

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT  
TEST -3 EXAMINATION- 2024  
M.Sc-I Semester (BT)

COURSE CODE (CREDITS): 20MS1BT112 (3)

MAX. MARKS: 35

COURSE NAME: Cell and Molecular Biology

COURSE INSTRUCTORS: Dr. Abhishek

MAX. TIME: 2 Hour

Note: (a) All questions are compulsory.

(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

| Q.No | Question  | Marks |
|------|---|-------|
| Q1   | <p>1A. Starting with a closed circular DNA of 5250 base pairs with <math>\sigma = -0.004</math> (assume 10.5 bp/turn for B-DNA).</p> <ol style="list-style-type: none"> <li>Calculate the linking number (L) for this DNA</li> <li>If 21 base pair of this DNA will remove then what will be the linking number for this DNA</li> </ol> <p>1B. An 84 bp segment of a circular DNA in the relaxed state would contain 8.0 double-helical turns, If one of these turns were removed, then what will be the number of basepair /turn?</p>  | 5     |
| Q2   | <p>RNA processing refers to the sequence of events that occur to transform the primary transcript of a gene into its mature form. It's also important to elicit different <u>biological function</u> from an RNA transcript.</p> <ol style="list-style-type: none"> <li>What are the different events that require to complete the RNA processing.[3]</li> <li>Signify the importance of 5,5-triphosphate linkage in RNA processing[1]</li> <li>Importance of trans-estrification reaction in RNA processing[1]</li> <li>What will happened if 3' end of primary transcript remain unprotected[1]</li> </ol>                            | 6     |
| Q3   | <p>Translation, also known as protein synthesis, is a process where cells create new proteins by assembling amino acids at ribosomes. The process involves several factors, including: initiation, elongation and releasing factor. Detail out the role of following in protein synthesis.</p> <ol style="list-style-type: none"> <li>IF-(IF<sub>1</sub>, IF<sub>2</sub>, IF<sub>3</sub>) [3]</li> <li>Shine-Dalgarno sequence [1]</li> <li>fMet-tRNA<sup>fMet</sup> [1]</li> <li>EF (EF-Tu and EF-Ts) [1]</li> <li>Peptidyl transferase [1]</li> <li>How does cycloheximide and tetracycline inhibit protein synthesis? [2]</li> </ol> | 9     |
| Q4   | <p>Repair enzymes recognize and remove DNA adducts, correct the DNA sequence, and rejoin strand breaks. The cell possesses a number of DNA repair mechanisms to deal with oxidative and alkylated DNA lesions. Detail-out (s) the various repair enzyme involved in</p> <ol style="list-style-type: none"> <li>Direct Repair</li> <li>Nucleotide-Excision Repair</li> <li>Base-Excision Repair</li> <li>Mismatch Repair</li> <li>Recombinational DNA repair</li> </ol>  | 5     |

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|----|---|---|
| Q5 | Activation of specific cyclin–Cdk complexes drives progression through the Start and G2/M transitions, progression through the metaphase- to-anaphase transition is triggered not by protein phosphorylation but by protein destruction, leading to the final stages of cell division The key regulator of the metaphase-to-anaphase transition is APC and SCF complex,the anaphase promoting complex also known as cyclosome (APC/C). Detail-out the proteolysis mechanism of protein by APC and SCF complex                           | 5 |
| Q6 | The growth, development, and maintenance of multicellular organisms depend not only on the production of cells but also on mechanisms to destroy them. The maintenance of tissue size, for example, requires that cells die at the same rate as they are produced. In most cases, this programmed cell death occurs by a process called apoptosis. Apoptosis Depends on an <b>Intracellular Proteolytic Cascade That Is Mediated by Caspases</b> , explain how? Also explain the role of caspase in DNA fragmentation during apoptosis. | 5 |

JUIT TEST-3 EXAMINATION- Dec-2024