Discuss in detail on occupational safety with suitable examples.

17. Elaborate common hazards in laboratory with neat illustrations.

18. Describe in detail the procedures for first aid injuries and their prevention methods.

19. Write an essay on biosafety of blood borne pathogens used in laboratory infection.

20. Explain in detail the institutional biosafety committee and its importance.

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S–3225	Sub. Code
	23MMI1S1

M.Sc. DEGREE EXAMINATION, APRIL 2024

First Semester

Microbiology

ENTREPRENEURSHIP IN BIOBUSINESS

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Draw Diagram if necessary.

Part A (10 × 2 = 20)

Answer **all** questions.

1. Bio-entrepreneurship
2. Small scale industries
3. Polyhouse culture
4. Biosensor
5. Bioremediation
6. Integrated compost
7. Stem cell bank
8. Prebiotics
9. BIRAC
10. Indian Company Act

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain the importance of Bio Entrepreneurship.

Or

(b) Explain the SWOT analysis of bio-business.

12. (a) Enlist the scope of entrepreneurship opportunity in agricultural microbiology.

Or

(b) Explain the role of biosensor development in agro management.

13. (a) Explain the prospect of entrepreneurship in bioremediation.

Or

(b) Illustrate the importance of biofertilizer from an entrepreneur perspective.

14. (a) Outline the role of entrepreneurship in Stem cell production.

Or

(b) Analyze the strategic involvement of entrepreneur in monoclonal antibodies production.

15. (a) Explore the importance of Indian Company Act for Bio-business Schemes.

Or

(b) List the steps involved in the preparation of project proposal for establishing start–Ups.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Describe in detail the characteristics and needs of small-scale industries.

17. Elaborate the view of entrepreneur in bioethanol production using agricultural waste.

18. Write an essay on the business opportunities involved in integrated compost production.

19. Discuss in detail the involvement of entrepreneurs in secondary metabolite production.

20. Explain the role of startup schemes and its business challenges in India.

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S–3226

Sub. Code
23MMI2C1

M.Sc. DEGREE EXAMINATION, APRIL 2024

Second Semester

Microbiology

MEDICAL BACTERIOLOGY AND MYCOLOGY

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Define antibiotics.

2. List the normal bacterial flora of the gastro intestinal tract and its significance.

3. Enlist the laboratory diagnosis of *mycobacterium*.

4. Describe the characteristics of *clostridium*.

5. What are opportunistic infection? Give example.

6. Define nosocomial infection.

7. Define systemic mycoses.

8. What are mycotoxin?

9. Name the causative organism of

(a) Rose gardener's disease

(b) Valley fever.

10. Name any four dimorphic fungi.

Part B $(5 \times 5 = 25)$

Answer **all** questions, choosing either (a) or (b).

11. (a) Discuss the protocol for handling and maintenance of laboratory animals rabbit and mice.

Or

(b) Write the procedure for antimicrobial sensitivity/susceptibility test.

12. (a) Explain the pathogenesis, diagnosis is treatment for disease caused by *corynebacteria*.

Or

(b) Explain the characteristic and morphology of *Bacillus* and name the disease caused by *Bacillus*.

13. (a) What are zoonotic disease? Name any two zoonotic diseases.

Or

(b) Discuss the laboratory diagnosis of *Bordetella*, *Treponema* and *Leptospira*.

14. (a) Discuss the testing methods of antifungal agents.

Or

(b) What are dermatophytes? Describe the morphology of *Trichophyton*.

15. (a) Explain the pathogenesis, diagnosis and treatment of *Blastomyces*.

Or

(b) Discuss opportunistic fungi causing secondary infection in immuno-compromised patients.

Part C $(3 \times 10 = 30)$

Answer any **three** questions.

