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63/1 (SEM-5) CC11/ZOOHC 5116

2023

ZOOLOGY

Paper : ZOOHC 5116

(Molecular Biology)

Full Marks : 60

Pass Marks : 24

Time : Three hours

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

1. Choose the correct options from the following : **(any five)** $1 \times 5 = 5$

(a) In *E. Coli* the site of origin of replication present in the chromosome is known as

(i) Klenow fragment

(ii) ori C

(iii) A-domain

(iv) C-domain

Contd.

(b) Meselson and Stahl experimentally demonstrated _____ replication of DNA.

(i) semi-conservative

(ii) conservative

(iii) dispersive

(iv) θ -replication

(c) Which of the following is not a pre-mRNA processing mechanism?

(i) Polyadenylation

(ii) 5' capping

(iii) Acetylation

(iv) Splicing

(d) Which is a stop codon?

(i) UUA

(ii) UCA

(iii) UAC

(iv) UGA

(e) The amino acid is attached to the _____ of the tRNA.

(i) 5' terminal

(ii) 3' terminal

(iii) D-arm

(iv) anticodon arm

(f) lac Z codes for the enzyme

(i) β -galactosidase

(ii) β -galactoside permease

(iii) β -galactoside acetyltransferase

(iv) allolactose

(g) In Eukaryotic cells, which polymerase is located in the mitochondria.

(i) Polymerase α

(ii) Polymerase β

(iii) Polymerase ϵ

(iv) Polymerase γ

(h) How many origin of replication does a bacterial chromosome contain ?

- (i) 1
- (ii) 3
- (iii) 4
- (iv) 6

(i) During transcription, which transcription factor initially binds to the core promoter.

- (i) TF II B
- (ii) TF II H
- (iii) TF II D
- (iv) TF II A

(j) The process of acetylation _____ gene expression.

- (i) enhances
- (ii) represses
- (iii) no effect
- (iv) decreases

2. Answer the following questions : **(any five)**
2×5=10

- (a) What is the function of 5' capping ?
- (b) Define monocistronic and polycistronic transcription unit.
- (c) What is semi-discontinuous replication ?
- (d) What is pyrimidine dimerization ?
- (e) Define genetic imprinting.
- (f) What are guide RNAs ?
- (g) What are km shuffling ?

3. Answer the following questions : **(any five)**
5×5=25

- (a) State the differences between DNA and RNA.
- (b) Explain the Wobble hypothesis with suitable diagram.
- (c) Describe the charging of tRNA with appropriate diagram.

(d) Write a note on the fidelity of translation.

(e) Write a note on the mechanism of spliceosome mediated RNA splicing.

(f) Discuss the trp operon system of gene expression regulation.

(g) Write a note on mismatch repair.

(h) State the differences between translation in prokaryotes and eukaryotes.

(i) Explain the replication process in the telomeric region.

4. Answer the following questions : **(any two)**

10×2=20

(a) Describe the mechanism involved in prokaryotic transcription.

(b) Define self splicing introns. Explain the mechanism of splicing in Group I and Group II introns. 2+8=10

(c) Explain the process of replication in eukaryotic cell.

(d) What is RNA interference ? Discuss the action of miRNA and siRNA to mediate RNAi. 2+8=10