JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION - 2024

B.Tech - VIII Semester (BT)

COURSE CODE (CREDITS): 18B1WBT833 (3) MAX. MARKS: 25

COURSE NAME: DIAGNOSTICS AND VACCINE MANUFACTURE

COURSE INSTRUCTORS: Dr. Rahul Shrivastava & Dr. Tyson MAX. TIME: 1 Hour 30 Minutes

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***Note: Note: (a)** All questions are compulsory.*

(b)Marks are indicated against each question in square brackets.

Q1. Give Reason in **support or against** the statement: **[CO-II] [1.5 X 3 =4.5]**

i. Indirect ELISA is more sensitive for detection of an antigen in comparison to direct ELISA.

ii. Washing steps are not essential for an ELISA protocol, and leads to time wastage.

iii. Monoclonal antibodies are commonly used as capture antibodies in Sandwich ELISA.

Q2. Presence of typhoid fever, caused by Salmonella bacteria can be identified by interaction of its immunogenic antigen with a complementary antibody, using any precipitation or agglutination based technique. Design an experiment using a method of your choice for diagnosis, with suitable reasons for your choice. Discuss the logistics and applications of such a method. **[CO-II] [3.5]**

Q3. Amplification of the gene coding for *'lipases'* from *Pseudomonas alcaligenes* by PCR for cloning and subsequent purification of the enzyme 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 *Pseudomonas alcaligenes* 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. **[CO-I] [4]**

Q4. Explain the following in relation with Rabies disease. **[CO-III] [2+1+2=5]**

a) Discuss the technological advancements that have been made in the development of rabies vaccines over the years.

b) How have these advancements improved the safety and efficacy of rabies vaccines?

c) Explain the concept of post-exposure prophylaxis for rabies and for whom is it recommended for.

Q5. Answer the following in relation with Malaria disease **[CO-III] [2+2=4]**

a) Discuss the strategies used in the design of malaria vaccines, focusing on the different life cycle stages of the Plasmodium parasite targeted by these vaccines.

b) How does the RTS,S/AS01 vaccine work to provide immunity against malaria, and what are its limitations?

Q6. Discuss the immunological and pathological mechanisms underlying the progression of Tuberculosis and the factors that influence disease outcome and explain the WHO's strategy for integrating new TB vaccines into existing TB control programs. **[CO-III] [4]**