16. How does clinical specimen is collected, transported, stored and processed during the outbreak of disease?

17. Explain the characteristics, pathogenesis laboratory diagnosis and treatment of disease caused by *pneumococci*.

18. Discuss the pathogenesis, laboratory diagnosis and treatment of disease caused by *Vibrio*.

19. Discuss dermatophytes and agents of superficial mycoses with suitable example.

20. Explain the disease caused of *Histoplasma* and *Coccidioides*. Describe the pathogenesis, diagnosis and treatment.

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S–3227

Sub. Code
23MMI2C2

M.Sc. DEGREE EXAMINATION, APRIL 2024

Second Semester

Microbiology

MEDICAL VIROLOGY AND PARASITOLOGY

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Define viroids.
2. What is the primary host for satellite RNAs?
3. Define virus entry.
4. Name one host defense mechanism against viral infections.
5. Name two bacterial viruses.
6. What are serological methods used for in the diagnosis of viral infections?
7. Name two protozoa causing human infections.
8. Briefly explain the laboratory diagnosis of parasitic infections.
9. Define helminths.
10. What is the life cycle of Taenia Solium?

Part B (5 × 5 = 25)

Answer **all** the questions choosing either (a) or (b).

11. (a) Describe the general structure of a virus.

Or

(b) Explain the process of virus cultivation in embryonated eggs.

12. (a) Compare and contrast the lab diagnosis methods for DNA and RNA viruses.

Or

(b) Outline the pathogenic mechanisms of DNA viruses.

13. (a) Discuss the lysogenic cycle in bacterial viruses and it's significance.

Or

(b) Compare the contrast conventional, serological and molecular methods used in diagnosis of viral infections.

14. (a) Discuss the classification of protozoa based on their characteristics and modes of transmission.

Or

(b) Comment on different laboratory diagnostic methods for parasitic infections, including microscopy and molecular techniques.

15. (a) Outline the life cycle of Taenia Saginata and it's transmission to humans.

Or

(b) Describe the different methods used for the lab diagnosis of parasitic infections, including microscopy and molecular techniques.

Part C $(3 \times 10 = 30)$

Answer any **three** questions.

16. Explain the principles behind plaque assays and endpoint assays for measuring viral infectivity.

17. Discuss the various lab diagnostic techniques used in identifying different viral infections, citing examples.

18. Evaluate the different types of viral vaccines and their mechanisms of action, citing examples and discussion their efficacy and safety.

19. Analyze the host-parasite relationship in infections caused by protozoa like Leishmania spp.

20. Discuss the cultivation methods used for parasites in the laboratory, including techniques for maintaining their life cycles.

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S–3228	Sub. Code
	23MMI2E1

M.Sc. DEGREE EXAMINATION, APRIL 2024

Second Semester

Microbiology

Elective — EPIDEMIOLOGY

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Define epidemiology and its significance in public health.

2. What is the chain of infection?

3. What is an index case?

4. Define risk rates in epidemiology.

5. Name one vector-borne disease prevalent in India.

6. Define sexually transmitted disease (STDs).

7. Define antimicrobial resistance.

8. Identify one common infection site for HAIs.

9. Name one national program related to communicable diseases.

10. What is the goal of National cancer control program?

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Discuss common risk factors associated with the transmission of infections diseases.

Or

(b) Describe control measures used to prevent and manage zoonotic diseases.

12. (a) Explain the significance of the index case in diseases out break investigations.

Or

(b) Describe the concept of contact investigation and its role in controlling the spread of infections diseases.

13. (a) Explain the background to communicable and non-communicable diseases, including factors influencing their prevalence and distribution.

Or

(b) Discuss the epidemiology, prevention and control of sexually transmitted diseases, with a focus on HIV/AIDS.

14. (a) Discuss the mechanisms by which bacteria develop antimicrobial resistance, including genetic mutations and horizontal gene transfer.

Or

(b) Evaluate strategies for the prevention and management of nosocomial infections, including hand hygiene, antimicrobial stewardship and environmental cleaning protocols.

15. (a) Discuss the strategies implemented under the National Malaria Eradication programme to control Malaria in India.

Or

(b) Outline the approaches used in vector-borne disease control programs to reduce the burden of vector-borne diseases in the population.

Part C $(3 \times 10 = 30)$

Answer any **three** questions.

