A **Reg. No. :** | | | | | | | | | | | | |

Question Paper Code: R2D04

B.E./B.Tech. DEGREE EXAMINATION, NOV 2024

Second Semester

Biotechnology

R21UBT204- MICROBIOLOGY

(Regulations R2021)

Duration: Three hours Maximum: 100 Marks

Answer All Questions

PART A - (5x 1 = 5 Marks)

1. Safranin used in Gram staining is a CO1-U

   (a) primary stain (b) Mordant (c) decolorizer (d) counter stain

2. In prokaryotes, the hair-like outgrowths which attach to the surface of other bacterial cells are CO1 -U

   (a) flagella (b) pili (c) plasmid (d) capsule

3. Which of the following have peptidoglycan in cell wall CO1 -U

   (a) bacteria (b) virus (c) fungi (d) protozoa

4. Flagella in bacteria enable them to CO1 -U

   (a) reproduce (b) locomote

   (c) Thrive in nutrient agar (d) Adhere to tissue surfaces

5. What nutritional type describes bacteria that obtain energy from sunlight and carbon from organic compounds? CO1 -U

   (a) Autotrophs (b) Heterotrophs (c) Phototrophs (d) Chemotrophs

6. Which of the following is commonly used as a gelling agent in microbiology culture media? CO1 -U

   (a) Gelatin (b) Agar (c) Starch (d) Cellulose

7. *Staphylococcus aureus* is known for its resistance to CO1 -U

   (a) Penicillin (b) Tetracycline (c) Ciprofloxacin (d) All of the above

8. In a clinical report *Staphylococcus aureus* strain resistant to antibiotic Penicillin, and Gentamicin. Shows less sensitive to Vancomycin and the sensitivity are high with Erythromycin. Which antibiotic is effective in treating the infection? CO5- Ana

(a) Penicillin (b) Gentamicin (c) Vancomycin (d) Erythromycin

9. An industry is emitting huge number of pollutants through its wastewater. Suggest which method is best suitable for removing such pollutants. CO6- Ana

(a) Bioleaching (b) Biofiltration (c) Bioaugmentation (d) None of these

10. What is the primary role of preservatives in food preservation? CO1 -U

(a) Enhancing flavor (b) Inhibiting microbial growth

(c) Improving texture (d) Adding color

PART – B (5 x 2= 10 Marks)

11. Jeffry, a virologist isolated a virus from an infected human blood sample. He needs to study the complete morphology of the specific virus. What microscope he will use and why? Justify your answer. CO2-App

12. Draw the structure of the bacterial cell and label its parts. CO1 -U

13. Janani working with a bacterium that has a generation time of 30 minutes. She transfers cells from an exponentially growing culture to a fresh source of same medium (assume no lag phase) so that the freshly inoculated medium contains 3.2 x 106 cells/mm. This new culture does not exhibit a lag phase. About how many cells/mm should you have after 1.5 hours incubation? CO3-App

14. Imagine a Petri dish is placed with a different concentration of antibiotics disc, ranging from very low to very high. Over time, the growth of bacterial colonies is observed and measured. What observations would indicate that the bacteria are sensitive to the antibiotic, and what would suggest resistance? CO5-Ana

15. How do biopesticides differ from chemical pesticides? CO1 -U

PART – C (5 x 16= 80 Marks)

16. (a) Viswa got two bacterial strains (one is gram positive and other is gram negative) from his friend's lab. Unfortunately, the labeling of the name of the strain is not clear. Now he needs to find out which vial contains gram positive and which vial contains gram negative bacteria. How he could solve the problem using the staining procedure. CO2-App (16)

Or

	(b)	Rakshana is employed with study of biology of viruses and the etiology of viral disease which are crucial to prevent the viral disease, efficient and reliable virus diagnosis, and virus control. Predict the essential microscopic tool for the study of viruses to her.	CO2-App	(16)
17.	(a)	Comprehend the classes of microorganisms with a detailed explanation in each category with examples.	CO1- U	(16)
		Or		
	(b)	Write a detailed note on asexual reproduction of fungi.	CO1- U	(16)
18.	(a)	Salma needs to differentiate bacteria based upon specific characteristics. Suggest her with the different media types availability and explain the functional types of culture media, including selective, differential, and enrichment media.	CO2- App	(16)
		Or		
	(b)	Anjana cultivated a metabolic product form bacterial strain which is grown in batch culture. Her yield not meets her expectation. So, to improve the yield of metabolite what type of culture she can use? Predict the culture type with neat explanation.	CO2- App	(16)
19.	(a)	What is antibiotic? How and why the antibiotic sensitivity assay is done. Explain the steps in detail and how to interpret the results.	CO1- U	(16)
		Or		
	(b)	Explain the principles behind physical methods of microbial control. Provide examples and discuss their applications in various settings.	CO1- U	(16)
20.	(a)	Imagine a scenario where a municipal wastewater treatment plant is struggling to effectively remove organic pollutants from its effluent. Design a comprehensive microbial-based treatment strategy that utilizes both aerobic and anaerobic microorganisms. Discuss the specific microbial species or consortia involved, the mechanisms of pollutant degradation, and the operational parameters required for successful implementation.	CO5- Ana	(16)
		Or		

(b)	Analyze the significance of penicillin in medicine and its impact on the pharmaceutical industry and highlight the production process.	CO5- Ana	(16)