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3 (Sem-5/CBCS) ZOO HC 1

2022

ZOOLOGY

(Honours)

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 : **(any seven)**

1×7=7

(i) The number of base pair per turn is 11
in

(a) Z-DNA

(b) A-DNA

(c) B-DNA

(d) C-DNA

Contd.

- (ii) During splicing
 - (a) Introns are removed and exons are joined together
 - (b) Exons are removed and introns are joined
 - (c) Both introns and exons are removed
 - (d) Both introns and exons are joined

- (iii) DNA replication is
 - (a) conservative
 - (b) dispersive
 - (c) semiconservative
 - (d) repulsive

- (iv) RNA primers are synthesized with the help of the enzyme
 - (a) RNA polymerase
 - (b) Primase
 - (c) Topoisomerase
 - (d) Ligase

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(v) The factor involved in initiation of transcription in prokaryotes is

- (a) alpha factor
- (b) beta factor
- (c) sigma factor
- (d) None of the above

(vi) Poly A tail is attached at the

- (a) 3' end of DNA
- (b) 5' end of DNA
- (c) 3' end of RNA
- (d) 5' end of RNA

(vii) The release factor(s) involved in termination of polypeptide in prokaryotes is/are

- (a) RF1
- (b) RF2
- (c) RF3
- (d) RF1, RF2 and RF3

(viii) The *lac* operon in *E. coli* was discovered by

- (a) Meselson and Stahl
- (b) Jacob and Monod
- (c) Barbara McClintock
- (d) Watson and Crick

(ix) A miRNA is

- (a) a small coding RNA
- (b) a small coding tRNA
- (c) a small non-coding RNA
- (d) a small rRNA

(x) The process by which a given gene is spliced into more than one type of mRNA molecule is called

- (a) exon shuffling
- (b) alternative splicing
- (c) intron shuffling
- (d) spliceosome machinery

- (xi) The site of protein synthesis is
- (a) Nucleolus
 - (b) Ribosome
 - (c) Mitochondria
 - (d) Nucleus
- (xii) If the sequence of bases in the mRNA codon is CAU, then the anticodon sequence in the corresponding tRNA will be
- (a) GTA
 - (b) AUG
 - (c) GUG
 - (d) GUA

2. Write short notes on the following :
(any four) $2 \times 4 = 8$

- (a) Chargaff's rule
- (b) Replication fork
- (c) RNA interference
- (d) DNA dependent RNA polymerase
- (e) Transcription factors

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- (f) Shine-Dalgarno sequence
- (g) Role of aminoacyl-tRNA synthetases
- (h) Methylation of DNA

3. Answer **any three** questions from the following : 5×3=15

(a) What is a telomere? Write a note on replication of telomere. 1+4=5

(b) Write the steps involved in the replication of linear ds-DNA.

(c) What do you mean by degeneracy of the genetic code? Define Wobble hypothesis with suitable example.

2+3=5

(d) Briefly explain the process of rho-independent and rho-dependent termination in prokaryotes. 3+2=5

(e) Comment on the structure of globin mRNA with proper illustration.

(f) What do you mean by initiation factor and elongation factor in eukaryotic translation? Name those eukaryotic initiation and elongation factors.

1+2+2=5

(g) What is a silencer in the context of regulation of gene expression? Elaborate on the location of silencer within the genome. $2+3=5$

(h) What is photoreactivation repair of DNA? Write the steps involved in the process of photoreactivation repair of thymine dimer in DNA molecule. $2+3=5$

4. Answer **any three** from the following : $10 \times 3 = 30$

(a) Briefly explain the mechanism of rolling circle DNA replication.

(b) What do you mean by 5'UTR and 3'UTR? Elaborate the mechanism of transcription in eukaryotes with appropriate diagrams. $2+8=10$

(c) What are protein synthesis inhibitors? Explain the inhibition mechanism of protein synthesis inhibitors with examples. $2+8=10$

(d) Write the difference between prokaryotic and eukaryotic translation.

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- (e) What is RNA splicing? Explain the mechanism of t-RNA splicing pathway. 2+8=10
- (f) What is regulation of gene expression? Discuss the regulation of tryptophan synthesis in prokaryotes. 2+8=10
- (g) Describe the salient features of genetic code.
- (h) Briefly explain the structure and assembly of a prokaryotic ribosome. 4+6=10