16. Critically analyze the role of epidemiology in identifying and controlling infections disease outbreaks.

17. Discuss the ethical considerations surrounding contact investigations in epidemiology, including issues related to privacy, consent and stigma.

18. Examine the impact of socioeconomic factors on the epidemiology and control of non-communicable diseases in India.

19. Discuss the challenges associated with managing hospital-acquired infections caused by multi drug resistant pathogens.

20. Compare and contrast the implementation strategies and outcomes of different national programs related to communicable and non-communicable disease in India.

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S–3229	Sub. Code
	23MMI2E2

M.Sc. DEGREE EXAMINATION, APRIL 2024

Second Semester

Microbiology

***Elective* — CLINICAL DIAGNOSTIC MICROBIOLOGY**

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Section A (10 × 2 = 20)

Answer **all** questions.

1. What is the primary purpose of wearing Personal Protective Equipment (PPE) in a microbiology lab?
2. What does the biohazard symbol signify in a laboratory setting?
3. Name two common methods for transporting clinical specimens to the laboratory.
4. Define diagnostic procedures in microbiology.
5. Define Microbial disease diagnosis.
6. Differentiate clinical and differential diagnosis.
7. What is the principle behind the disk diffusion method?
8. Name two standard strains commonly used in antibiotic sensitivity testing.
9. What are the primary sources of nosocomial infections?
10. Define reservoirs in the context of nosocomial infections.

Section B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain the procedure for the proper disposal of infectious healthcare waste in a healthcare facility.

Or

(b) Discuss three general safety guidelines that should be followed in a microbiology lab.

12. (a) Describe the process of collecting a clinical specimen for microbiological analysis, including considerations for different types of specimens.

Or

(b) Compare and contrast the storage requirements for different types of clinical specimens in a microbiology laboratory.

13. (a) Compare and contrast the advantages and limitations of microbiological and immunological methods for diagnosing microbial diseases.

Or

(b) Explain the principles behind molecular diagnosis techniques such as Polymerase Chain Reaction (PCR) and nucleic acid sequencing in identifying microbial pathogens.

14. (a) Describe the procedure for performing the E-Test and discuss its applications in clinical microbiology.

Or

(b) Discuss the significance of determining both MIC and MBC values in antibiotic sensitivity testing.

15. (a) Discuss the role of healthcare workers in the transmission of nosocomial infections and strategies to prevent this transmission.

Or

(b) Describe the common sources of nosocomial infections within healthcare facilities and how they contribute to infection spread.

Section C $(3 \times 10 = 30)$

Answer any **three** questions.

16. Describe the classification of biomedical waste based on it's potential risk and provide examples for each category.

17. Analyze the ethical considerations associated with the collection. Storage and use of clinical specimens for research purposes.

18. Discuss the ethical considerations associated with the use of patient samples in microbial disease diagnosis and research.

19. Critically evaluate the reliability and reproducibility of various antibiotic sensitivity testing methods including disk diffusion, E-Test and dilution methods.

20. Briefly explain the main functions of a hospital infection control committee.

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S–3230	Sub. Code
	23MMI2E3

M.Sc. DEGREE EXAMINATION, APRIL 2024

Second Semester

Microbiology

Elective – BIOREMEDIATION

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Section A (10 × 2 = 20)

Answer **all** questions.

1. Define bioremediation.
2. List out pros and cons of bioaugmentation.
3. What is BOD and its limits in waste water?
4. How membrane bioreactor works?
5. Mention the biological methods for dye degradation.
6. Summarize the principle of composting of social waste.
7. What is bioleaching and how does it work?
8. What are super bugs? Give some examples.
9. Mention the components of phytoremediation process.
10. Define sequestration.

Section B (5 × 5 = 25)

Answer **all** questions choosing either (a) or (b).

11. (a) Write a note on factors affecting bioremediation.

Or

(b) Explain about microbial and metabolic aspects of biorediation.

12. (a) Comment on sustainable treatment of aqua culture effluents.

Or

(b) Write short notes on treatment of leachate from municipal solid waste land fill.

