

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION - 2025

B.Tech - VIII Semester (BT)

COURSE CODE (CREDITS): 18B1WBT833 (3)

MAX. MARKS: 35

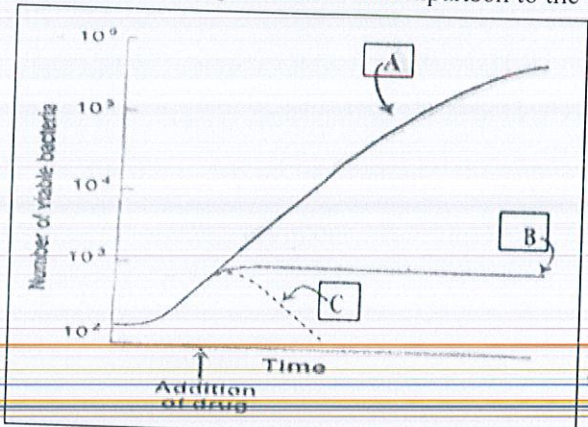
COURSE NAME: DIAGNOSTICS AND VACCINE MANUFACTURE

COURSE INSTRUCTORS: Dr. Rahul Shrivastava

MAX. TIME: 2Hour

Note: (a) All questions are compulsory. (b) The candidate is allowed to make suitable numeric assumptions wherever required for solving problems

Q. No	Question	CO	Marks										
Q1	<p>A 2.9 Kb Thalassaemia diagnosis related gene needs to be amplified. If there are four template DNA molecules present in the initial PCR reaction mixture, Calculate (and provide reason) the number of molecules that would be obtained after 5 cycles of PCR if the extension time used is:</p> <p>a. 1 min b. 2 mins c. 4 mins</p>	I	[1+1+2 = 4]										
Q2	<p>Forward and Reverse primers designed for amplification of SigF gene of <i>Mycobacterium tuberculosis</i> show non-specific amplification, with the homology search revealing binding of the forward and reverse primers at multiple locations in the genome. Design a strategy for specific amplification of the gene, providing diagrams / flowchart.</p>	I	[5]										
Q3	<p>Antibiotic Susceptibility Test was performed using The Kirby-Bauer method against pathogenic <i>Salmonella</i> bacteria. The test showed varied levels of susceptibility. With reference to the table provided, answer the following questions:</p> <table><tr><th>Antibiotic Used</th><th>Diameter of the zone of inhibition</th></tr><tr><td>Amikacin</td><td>12 cm</td></tr><tr><td>Ciprofloxacin</td><td>21 cm</td></tr><tr><td>Isoniazid</td><td>1 cm</td></tr><tr><td>Penicillin</td><td>18 cm</td></tr></table> <p>i. Compare and arrange the order of susceptibility of the <i>Salmonella</i> bacteria against the antibiotics used, providing suitable reason for your order.</p> <p>ii. Elaborate the method employed.</p> <p>iii. Discuss application of the assay in disease diagnostics and therapeutics.</p>	Antibiotic Used	Diameter of the zone of inhibition	Amikacin	12 cm	Ciprofloxacin	21 cm	Isoniazid	1 cm	Penicillin	18 cm	V	[1+2+2 = 5]
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Q4	<p>In a treatment strategy against pathogenic Multidrug-resistant <i>Staphylococcus aureus</i>, two different drugs (B & C) were tested by addition at early log stage of the bacteria.</p> <p>i. Compare the mode of inhibition of the two drugs B and C in comparison to the control A (no drug) with reason for your answer.</p> <p>ii. Which drug do you think should be administered for such MDR infections?</p> <p>iii. What are narrow and broad spectrum antibiotics? Differentiate under what conditions each must be used.</p>		IV, V	[1.5+1.5+2 = 5]
Q5	<p>Malaria is one of the oldest diseases known to mankind, yet no vaccine is available to tackle the disease.</p> <p>A. Discuss the probable reasons why efforts towards vaccine development against malaria have largely been unsuccessful.</p> <p>B. Illustrate the life cycle of a Malaria parasite.</p> <p>C. Suggest important stages of the above life cycle which may be targeted for vaccine intervention strategies and their significance.</p>		III	[2+2.5+2.5 = 7]
Q6	<p>A person is suffering from an infection with symptoms of 'hydrophobia' and 'hallucinations'.</p> <p>i. Why are both pre and post exposure vaccines recommended for such infections? Give details of such vaccines and their utility.</p> <p>ii. Illustrate the transmission and pathogenesis of the infection.</p> <p>iii. Provide details on Nerve Tissue and Cell Culture methods for production of such vaccines.</p>		III	[2+2.5+2.5 = 7]
Q7	<p>Compare the advantages and limitations of delivery of a particulate antigen through liposomes and microspheres</p>		III	2