

12/8/22

Your Roll No.....

**M.Sc. BIOTECHNOLOGY
SEMESTER - II EXAMINATION 2022
PAPER CODE: MBT-201**

PAPER TITLE: EXPRESSION OF GENETIC INFORMATION

Time: Three Hours

Maximum Marks: 75

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

Attempt all questions. All parts of a question must be attempted in continuation. Start answer of a fresh question on a new page. Cite examples and draw labelled diagrams wherever necessary.

Q1. Answer all the questions: [1x15=15]

- I. In protein synthesis, translocation is initiated with the movement of_____.
 - a) tRNA from P-site to the A-site
 - b) dipeptidyl tRNA from A-site to P-site
 - c) tRNA from A-site to P-site
 - d) tRNA from P-site to E-site
- II. Statement about protein synthesis that is incorrect_____.
 - a) Stop codons do not encode amino acids
 - b) Each tRNA transports only one amino acid
 - c) The anticodon of tRNA carries the genetic information of the amino acid sequence
 - d) Ribosomes can move on mRNA
- III. What is polysome?
 - a) Active site for synthesis of lipids
 - b) Active site for synthesis of proteins
 - c) Active site for synthesis of DNA
 - d) All of these
- IV. Which of the following is not a post-translational modification?
 - a) Lipidation
 - b) Protein phosphorylation
 - c) Proteolytic processing
 - d) DNA methylation
- V. Signal sequences are _____.
 - a) Short peptide sequences attached to a protein that initiates its degradation by digestive enzymes

- b) Short peptide sequences to transport a protein to the nucleus
 - c) Glycoproteins that serve as an address for transporting newly synthesized protein to the correct location
 - d) Short peptide sequences that serve as an address for transporting newly synthesized proteins to the correct location
- VI. Proteins tagged with mannose 6-phosphate are transported to _____
- a) Golgi complex
 - b) Mitochondria
 - c) Lysosome
 - d) Nucleus
- VII. Which of the following is the most appropriate definition of an operator?
- a) A non-coding, regulatory DNA sequence that is bound by RNA polymerase
 - b) A non-coding, regulatory DNA sequence that is bound by a repressor protein
 - c) A DNA-binding protein that regulates gene expression
 - d) A cluster of genes that are regulated by a single promoter
- VIII. Formation of the attenuator stem-and-loop structure depends on the events that occur during translation of _____
- a) Regulatory sequence 1
 - b) Regulatory sequence 2
 - c) Regulatory sequence 3
 - d) Regulatory sequence 4
- IX. Choose the correct statement for the *cl* gene.
- a) It represses only *cII* gene
 - b) It activates *cII* gene and represses *cIII* gene
 - c) It represses both *cII* and *cIII* gene
 - d) It activates both *cII* and *cIII* gene
- X. In zinc finger motif, which residues in this sequence motif form ligands to a zinc ion?
- a) Cysteine and Histidine
 - b) Cysteine and Arginine
 - c) Histidine and Proline
 - d) Histidine and Arginine
- XI. Gene imprinting involves _____
- a) DNA methylation
 - b) DNA phosphorylation
 - c) DNA glycosylation
 - d) DNA oxidation

- XII. Which of the following statements about lac operon in E.coli is true?
- Promoter is the binding site for the lac repressor
 - Operon is only switched on in the absence of lactose in the growth medium
 - β -galactosidase is only produced in large quantities when the lac repressor is bound to the operator
 - Lac operon mRNA is a polycistronic mRNA
- XIII. Which of the following is not true?
- N and Q proteins are anti-terminators
 - N binds to nut sites
 - In the absence of Q protein, termination is prevented
 - Q protein interacts with RNA polymerase and modulates it
- XIV. Steroid hormones receptor binds to _____
- Hormone response elements in m-RNA
 - Hormone response elements in DNA
 - Hormone response elements in proteins
 - Ribosomes to stimulate translation
- XV. In Britten-Davidson model, which gene is responsible for synthesis of activator RNA?
- Integrator gene
 - Producer gene
 - Receptor site
 - Sensor site

- Q2. Attempt **ANY THREE** of the following: [3x5=15]
- Give a detailed account of the secondary structure of tRNA.
 - What is activation of amino acids? What is the difference between two classes of aminoacyl tRNA synthetases?
 - Discuss the role of elongation factors in the elongation cycle of protein synthesis in Prokaryotes.
 - How the initiation of protein synthesis takes place in Eukaryotes?
 - Explain the significance of GTPase timer.

- Q3. Attempt **ANY ONE** of the following: [1x15=15]
- Give a detailed account of the chemical modification of protein after its translation. Highlight the significance of these PTMs in the cellular processes.
 - What is Signal Hypothesis? Give the detailed account of Signal Recognition Particle.

- Q4. Attempt **ANY TWO** of the following: [2x7.5=15]
- How the transcriptional termination is controlled by alternate RNA conformations? Explain by giving the suitable example.
 - What is a DNA binding domain? Give a detailed account of the types of DNA binding motifs?

- c) Discuss the regulation of gene expression in prokaryotes by taking Lac Operon as a model.
- d) Give an account of the transcriptional switch for control of lytic and lysogenic cycles of lambda phage.

Q5. Attempt **ANY TWO** of the following:

[2x7.5=15]

- a) What is epigenetic control of gene expression? Explain by giving a suitable example.
- b) Give an account of Britten-Davidson models for regulation of gene expression.
- c) How do the hormones control the gene expression in eukaryotes?
- d) Discuss the regulation of gene expression by chromatin structure.