

**Sl. No. of Ques. Paper : 1426**

**F-7**

**Unique Paper Code : 2491302**

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

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

**Semester : III**

**Duration : 3 hours**

**Maximum Marks : 75**

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

*Attempt five questions in all. Question No. 1 is compulsory.*

**1A. State True or False and Justify your answer**

- a. Most DNA binding proteins bind to the major groove of DNA
- b. 5-bromouracil is a mutagenic base analogue of thymine.
- c. Organisms with high GC content are more tolerant to high temperatures.
- d. Genome size correlates with an organism's complexity.
- e. Histones have high content of negatively charged amino acids.

(1x5=5)

**B. Give the contribution of the following scientists.**

- a. E.Chargaff
- b. Hargobind Khorana
- c. Fredrick Meischer
- d. Marshall Nirenberg
- e. Hershey and Chase

(1x5=5)

**C. Define the following:**

- a. Mutagens
- b. Central Dogma
- c. Base Tautomerism
- d.  $T_m$
- e. Replication fork

(1x5=5)

**D. Fill in the Blanks.**

- a. Okazaki fragments in the lagging strand are joined together by ..... enzyme.
- b. Linking number is the sum of two geometric components called ..... and .....
- c. Decondensed/ relaxed form of genome is known as .....
- d. .... enzyme replicates the ends of eukaryotic chromosomes.

(1x4=4)

- 2A. What is gene density? Why is it higher in prokaryotes than in eukaryotes?  
(4, 5, 5)
- B. How was the genetic code deciphered?
- C. What are the key steps of homologous recombination as explained by the Holliday Model?
- 3A. What is a replisome? State the function of following enzymes during replication.
- Helicase
  - Primase
  - PCNA
  - SSB
  - Tau protein
- B. What are different classes of transposable elements? Describe the cut and paste mechanism of DNA transposition.  
(6, 8)
- 4A. Differentiate between the following:
- Euchromatin and Heterochromatin
  - B-DNA and Z-DNA
  - DNA polymerase I and DNA polymerase III
  - Topoisomerase Type I and Topoisomerase Type II
  - Frameshift mutation and Reverse mutation
  - Chromatin and Chromosome
  - LINE and SINE
- (2x7=14)
- 5A. Telomerase is a special type of DNA polymerase. Justify.
- B. Describe the silent features of the Watson and Crick model of DNA.
- C. How do Novobiocin and Nalidixic acid inhibit bacterial infection in humans?  
(5, 6, 3)
- 6A. Explain Nucleotide excision repair. What is its correlation with the disease Xeroderma pigmentosum ?
- B. Give the diagrammatic representation of pseudogenes.
- C. Describe the structural organization of chromatin according to nucleosome model.  
(5, 3, 6)

7. Writes short notes on

- a. DNA damage by oxidation
- b. Semi conservative model of DNA replication
- c. Organellar DNA
- d. Mismatch repair

(3.5x4=14)

8A. What are base analogues and intercalating agents? With the help of examples show how they cause mutations.

B. Describe a test used for screening potentially mutagenic compounds.

C. Explain the damage caused to DNA by UV radiation. How is it repaired?

(6, 5, 3)