13. (a) Explain about biodegradation of hydro carbons.

Or

(b) Discuss pros and cons of anaerobic digestion process.

14. (a) Write a short notes on process, types and examples of microbial ore leaching.

Or

(b) Describe about biodegradation of plastics.

15. (a) Explain about organic and synthetic amendments in multi metal contaminated mine sites.

Or

(b) Comment on phytodegradation mechanisms and its application.

Section C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Give a detailed account on insitu and Exsitu bioremediation with their merits and limitations.

17. Describe in detail about three Stages of Sewage treatment process, with diagram.

18. Explain in detail about bioremediation in paper and pulp industry.

19. Elaborate biotransformation of heavy metals.

20. Discuss in detail about types of phytoremediation process.

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S–3231	Sub. Code
	23MMI2E4

M.Sc. DEGREE EXAMINATION, APRIL 2024

Second Semester

Microbiology

Elective – BIOINFORMATICS

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions

1. Define data visualization.
2. Enlist the applications of multiple sequence alignment.
3. Differentiate rooted and unrooted trees.
4. Describe substitution matrix.
5. Define potential energy surfaces.
6. Mention the role of molecular graphics in Bioinformatics.
7. Define ligand compounds.
8. What are the applications of molecular descriptors?
9. Describe bonded interaction.
10. Comment on subtractive genomics approach.

Part B (5 × 5 = 25)

Answer **all** the questions choosing either (a) or (b).

11. (a) Differentiate PAM and BLOSUM matrix.

Or

(b) Explain in detail about primary and derived databases with suitable examples.

12. (a) Describe the methods used to verify the reliability of phylogenetic tree.

Or

(b) Discuss in detail about ultrametric trees.

13. (a) Write a short note on prediction of protein function from structure.

Or

(b) Comment on prediction of 3D structure by fold recognition method.

14. (a) Summarize the properties of Ligand compounds.

Or

(b) Comment on Linear free energy relationship.

15. (a) Explain the active site prediction methods.

Or

(b) Write a short note on rigid docking

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Mention the steps involved in pair wise sequence alignment.

17. Write a detailed note on character based tree reconstruction.

18. Explain in detail about various molecular visualization tools.

19. Describe the stages of 4D QSAR modeling.

20. Discuss in detail about molecular docking software and working methods.

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S–3232	Sub. Code
	23MMI2E5

M.Sc. DEGREE EXAMINATION, APRIL 2024

Second Semester

Microbiology

Elective – BIOSAFETY, BIOETHICS AND IPR

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** the questions.

1. Comment on Trademarks and copyrights.

2. Differentiate the role of WTO and GATT.

3. Explain the role of Patent databases.

4. What is Sui-genesis system?

5. Differentiate territorial and global patent regime.

6. Comment on Uniform patent law.

7. Mention the needs of Bioethics in today's world.

8. Define Gene Pool.

9. Comment on the Nuremberg Code.

10. Enlist the bioethics of using animals in research.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Discuss the implications of TRIPS for the developing countries.

Or

(b) Explain the role of IPR in Biotechnology with suitable illustrations.

12. (a) Describe the differences between pre-grant and post-grant opposition procedures.

Or

(b) Discuss the strategies to be followed during the process of patenting.

13. (a) Write in detail about the statutory provisions regarding biotechnological inventions under Patent Act 1970.

Or

(b) How does the invention contribute to the advancement of biotechnological knowledge on addressing existing challenges in the field?

14. (a) Explain the protocol in exchanging biological materials across borders.

Or

(b) Discuss the role of bioethics in conserving the biodiversity.

15. (a) Elicit the process of bioethical procedures in animal cloning.

Or

(b) Explain the role of bioethics in stem cell research.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. What are the key elements required for the successful registration and enforcement of trademarks, copyrights, patents, geographical indications and trade secrets?

17. Enumerate the methods of Patent search with suitable illustrations. Add a note on patent mapping.

18. Discuss the process of patentability of biotechnological inventions in India. Add a note on its importance in search.

