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**3 (Sem-5/CBCS) ZOO HC 1**

**2023**

**ZOOLOGY**

(Honours Core)

Paper : ZOO-HC-5016

**(Molecular Biology)**

Full Marks : 60

Time : Three hours

**The figures in the margin indicate full marks for the questions.**

1. Choose the correct answer :  $1 \times 7 = 7$

(i) The number of base pairs present in each turn of B-form of DNA helix is

(a) 9

(b) 12

(c) 11

(d) 10

*Contd.*

(ii) In eukaryotes, the TATA box sequences required for initiation of transcription are present in

- (a) 10 nucleotides upstream of transcription start site (TSS)
- (b) 25 nucleotides upstream TSS
- (c) 10 nucleotides downstream TSS
- (d) 25 nucleotides downstream TSS

(iii) The enzyme responsible for photo- reactivation of DNA is

- (a) Photoligase
- (b) Photoreductase
- (c) Photooxidase
- (d) Photolyase

(iv) The nucleotide cap that is attached at the 5' end of mRNA during capping is

- (a) 5-methyl guanosine
- (b) 7-methyl guanosine
- (c) 5-acetyl guanosine
- (d) 7-acetyl guanosine

(v) Which of the following reaction is required for proofreading during DNA replication by DNA polymerase III?

- (a) 5' to 3' exonuclease activity
- (b) 3' to 5' endonuclease activity
- (c) 3' to 5' exonuclease activity
- (d) 5' to 3' endonuclease activity

(vi) Removal of intron is called as

- (a) Splicing
- (b) Capping
- (c) RNA editing
- (d) All of the above



(vii) Which of the following amino acids has the highest number of codons?

- (a) Proline
- (b) Leucine
- (c) Tryptophan
- (d) Aspartic acid

2. Write short notes on the following:

2×4=8

- (a) Pyrimidine dimerization
- (b) Split genes
- (c) 'Clover Leaf Model' of t-RNA
- (d) Gene silencing

3. Answer **any three** from the following:

5×3=15

- (a) Write the steps involved in synthesis of rRNA.

(b) Write a note on the structural features of a prokaryotic ribosome.

(c) Write a brief account on the mechanism of mRNA splicing in eukaryotes.

(d) What is RNA editing? Write the role of editosome and guide RNA (gRNA) in insertion/deletion type of RNA editing. 1+4=5

(e) Write the difference between short interfering RNA (siRNA) and micro RNA (miRNA).

4. (a) Why is DNA replication known as 'high-fidelity' reaction? Briefly explain the mechanism of DNA replication in eukaryotes. 2+8=10



Or

Or

(b) What are protein synthesis inhibitors? Discuss the role of inhibitors in the regulation of various stages of protein synthesis. 2+8=10

5. (a) What do you mean by degeneracy of the genetic code? Briefly explain the mechanism of translation of mRNA in prokaryotes with an elaborate discussion on translation initiation, elongation and termination. 2+8=10

Or

(b) Briefly discuss the process of transcription in prokaryotes. Mention the importance of transcription factors in transcription process. 8+2=10

6. (a) What are inducers and co-repressors? What is an operon constituted of? Briefly explain the lactose (lac) operon in *Escherichia coli*. 2+1+7=10

(b) Describe the characteristic features of two classes of aminoacyl-tRNA synthetases. Explain the process of interaction between the two classes of aminoacyl-tRNA synthetases and their corresponding tRNAs. 4+6=10

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