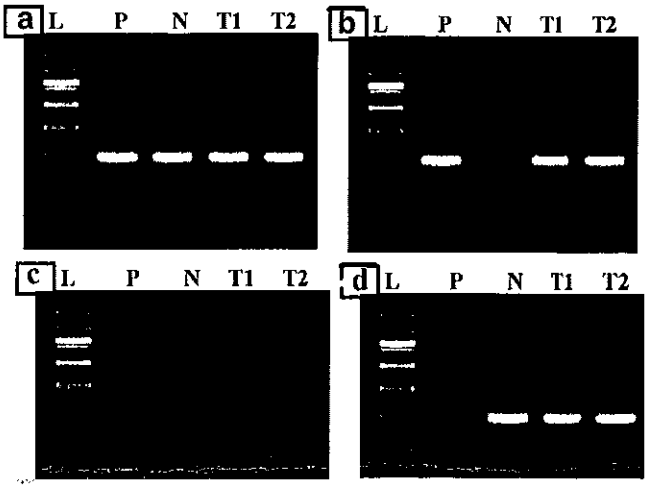
JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
TEST -2 EXAMINATION - 2026
B.Tech - VIII Semester (BT)

COURSE CODE (CREDITS): 18B1WBT833 (3) MAX. MARKS: 25
COURSE NAME: DIAGNOSTICS AND VACCINE MANUFACTURE
COURSE INSTRUCTORS: Dr. Rahul Shrivastava MAX. TIME: 1 Hour 30 min

Note: *(a) All questions are compulsory, Q3 and Q4 has internal choices. (b) The candidate is allowed to make suitable numeric assumptions wherever required for solving problems*

Q. No	Question	CO	Marks
Q1	***Case Study:*** Sputum test samples (T1 and T2) from two patients were collected for detection of *Mycobacterium tuberculosis* by PCR amplification of *IS6110* target DNA. The samples were given to four students to conduct PCR based diagnostics using suitable Positive (P) and Negative (N) Controls. The students performed a set of PCR reactions and the products thus obtained were run on agarose gel by each. The four students presented their data as a, b, c, d respectively, as provided below.  Provide suitable explanation for each gel observation. In each case point out if the test would be valid or not?	I, IV	[1.5 X 4 = 6]
Q2	***Experimental Design:*** Design a Multiplex PCR assay which may be used to simultaneously detect three pathogens: • *Escherichia coli* • *Salmonella enterica,* and • *Shigella dysenteriae* Providing essential steps, including strategies and precautions used during - selection of target sequence, designing of primers, designing of PCR cycle,	I	[6]

	and interpretation of results. Take suitable example to demonstrate your answer.		
Q3	Correct the following statements **<u>if required</u>** and provide suitable justification in support of the statements provided: **(ANY FOUR)** a. Common milk powder can be used as a blocking agent in Western Blot experiments. b. Use of capture antibody in Sandwich ELISA increases the specificity of the assay. c. Direct ELISA provides better sensitivity of the assay in comparison to Indirect ELISA. d. Several washing steps with PBST are required in an ELISA experiment to achieve proper results. e. Use of a coloured substrate and coloured enzyme is essential in ELISA, to produce a colorless product.	II, IV	**[1.5 X 4 = 6]**
Q4	Compare and differentiate between **(ANY TWO)**: A. Direct and Indirect Agglutination with examples and application. B. Direct and Indirect Immunofluorescence with applications. C. Nested and Semi-Nested PCR with an example and application.	I, II	**[3.5 X 2 = 7]**