19. Elucidate the issues and concerns pertaining to genetically modified foods and food crops.

20. Describe the protocols of ethical concerns related to prenatal diagnosis and organ transplantation.

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S–3233

Sub. Code
23MMI2E6

M.Sc. DEGREE EXAMINATION, APRIL 2024

Second Semester

Microbiology

Elective – CLINICAL RESEARCH AND CLINICAL TRIALS

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** the questions.

1. What is pharmacodynamics?
2. What is preclinical trial?
3. Define FDA.
4. Write about MHRA.
5. What is Ethics committee?
6. Define patient screening.
7. Describe Quality Assurance
8. What is source data?
9. Write about the scope of CRO.
10. Name any two IT companies offering services in the clinical trial research.

Part B (5 × 5 = 25)

Answer **all** the questions choosing either (a) or (b).

11. (a) Write a short account on the pipeline of drug discovery with a neat sketch.

Or

(b) Write briefly on any three of the clinical research types.

12. (a) Write a brief account on Ethical committee and their responsibility.

Or

(b) Comment on historical guidelines in clinical research.

13. (a) Write shortly about essential documents in clinical research.

Or

(b) Compare and contrast the responsibilities of a sponsor and Investigator.

14. (a) Comment on SOP of a clinical research.

Or

(b) Write brief notes on drug safety reporting, corrective and preventive action process.

15. (a) Comment on outsourcing in clinical research.

Or

(b) Discuss about the role of business development manager.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Write elaborately on the different phases of the clinical trials after drug discovery process.

17. Discuss in detail the history, structure and guidelines of International conference on harmonization.

18. Elaborate the protocol in clinical research and clinical research and clinical trial design.

19. Write a detailed account on quality assurance and quality control.

20. Explain in detail about the different stages of business development in the clinical research of Industry.

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S–3234

Sub. Code
23MMI2S1

M.Sc. DEGREE EXAMINATION, APRIL 2024

Second Semester

Microbiology

VERMITECHNOLOGY

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Define Vermiculture.

2. Enlist the significance of organic forming.

3. What role do the clitellum and setae patterns play in distinguishing between earthworm and species?

4. Diagrammatically explain the anatomy of Eisenia fetida.

5. Mention the importance of compost and animal manures in the preparation of Vermicompost.

6. Comment on the stabilization phase of Vermicomposting.

7. Differentiate Sideway and Vertical separation process in Vermitechnology.

8. Enlist the ways to protect the Vermicomposting process from pests and Birds.

9. Differentiate Vermicompost and Vermiwash.

10. Mention the role of Vermicastings in Agriculture.

Part B $(5 \times 5 = 25)$

Answer **all** questions choosing either (a) or (b).

11. (a) Discuss the Local and Exotic species of earthworms used in vermitechnology.

Or

(b) Explain the factors that affect the distribution of earthworms in soil.

12. (a) Describe the Taxonomy and Physiology of Einsenia fetide.

Or

(b) Discuss the importance of humidity, temperature and light in the growth of earthworms.

13. (a) Write in detail about the basic process of vermicomposting at initial, mesophilic and maturation phase.

Or

(b) Discuss the importance and varieties of feeds for vermitech system.

14. (a) Explain in detail about the nutritional analysis of vermicompost.

Or

(b) Discuss the methods of harvesting Earthworm.

15. (a) Discuss the commonly used value added products produced from vermitechnology with suitable examples.

Or

(b) How will you enumerate the application quantity of vermicompst to be used in Agricultural fields?

Part C $(3 \times 10 = 30)$

Answer any **three** questions.

16. Elucidate the classification of vermiculture and discuss its economic importance in developing a sustainable agriculture.

17. Enumerate the physiology and reproduction of Endrilus eugeniae.

18. Discuss the various methods of vermicomposting process with a neat diagram.

19. What strategies can be implemented to optimize the efficiency of a vermicomposting system and minimize troubleshooting needs?

20. Describe the benefits of vermiculture for a sustainable agriculture. Add a note on its limitations.

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