2026

ANANDARAM DHEKIL PHUKAN COLLEGE LIBRARY
Acc. No.
Date
Nagaon · Assam

ZOOLOGY

(Major)

Paper : ZLG0600204

(Molecular Biology)

Full Marks : 45

Time : 2 hours

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

1. Choose the correct answer : 1×5=5

(a) The repeat sequence of nucleotides in telomere is

(i) TTGGGA *(ii)* GGGATT

(iii) TTAGGG *(iv)* TTGAGG

(b) What is the primary role of topoisomerase during the initiation of replication?

(i) Breaking hydrogen bonds between nitrogenous bases to unzip the double helix

(ii) Synthesizing a short RNA primer to provide a 3′—OH group

(iii) Connecting Okazaki fragments on the lagging strand

(iv) Relieving torsional strain and preventing supercoiling ahead of the replication fork

(c) A particular triplet of bases in the template strand of DNA is 5′ AGT 3′. The corresponding codon for mRNA transcribed is

(i) 5′ TCA 3′

(ii) 3′ ACU 5′

(iii) 3′ UCA 5′

(iv) either UCA or TCA, depending on wobble in the first base

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

(i) 25 nucleotides upstream of transcription start site (TSS)

(ii) 10 nucleotides upstream of TSS

(iii) 10 nucleotides downstream of TSS

(iv) 25 nucleotides downstream of TSS

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

(i) 5-methyl guanosine

(ii) 7-methyl guanosine

(iii) 5-acetyl guanosine

(iv) 7-acetyl guanosine

(Continued)

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2. Answer/Write on any *five* of the following in brief : 2×5=10

(a) Differentiate between introns and exons.

(b) Differentiate between Z-DNA and B-DNA.

(c) Define miRNA and siRNA.

(d) What is nucleosome?

(e) What is globin mRNA?

(f) Write a short note on post-transcriptional gene silencing.

(g) Role of reverse transcriptase

(h) Function of telomerase

(i) Write briefly on bidirectional DNA replication.

(j) Name some inhibitors of protein synthesis.

3. Answer any *four* of the following : 5×4=20

(a) Why are RNA primers needed? Briefly describe the RNA priming event during DNA replication with special emphasis on primosome. 1+4=5

(b) Briefly discuss the differences between prokaryotic transcription and eukaryotic transcription.

(c) What are the key regions that define a transcription unit? Mention their functions.

(Turn Over)

(d) Discuss the salient features of Watson and Crick model of DNA.

(e) Write a short note on excision repair mechanisms of DNA damage.

(f) How do activator and silencer regulate the process of eukaryotic gene expression?

(g) What is spliceosome? Describe the process of mRNA splicing. 1+4=5

(h) Explain the structure of tRNA.

4. Answer any *one* of the following : 10

(a) Briefly explain the mechanism of DNA replication in eukaryotes. How does it differ from prokaryotic replication? 7+3=10

(b) What is an operon? Briefly describe about regulation of trp operon in *E. coli*. How do mutations in leader sequence affect regulation process? 2+6+2=10

(c) Define genetic code. Write the characteristics of genetic code. Explain degeneracy of genetic code with special reference to 'wobble hypotheses'. 1+4+5=10

(d) Give a detailed account of the mechanism of translation in eukaryotes. How do inhibitors of protein synthesis affect translation process? 8+2=10

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