

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION-2022

B.Tech-VIII Semester (BT)

COURSE CODE (CREDITS): 18B1WBT833 (3)

MAX. MARKS: 35

COURSE NAME: DIAGNOSTICS & VACCINE MANUFACTURE

COURSE INSTRUCTORS: Dr. Rahul Shrivastava

MAX. TIME: 2 Hours

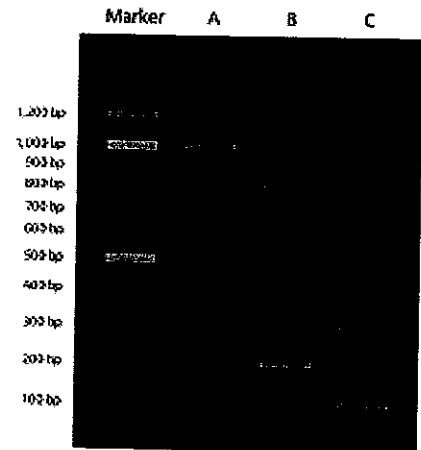
*Note: All questions are compulsory. Marks are indicated against each question in square brackets.*

Q1. Restriction profile of Wild type and Mutant strains of a species are provided. Suggest what restriction sites can be used as RFLP marker site(s) for detection of SNP in the strains. Discuss what additional conditions should be met for these restriction site(s) to be used as RFLP marker. [3](CO-I)

	EcoRI	BamHI	NotI	TaqI	SmaI	XbaI	HindIII	PstI	KpnI
Wild Type	+	-	+	+	+	+	+	+	-
Mutant	-	-	-	+	+	+	+	-	-

Q2. Examine the DNA gel electrophoresis picture provided. Draw restriction profile/map of the gene indicating size of the gene and locations of the restriction enzymes EcoRI and BamHI. [3] (CO-I)

Marker – 100bp DNA ladder  
 Lane A - Undigested Gene (No treatment)  
 Lane B -- Gene digested with EcoRI  
 Lane C - Gene digested with BamHI



[2+2+1=5] (CO-III)

Q3. With reference to vaccines for Malaria, Write short notes on:

- i. RTS,S and its development
- ii. Life cycle stages targeted for vaccine development
- iii. Current status of malaria vaccine research

Q4. BCG has been used worldwide for control of Tuberculosis since last 100 years, but is has been shown to be largely ineffective in the control of disease. Discuss the reasons for ineffectiveness of BCG against tuberculosis.

[2] (CO-III)

Q5. You have to perform a Real-Time PCR based assay for checking presence of a viral antigen in human serum samples.

[3 + 3 = 6] (CO-IV)

- i. Demonstrate what controls are required for quality control of the assay; establish significance of each control taken.
- ii. Describe two methods which can be used for performing the experiment and visualization of the results.

Q6. Genomic DNA of 22 year old boy, possible suspect in a crime, was isolated for performing forensic analysis using STR. Design a PCR cycle for amplification of 500bp products from the genomic DNA. How would you limit the length of the PCR products in the PCR cycle? (Assume melting temperature of both primers = 55°C)

[4] (CO-I)

Q7. In a Kirby-Bauer test for antibiotic susceptibility, no zone of inhibition was observed after incubation of a pathogenic bacterial strain with an antibiotic. Analyze and provide all possible reasons for the observation.

[2] (CO-V)

Q8. Short Answer Questions (Any Four)

[2.5 X 4 = 10] (CO – III)

- A. Can a person get infected even after being vaccinated for Covid-19? Why is a booster dose required for COVID-19?
- B. What step of a CRISPR-cas editing mechanism is exploited to diagnose infections? What cas protein would you employ for use in a CRISPR-cas based diagnostic test for SARS-COV-2?
- C. What are edible vaccines? Why edible vaccines are needed? What are the factors affecting the efficacy of edible vaccines?
- D. What is Pneumococcal Vaccine? What is the difference between 23-valent pneumococcal polysaccharide vaccine (23vPPV) and 13-valent pneumococcal conjugate vaccine (PCV13)? Can pneumococcal vaccines be taken together with seasonal influenza vaccine?
- E. What are the various diagnostic methods for yellow fever? How can the disease be prevented?