

- (b) What are the two basic substrates for DNA synthesis. Explain why each is necessary for DNA synthesis. (6)

5. (a) Draw a schematic representation (Any 3) (4×3=12)

(i) Steps of spliceosome mediated splicing reactions

(ii) Different steps involved in capping

(iii) Rescue of stalled ribosomes by Non-stop mediated decay

(iv) Trombone model of DNA replication

- (b) What are the three mechanisms to ensure mutually exclusive splicing. (6)

6. Give role of the following (Any 9) (2×9=18)

- (i) RNase H
- (ii) Ligase
- (iii) Mg²⁺ in DNA polymerase activity
- (iv) Uracil N glycosylase
- (v) TATA box
- (vi) EF-Ts
- (vii) Tau proteins
- (viii) Sliding clamp
- (ix) Chloramphenicol
- (x) DnaB protein

(200)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 4092

H

Unique Paper Code : 3182012402

Name of the Paper : Molecular Biology (DSC)

Name of the Course : B.Sc. (Hons) Biomedical Science (NEP 2020)

Semester : IV

Duration : 3 Hours

Maximum Marks : 90

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt five questions in all.
3. Question No. 1 is compulsory.
4. Give illustrations and examples wherever required.
5. Subparts of the questions should be attempted together.

1. (a) Define (Any 6) (1×6=6)

- (i) Co-operative binding
- (ii) Transition mutation
- (iii) Okazaki fragments
- (iv) DNA intercalator

P.T.O.

- (v) Processivity of a polymerase
- (vi) Klenow fragment
- (vii) Shine Dalgarno Sequence
- (viii) Wobble Hypothesis

(b) Justify the following statements as true or false
(Any 4) (3×4=12)

- (i) RNA primers must be removed to complete DNA replication.
- (ii) Transcriptional regulatory proteins called activators help recruit polymerase to the promoter.
- (iii) tRNAs are adaptor molecules between amino acid and codons.
- (iv) Promoters differ markedly in their efficacy.
- (v) The number of ORFs per mRNA is different in prokaryotes and eukaryotes.

2. (a) Differentiate between the following (Any 3)
(4×3=12)

- (i) Ribosomal architecture in Prokaryotes and Eukaryotes
- (ii) Translesion synthesis and NHEJ
- (iii) Exon shuffling and RNA editing
- (iv) Replication initiation in Prokaryotes vs Eukaryotes

- (b) Describe the three steps of transcription initiation that occur before the elongation phase begins, focusing on the key features of RNA polymerase at each step. (6)

3. (a) What is the functional significance of the following
(Any 4) (3×4=12)

- (i) Promotor escape
- (ii) Translocation in translation
- (iii) Polymerase switching
- (iv) Transcription coupled repair
- (v) Three binding sites for aminoacylated-tRNA on ribosomes

(b) What is the role of alternate splicing in sex determination in drosophila? (6)

4. (a) Comment on the following (Any 4) (3×4=12)

- (i) Theta model of replication
- (ii) CTD tail of RNA polymerase
- (iii) Translesion synthesis
- (iv) Alternative splicing
- (v) Regulation of DNA replication in Eukaryotes