

This question paper contains 4 printed pages]

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S. No. of Question Paper : **2027**

Unique Paper Code : **2492012403**

Name of the Paper : **Gene Organization, Replication and Repair**

Name of the Course : **B.Sc. (Hons.) Biochemistry (NEP)**

Semester : **IV**

Duration : **2 Hours**

Maximum Marks : **60**

(Write your Roll No. on the top immediately on receipt of this question paper.)

There are **6** questions.

Attempt **4** questions in all.

All questions carry equal marks.

Question No. **1** is compulsory.

1. (A) Give the functions of the following proteins :

- (a) Helicase
- (b) Primase
- (c) DNA polymerase δ
- (d) Single strand DNA binding proteins
- (e) Dam methylase

P.T.O.

(B) State True or False and explain :

- (a) Eukaryotic chromosomes are linear and free from torsional strain.
- (b) Sliding clamps increase DNA polymerase processivity.
- (c) DNA replication is conservative in nature.
- (d) Microsatellites are mutational hot spots that can serve as biomarkers for diseases.
- (e) Linking number of a DNA molecule with double stranded breaks equals to Twist.

5,10

2. Differentiate between the following :

- (a) Topoisomerase I and Topoisomerase II
- (b) Recombination and Transposition
- (c) A-DNA and Z-DNA
- (d) Translesion Repair and NHEJ
- (e) Serine and Tyrosine recombinase

5×3

3. (A) What is the mechanism of replication initiation in prokaryotes and eukaryotes ?

(B) Explain *two* mechanisms of direct repair of DNA.

- (C) Diagrammatically explain the roles of various domains of DNA polymerase III. 6,5,4
4. (A) Describe the features of Watson-Crick model of DNA structure and explain the underlying basis for its flexibility.
- (B) Explain how the following chemicals or conditions cause mutations :
- (a) 8-oxo Guanine
 - (b) Exposure to UV
 - (c) Deamination of adenine
 - (d) Ethidium bromide
 - (e) Gamma radiation
- (C) Explain the key steps of Homologous recombination. Draw the Holliday Model. 5,5,5
5. (A) What are Okazaki fragments ? Explain leading and lagging strand synthesis with the help of a diagram.
- (B) Name the scientist who invented the Ames Test. Explain its principle and state its application.
- (C) Explain the role of telomerases in eukaryotic DNA replication. 6,5,4

6. Write short notes on the following :

- (a) Replication slippage
- (b) RecA
- (c) Xeroderma pigmentosum
- (d) Topoisomerase inhibitors
- (e) Split genes and satellite DNA.

3×5