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 : 1×7=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

(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

(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

Or

(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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