

This question paper contains 3 printed pages]

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S. No. of Question Paper : 5704

Unique Paper Code : 3182013501

Name of the Paper : Genome Organisation and Function

Name of the Course : B.Sc. (H) Biomedical Science (NEP)

Semester : V

Duration : 3 Hours

Maximum Marks : 90

(Write your Roll No. on the top immediately on receipt of this question paper.)

Attempt five questions in all.

Question No. 1 is compulsory.

Attempt the sub-parts of the questions together.

Draw illustrations or diagrams, wherever required.

1. (a) Define (any four) :

4×1=4

(i) Chromodomain proteins

(ii) Nucleosome positioning

(iii) CRISPR-Cas system

(iv) miRNA

(v) mRNA decay.

P.T.O.

(b) Justify the following statements as True or False (any *five*) : $5 \times 2 = 10$

- (i) Methylation of Lysine at the 9th position of H3 (H3K9) is associated with 'Transcriptional Activation'.
- (ii) miRNAs and siRNAs both regulate gene expression by targeting mRNAs.
- (iii) Tm RNA is involved in rescuing stalled ribosomes.
- (iv) The ubiquitin-proteasome pathway degrades misfolded proteins.
- (v) Unitary pseudogenes originate from functional genes with the accumulation of degenerative mutations.
- (vi) Repetitive DNA sequences are absent in the human genome.

(c) Expand the following acronyms (any *four*) :

$4 \times 1 = 4$

- (i) EMSA
- (ii) VNTR
- (iii) RISC
- (iv) CpG
- (v) HDAC.

2. Distinguish between (any *three*) :

$3 \times 6 = 18$

- (i) Activators and co-activators
- (ii) Gene families and Superfamilies
- (iii) Chromodomain proteins and bromodomain proteins
- (iv) Ubiquitin-proteasome pathway and lysosomal degradation.

3. Comment on the following (any *three*) : 3×6=18
- (i) mRNA Decay
 - (ii) Gene Families and Superfamilies
 - (iii) Translational repressor
 - (iv) Insulator prevents enhancer-promoter interactions.
4. (a) Explain various mechanisms by which bacterial cells can regulate mRNA expression. 6
- (b) Discuss riboswitches and describe how they can serve as potential targets for antibiotics. 6
- (c) Explain how enhancers and silencers regulate gene expression at a distance. Why are enhancers important in tissue-specific gene expression ? 6
5. (a) Define insulators and boundary elements. 4
- (b) Explain how insulators prevent enhancer-promoter interactions. 8
- (c) Discuss the significance of insulators in genome organisation. 6
6. (a) Define sRNAs and their role. 6
- (b) Give examples of sRNA-mediated regulation. 4
- (c) How do sRNAs improve bacterial adaptability ? 8