



LOYOLA COLLEGE (AUTONOMOUS) CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION – BIOTECHNOLOGY

FIRST SEMESTER – APRIL 2025

PBT1MC03 – APPLIED MICROBIOLOGY



Date: 28-04-2025

Dept. No.

Max. : 100 Marks

Time: 09:00 AM - 12:00 PM

SECTION A – K1 (CO1)

Answer ALL the questions

(5 x 1 = 5)

1 Choose the best option

- a) The characteristic of free-living nitrogen-fixing bacteria is
 i) They live in symbiotic relationships with plant roots
 ii) They fix nitrogen independently of plants
 iii) They exclusively fix phosphorus
 iv) They decompose plant residues
- b) Identify the common waterborne disease
 i) Tuberculosis ii) Cholera iii) Influenza iv) Measles
- c) Acidophiles are found in
 i) Hydrothermal vent ii) Unexplored forest soil
 iii) Highly acidic environments iv) Deep-sea sediments
- d) Which of the following is an example of an antiviral drug?
 i) Amphotericin B ii) Isoniazid iii) Acyclovir iv) Ciprofloxacin
- e) In proteomics, what does the term "proteome" refer to
 i) The complete set of nucleic acids in an organism
 ii) The complete set of proteins expressed by a genome
 iii) The set of carbohydrates present in a sample
 iv) The total number of metabolites in a cell

SECTION A – K2 (CO1)

Answer ALL the questions

(5 x 1 = 5)

2 Answer in one or two sentences)

- a) Give two examples of bacterial secondary metabolites which act as agrochemicals.
- b) List three common nutrients found in aquatic environments.
- c) Define enrichment culture in microbiology.
- d) Mention two examples of emerging or re-emerging infectious diseases.
- e) List the primary types of nanomaterials used in optical sensing for pathogen detection.

SECTION B – K3 (CO2)

Answer any THREE of the following

(3 x 10 = 30)

- 3 You are tasked with improving the nitrogen content of a degraded soil field. How would you apply biological nitrogen fixation to achieve this? Outline the steps you would take and the expected outcomes.
- 4 Summarise the process of bacterial biofilm formation.

5	Describe the process of selective single-cell isolation using laser tweezers.
6	Outline the antigenic structure and genes present in HIV which contributes to its virulence.
7	Explain the principle behind the use of Flow cytometry for analyzing microbial metabolites.
SECTION C – K4 (CO3)	
	Answer any TWO of the following (2 x 12.5 = 25)
8	Examine the differences in transmission mechanisms between waterborne diseases like cholera and airborne diseases like influenza.
9	What are the steps would you take to perform a culture-independent microscopic analysis of a microbial community from a polluted water source?
10	Explain the antibiotic resistance mechanisms.
11	Compare the sensitivity and specificity of NMR and HPLC for detecting microbial secondary metabolites.
SECTION D – K5 (CO4)	
	Answer any ONE of the following (1 x 15 = 15)
12	Categorise biopesticides and explain bacterial and viral pesticides.
13	Explain the types of bioremediation and analyse the benefits and drawbacks of using <i>in situ</i> and <i>ex situ</i> bioremediation for oil spill cleanup.
SECTION E – K6 (CO5)	
	Answer any ONE of the following (1 x 20 = 20)
14	Evaluate the differences between free-living nitrogen-fixing bacteria and symbiotic nitrogen-fixing bacteria in terms of their impact on agriculture.
15	Classify drug resistant tuberculosis and explain the virulence characteristics and pathogenesis of the disease.

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