

1922

- (v) Shine Dalgarno sequence
(vi) Translocation
(vii) DNA helicase
- (b) What is RNA editing. Explain its significance. 5
5. (a) Give Schematic representation of the following:
(Any 4) $4 \times 3 = 12$
- (i) Transcription initiation in Prokaryotes
(ii) tRNA clover leaf structure
(iii) Rolling circle model of replication
(vi) Steps in 5' Capping of mRNA
(v) Reaction catalyzed by photolyase
(vi) Ribosome structure in Eukaryotes.
- (b) Explain how cells distinguish between the template strand and newly synthesized strand during mismatch repair in Prokaryotes and Eukaryotes. 3
6. (a) A human cell line shows progressive shortening of chromosome ends after multiple divisions. Explain the molecular basis of this observation and discuss why this does not occur in normal human cells. 5
- (b) Explain how steric hinderance can lead to mutually exclusive splicing. 5
- (d) How do stop codons terminate translation? Explain the role of release factors. 5

[This question paper contains 4 printed pages]

Your Roll No. :

Sl. No. of Q. Paper : 1922 I

Unique Paper Code : 3182012402

Name of the Paper : Molecular Biology
(DSC)

Name of the Course : B. Sc. (Hons) Biomedical Science (NEP-UGCF 2022)

Semester : IV

Time : 3 Hours Maximum Marks : 90

Instructions for Candidates :

- (a) Write your Roll No. on the top immediately on receipt of this question paper.
(b) Attempt any **FIVE** questions in **all**. Question **NO.1** is compulsory.
(c) Subparts of the questions should be attempted together.
(d) Give illustrations and examples wherever required.
1. (a) Define: (Any 5) $5 \times 2 = 10$
- (i) Semi-conservative mode of replication
(ii) Core promoter
(iii) Processivity of polymerase
(iv) Transition mutation
(v) Ribosome cycle
(vi) Exon shuffling
(vii) Promoter escape

(b) Give one word for the following: **(Any 10)**

10×2=20

- (i) The initiator tRNA is coupled to this amino acid
- (ii) Group of factors required for efficient and promoter specific initiation of transcription in eukaryotes
- (iii) The protein responsible for both RNA Polymerase removal and recruitment of repair machinery during transcription
- (iv) A sequence that is generally conserved across species and is required for a particular function
- (v) A repair pathway that potentially introduces mutations
- (vi) E. coli enzyme that methylates A residues on both strands of the sequence 5'- GATC-3,
- (vii) Repair system correcting replication errors
- (viii) Protein that increases DNA polymerase processivity
- (ix) Structural problem caused by unwinding ahead of replication fork
- (x) Ability of RNA polymerase to start synthesis without primer
- (xi) Simultaneous translation by multiple ribosomes
- (xii) Enzyme ensuring correct amino acid-tRNA pairing

2. (a) Justify the following statements as true or false. **(Any 5)**

5×2=10

- (i) Eukaryotic DNA is replicated exactly once per cell cycle.
- (ii) Translation initiation factors hold eukaryotic mRNAs in circles.

(iii) Steps in eukaryotic transcription are regulated by phosphorylation of CTD tail of RNA polymerase II.

(vi) Okazaki fragments are synthesized continuously and later broken into smaller pieces.

(v) Stop codons encode special amino acids that terminate translation.

(vi) Both strands of DNA are transcribed equally for a given gene.

(b) Discuss the molecular basis of UV-induced DNA damage and the mechanisms used by cells to repair it. 5

3. Differentiate between the following: **(Any 3)**

3×5=15

(i) Rho dependent Vs Rho independent transcription termination.

(ii) Group I Vs Group II self-splicing introns

(iii) Prokaryotic Vs Eukaryotic translation initiation

(iv) DNA Polymerase in Eukaryotes Vs Prokaryotes

4. (a) Give the Role/Significance of the following: **(Any 5)**

5×2=10

(i) Fail safe glycosylases

(ii) Chloramphenicol

(iii) Telomerase

(vi) Base analogs