JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
TEST -2 EXAMINATION- 2025
M.Sc.-IISemester (BT & Micro)

COURSE CODE (CREDITS): **24MS1BT211 (3)** MAX. MARKS: **25**
COURSE NAME: **Molecular Diagnostics & Forensic Biology**
COURSE INSTRUCTORS: **Dr. Jitendraa Vashistt** MAX. TIME: **1 Hour 30 Min**

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

Q. No.	Question	Marks
Q1	You aim to amplify a gene segment using Polymerase Chain Reaction (PCR), but the target fails to amplify. How would you troubleshoot this issue by evaluating the following components: (a) template, (b) enzyme, (c) reaction cofactor, and (d) dNTPs? Provide justification for each aspect based on their underlying principles.	4
Q2	A person diagnosed with typhoid is prescribed a specific class of antibiotics designed to inhibit bacterial replication. a) Identify the pathogen responsible for the infection, the recommended antibiotic, and its molecular target. b) Additionally, explain how antibiotic resistance can arise in bacteria if the prescribed course or dosage of the medication is not properly adhered to.	4
Q3	Define the following ionization methods with respect to charge state of ions production. a) Electrospray Ionization b) MALDI	4
Q4	What are the unique characteristics of cancer cells that set them apart from normal cells in the human body? Additionally, describe the molecular diagnostic techniques used to identify cancer in specific tissues, including relevant examples.	4
Q5	Define a molecular strategy if you need to identify a set of proteins differently expressed in a diabetic patient population with respect to normal individual population.	4
Q6	A tumor suppressor protein of 53 kDa also has function in maintaining genomic stability and cell growth. a) Identify this protein and explain how mutations in the gene of above mentioned protein contribute to cancer progression? b) Also define the regulation of this protein by mdm2 gene.	5