Dr. Rahul Shrivastava

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
TEST -2 EXAMINATIONS-2022
B.Tech-VIII Semester (BT)

COURSE CODE: **18B1WBT833** MAX. MARKS: 25
COURSE NAME: **DIAGNOSTICS & VACCINE MANUFACTURE**
COURSE CREDITS: 3 MAX. TIME: 1 Hour 30 Min

Note: *All questions are compulsory. Marks are indicated against each question in square brackets.*

Q1. A patient reports of vomiting, confusion, breathing quickly, muscle and joint pain – all symptoms of bacterial meningitis. Provide a 'Direct' diagnostic strategy for detection of the meningitis pathogen from the patient. **[1] (CO-II)**

Q2. Write short notes on the following: **[1.5 X 2 = 3] (CO-I)**

i. Hot-start PCR
ii. Asymmetric PCR

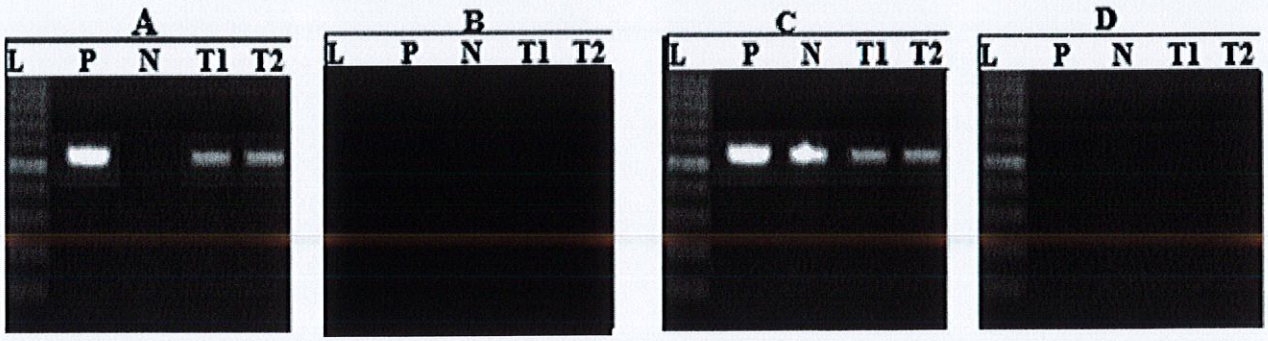
Q3. Can a gene be used as a Vaccine, Diagnostic and Therapeutic target simultaneously? Compile the conditions which are required to be satisfied for the gene to be used as a common molecular marker. **[3] (CO-III)**

Q4. Draw a diagram showing laboratory set-up for a PCR-based diagnosis laboratory. Elaborate the function of each segment involved. **[3] (CO-IV)**

Q5. A person is suffering from an infection with symptoms of 'hydrophobia' and 'hallucinations'. **(Attempt Any Two)** **[2.5 Each = 5.0] (CO-III)**

A. Describe the transmission and pathogenesis of the infection.
B. Why are pre- and post exposure both vaccine types are required for such an infection. Give details of recommended groups for these vaccines.
C. How are nerve-tissue, and culture based vaccines produced? Compare advantages and disadvantages of each.

Q6. A set of PCR reactions were performed for diagnosis of viral infection, using human blood test samples (T1 and T2). Genomic DNA of the virus was isolated and used to amplify presence of a unique sequence, for confirming the presence of virus. PCR reactions were performed for the test samples (T1 & T2), FOUR INDEPENDENT TIMES (A, B, C and D); with Proper positive (P) and negative (N) controls. The PCR products thus obtained were run on agarose gel, with DNA ladder. Analyze and provide suitable explanation for the four separate results obtained. In each case point out if the test would be valid or not? **[4 X 1.5 = 6] (CO-IV)**



L = 100bp DNA Ladder; P = Positive Control; N = Negative Control; T1 & T2 – Patient Test Samples

Q7. Amplification of the gene ***'str'*** by PCR for cloning and subsequent purification of the streptomycin antibiotic is to be accomplished. Two primers Forward (F) and Reverse (R) used for amplification of the gene bind at 2 other locations each, in the *Streptomyces griseus* genome, in addition to the specific binding sites of the gene. Sketch a diagrammatic representation of how many PCR products would be obtained if PCR is performed under such conditions? Design a PCR-based strategy for specific amplification of the gene. **[4] (CO-I)**