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Printed Page:-4 **Subject Code:- BBT0302**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA
(An Autonomous Institute Affiliated to AKTU, Lucknow)
B.Tech
SEM: III - THEORY EXAMINATION (2025 - 2026)
Subject: Microbiology

Time: 3 Hours **Max. Marks: 100**

General Instructions:

IMP: *Verify that you have received the question paper with the correct course, code, branch etc.*
1. *This Question paper comprises of* ***three Sections -A, B, & C.*** *It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.*
2. *Maximum marks for each question are indicated on right -hand side of each question.*
3. *Illustrate your answers with neat sketches wherever necessary.*
4. *Assume suitable data if necessary.*
5. *Preferably, write the answers in sequential order.*
6. *No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.*

SECTION-A 20

1. Attempt all parts:-

1-a. The objective of the of Koch's postulates is (CO1, K2) 1

(a) Microbial classification
(b) To study the genetic material
(c) To determine the causative agent of a disesase
(d) None of the above

1-b. The staining method that identifies acid-fast bacteria is known as (CO1, K1) 1

(a) Zeil nelson stain
(b) Gram stain
(c) Simple stain
(d) Lactophenol staining

1-c. Fungi that can interchange forms between molds and yeast are known as (CO2, K2) 1

(a) Sporogangia
(b) Dimorphic fungi
(c) Deuteromycetes
(d) Dikaryophasic

1-d. The symbiotic association between plant roots and fungi is known as (CO2, K1) 1

(a) Mycorrhiza
(b) Lichens
(c) nodulated
(d) symbioyant

1-e. Which type of microorganisms grow best at low temperatures? (CO3, K2) 1

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(a) Psychrophiles
(b) Mesophiles
(c) Osmophiles
(d) Halophiles

1-f. Which type of culture media is designed to distinguish between different types of microorganisms based on their metabolic activities? (CO3, K4) 1

(a) Selective media
(b) Differential media
(c) Enrichment media
(d) Complex media

1-g. Which method is used for the maintenance and preservation of microbial cultures? (CO4, K2) 1

(a) Lyophilization
(b) Autoclaving
(c) Boiling
(d) Incineration

1-h. What is the role of antibiotics (CO4, K2) 1

(a) Kill all microorganisms
(b) Inhibit microbial growth
(c) enhance microbial growth
(d) has no effect on microbial growth

1-i. What is the primary goal of a sewage treatment plant (CO5, K2) 1

(a) Remove contaminants from wastewater
(b) Produce drinking water
(c) Generate electricity
(d) Increase water flow

1-j. Which is the compound responsible for color to the wine (CO5, K2) 1

(a) Tanins
(b) Anthocyanin
(c) Chlorophyll
(d) Xanthophyll

2. Attempt all parts:-

2.a. Describe the key features of prokaryotic cells. (CO1, K1) 2

2.b. Explain how viruses differ from cellular organisms in terms of structure and function. (CO2, K4) 2

2.c. What for the differential media used in microbiology labs? (CO3, K2) 2

2.d. Write the names of the ioninzing radiations used for the sterilization? (CO4, K1) 2

2.e. Analyze the agar diffusion assay method for determining antimicrobial efficacy. (CO5, K4) 2

SECTION-B 30

3. Attempt all parts:-

3.a. Answer any one of the following:-

3.a.(i)	Describe different types of bacteria on the basis of environmental adaptations? Mention with one example of each for each kind of extremophiles? (CO1, K2)	6
3.a.(ii)	What is the function of a capsule in a bacteria and how is capsular staining performed? (CO1, K2)	6

3.b. Answer any one of the following:-

3.b.(i)	Explain how algae are distinguished from other microorganisms based on their morphology and physiology. (CO2, K4)	6
3.b.(ii)	Distinguish viral reproduction and bacterial reproduction processes and interpret it industrially? (CO2, K4)	6

3.c. Answer any one of the following:-

3.c.(i)	Describe the nutritional requirements of autotrophs and provide an example. (CO3, K2)	6
3.c.(ii)	Describe cultural characteristics used to identify and analyze microorganisms on agar plates. (CO3, K4)	6

3.d. Answer any one of the following:-

3.d.(i)	Compare and contrast autoclaving with pasteurization as methods of sterilization. (CO4, K4)	6
3.d.(ii)	Explain how gamma radiation can be applied to sterilize medical equipment, and give an example of a situation where it is more advantageous than other sterilization methods. (CO4, K3)	6

3.e. Answer any one of the following:-

3.e.(i)	Analyze the role of rhizobium as a biofertilizer in agricultural fields to enhance plant growth through nitrogen fixation? (CO5, K4)	6
3.e.(ii)	Apply your understanding of AIDS to explain how an infection by HIV affects the human immune system, also mention how does the HIV virus effects immune system (CO5, K3)	6

SECTION-C 50

4. Answer any one of the following:-

4-a.	Discuss the significance of microbial taxonomy in the identification and classification of microorganisms. (CO1, K4)	10
4-b.	Evaluate the impact of the germ theory of disease on public health and medical practices. (CO1, K5)	10

5. Answer any one of the following:-

5-a.	Compare the characteristics of cellular organisms with acellular organisms and evaluate which group poses a greater challenge in disease control, explaining your reasoning. (CO2, K5)	10
5-b.	Evaluate the role of the conjugation tube in bacterial genetic exchange and assess how the presence or absence of the fertility (F) factor influences the success and efficiency of this process? (CO2, K5)	10

6. Answer any one of the following:-

6-a.	Evaluate the strengths and limitations of using colony morphology alone for identifying microorganisms in a clinical laboratory setting (CO3, K5)	10

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6-b.	Describe and analyze the process of preparing and using agar slants for culturing microorganisms. Explain their advantages over other types of culture media. (CO3, K3)	10

7. Answer any <u>one</u> of the following:-

7-a.	List two types of chemotherapeutic agents used against bacterial infections and apply their modes of action for industrial applications. (CO4, K3)	10
7-b.	Explain how lyophilization is used to preserve microbial cultures over long periods, including its advantages and limitations. (CO4, K3)	10

8. Answer any <u>one</u> of the following:-

8-a.	Explain how Single Cell Proteins (SCP) can be applied as an alternative food source and give an example of where they might be used. (CO5, K3)	10
8-b.	Apply your understanding of sewage treatment to explain how microorganisms contribute to the purification of water in a Sewage Treatment Plant. (CO5, K3)	10