

Dr. Titendra Vashishth

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

COURSE CODE: 18B11BT412

MAX. MARKS: 25

COURSE NAME: Molecular Biology

MAX. TIME: 1 Hour 30 Min

COURSE CREDITS: 3

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

- Q1. If you are working for identification and localization of protein antigen in a cell, which of the molecular biology application is best suited to see the localized antigen? (3 marks) (CO-I)
- Q2. It is always advisable to use an anionic detergent, when the separation and visualization of proteins of a cell done using gel electrophoretic system? What is this anionic detergent and why it is essential in complete separation of proteins? (3 marks) (CO-I)
- Q3. Human cells have a tendency that by each replication cycle chromosomes length gets shortened. This is essential for maintaining the controlled cell life process. However, if a human cell becomes cancerous, then the above mentioned processes of chromosome shortening get hampered. Explain the molecular event and over-expressed enzyme responsible for elongation of chromosomes during replication. (3 mark) (CO-II)
- Q4. The genome of *E. coli* is contained in a single circular DNA molecule of 4.6×10^6 nucleotide pairs and required 40 minutes to duplicate. The human genome is 600X larger (3×10^9 base pairs) and if replication occurs at the rate of a bacterium it would require 300 hours for completion, however the entire human genome gets replicated within several hours. How is this possible? (3 marks) (CO-II)
- Q5. Deoxyribonucleotides are the major ingredients for DNA synthesis; however a structural variant of this molecule can stop the DNA synthesis. Name the above mentioned variant and define its structural property for nucleotide synthesis inhibition. Which of the technique may be done with the help of this structural variant of deoxyribonucleotide? (3marks) (CO-III)
- Q6. DNA replication in bacteria usually occurs at faster rate (1000 nucleotides/second), however this process is not allowable to get an error in joining of nucleotides against template DNA due to proof read activity. Define the role of different bacterial enzymes and their structural components which prevent errors and proof read the process. (4 mark) (CO-IV)
- Q7. A molecular biologist was doing the Polymerase chain reaction (PCR). However, he unknowingly did several following mistakes. What would be the effect on the final product PCR reaction if any of the following circumstances arose? Justify the answer with explanation. (2X3=6 mark) (CO-V)
- a) He added the excess of primers in the reaction mixture. b) He changed the annealing temperature and reduced to 4°C lesser than optimum temperature. c) He lowered the concentration of Mg^{2+} ions in the reaction mixture