

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST - 2 EXAMINATION- 2026

M.Sc. (Microbiology) - II Semester

COURSE CODE (CREDITS): 18MS1BT313 (3)

MAX. MARKS: 25

COURSE NAME: RECOMBINANT DNA TECHNOLOGY

COURSE INSTRUCTORS: Dr. Rahul Shrivastava

MAX. TIME: 1 hour 30 mins

Note: (a) All questions are compulsory, **Q2 and Q3** has internal choices. (b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems. (c) **Calculators are NOT allowed.**

Q. No.	Question	Marks
Q1	Polymerase chain reaction was performed for specific amplification of <i>Staphylococcus</i> gene coding for lipases enzyme. The PCR yields a specific 1923-bp product. Primers used for the amplification are: Forward Primer - 5' GCACATTAGATTACCGTCAGCG Reverse Primer - 5' TGCCCGTGTTTCATAGAACATGAC a. Calculate the T_m of the primers. b. Calculate the amount of PCR product that would be obtained after 4 cycles if the initial amount of gene product is 125 ng. c. Suggest a strategy for direct cloning of the PCR product obtained into a vector without use of restriction enzymes (draw diagrams if required). Provide its comparative advantage over restriction enzyme based cloning.	[3] [3] [4]
Q2	Discuss the genetic engineering strategy involved in production of the following transgenic crops. Provide application of such crops for human welfare. (ANY TWO): A. Bt-cotton B. GM Mustard C. Golden Rice	[3 X 2 = 6]

Q3	A DNA fragment of about 30 Kb needs to be cloned, examine and assess the utility of Cosmids and Yeast vectors for cloning of such large genes. Provide details of any one for cloning of such large DNA fragments.	[3]
Q4.	Experimental Design: A researcher aims to develop a herbicide-resistant transgenic plant using a Ti plasmid system. Design an experiment covering: - Construction of a Ti plasmid - Insertion of gene of interest within T-DNA (between LB and RB) - Role of <i>vir</i> genes in T-DNA transfer - Provide a flow-chart or diagrammatic representation for steps involving <i>Agrobacterium tumefaciens</i> infection of plant cells	[1] [1] [1] [3]