LOYOLA COLLEGE (AUTONOMOUS) CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION – **BIOTECHNOLOGY**

FIRST SEMESTER – **NOVEMBER 2024**

PBT1MC03 – APPLIED MICROBIOLOGY

Date: 13-11-2024 Dept. No. Max. : 100 Marks

Time: 01:00 pm-04:00 pm

	SECTION A – K1 (CO1)	
	Answer ALL the questions	**(5 x 1 = 5)**
1	**Choose the best option)**	
a)	Biorational pesticides are derived from which of the following? i) Chemical synthesis ii) Microbial metabolites iii) Heavy metals iv) Industrial waste	
b)	The primary mode of transmission for Giardiasis is i) Contact with infected animals ii) Inhalation of contaminated air iii) Ingestion of contaminated water iv) Physical contact with infected individuals	
c)	The methodology that involves the use of microorganisms to degrade pollutants in contaminated soil is i) Chemical oxidation ii) *In situ* bioremediation ii) Physical removal iii) Thermal desorption	
d)	The pathogen that is associated with opportunistic fungal infections is i) *Chlamydia trachomatis* ii) *Candida albicans* iii) Dengue virus iv) HIV	
e)	The technology that is commonly used to sequence DNA in metagenomics studies? i) Sanger sequencing ii) Next-Generation Sequencing (NGS) iii) RT-PCR iv) Western blotting	
	SECTION A – K2 (CO1)	
	Answer ALL the questions	**(5 x 1 = 5)**
2	**Answer in one or two sentences)**	
a)	Differentiate between nitrogen-fixing microorganisms and phosphate solubilizing microorganisms.	
b)	Name two water quality assays used to assess water contamination.	
c)	List three types of extremophiles based on their habitat.	
d)	Which class of antimicrobial drugs does MRSA show resistance to and what is the primary mechanism?	
e)	What is metagenomics? How is it used to study microbial communities?	
	SECTION B – K3 (CO2)	
	Answer any THREE of the following	**(3 x 10 = 30)**
3	Discuss the effectiveness of phosphate-solubilizing and iron absorbing microorganisms on crop yield.	
4	How would you assess the risk of airborne disease transmission in an indoor environment?	
5	Why is Fluorescence *In Situ* Hybridization (FISH) used in microbial community analysis? Discuss.	

6	Write in brief on the pathogenesis of *Chlamydia trachomatis*, including its mechanisms for evading the host immune response and establishing chronic infection.
7	Explain how LAMP amplifies DNA without the need for thermal cycling.
	SECTION C – K4 (CO3)
	Answer any TWO of the following **(2 x 12.5 = 25)**
8	Analyze how biogeochemical cycling of inorganic nutrients and metals influences soil health.
9	Explain the role of toxin and pathogenesis of *Salmonella typhi*.
10	Examine the role of PCR-based methods in understanding microbial diversity in marine sediments
11	Explain the mechanism of action of antibiotics and how they inhibit the growth of bacteria?
	SECTION D – K5 (CO4)
	Answer any ONE of the following **(1 x 15 = 15)**
12	Discuss how you would integrate classical procedures for isolating microbes with modern molecular techniques to study extremophiles in marine environments.
13	Design a multi-faceted experimental approach using zebrafish to investigate both the short-term and long-term effects of probiotics.
	SECTION E – K6 (CO5)
	Answer any ONE of the following **(1 x 20 = 20)**
14	Explain how bacteria convert nitrogen gas (N_2) from the atmosphere into a form that plants can use, write in detail on the enzymes and genes involved.
15	Evaluate the effectiveness of primary and secondary water treatment methods.

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