BUDDHA SERIES

(Unit Wise Solved Question & Answers)

Course – B.Sc Biology 2nd year 3rd Semester

College – Buddha Degree College

(DDU Code-859)

Department: Science

Subject: Zoology

Faculty Name: Mazhar khan

Unit – III Regulation of gene Expression

1. Which of the following is a post-transcriptional regulation mechanism?

A. DNA replication
B. RNA splicing
C. Protein folding
D. DNA methylation
Answer: B. RNA splicing

2. Alternative splicing allows:

A. Multiple proteins from one gene
B. Only one protein form
C. DNA mutations
D. Translation inhibition
Answer: A. Multiple proteins from one gene

3. The 5′-UTR and 3′-UTR influence:

A. Gene duplication
B. mRNA stability and translation efficiency
C. DNA replication
D. Protein glycosylation
Answer: B. mRNA stability and translation efficiency

4. Riboswitches are found in:

A. Eukaryotic promoters
B. 5′-UTR of bacterial mRNAs
C. Protein kinase domains
D. Ribosomal RNA only
Answer: B. 5′-UTR of bacterial mRNAs

5. Which of the following is *not* a mechanism of epigenetic regulation?

A. DNA methylation
B. Histone modification
C. Chromatin remodeling
D. RNA polymerase errors
Answer: D. RNA polymerase errors

6. Transcription factors bind to:

A. Ribosome
B. Promoter or enhancer DNA motifs
C. tRNA
D. Introns
Answer: B. Promoter or enhancer DNA motifs

7. The mediator complex in eukaryotes:

A. Inhibits transcription
B. Links activators to RNA Pol II
C. Degrades mRNA
D. Acetylates histones
Answer: B. Links activators to RNA Pol II

8. Which of the following is a major point of gene regulation?

A. DNA replication
B. Transcription
C. Translation
D. Post-translational modification
Answer: B. Transcription

9. Operons are found in which type of organisms?

A. Eukaryotes
B. Archaea only
C. Bacteria
D. Protozoa
Answer: C. Bacteria

10. In the lac operon, the presence of lactose results in:

A. Corepressor binding to the operator
B. Repressor binding to the operator
C. Repressor conformation change, allowing transcription
D. Activator binding to the operator
Answer: C. Repressor conformation change, allowing transcription

11. What role does cAMP play in the lac operon?

A. It acts as a corepressor
B. It activates CAP to increase transcription
C. It binds directly to DNA
D. It degrades lactose
Answer: B. It activates CAP to increase transcription

12. Attenuation is a regulatory mechanism in:

A. Heat shock genes
B. Bacterial operons like trp
C. Eukaryotic splicing
D. mRNA silencing
Answer: B. Bacterial operons like trp

13. The trp operon is regulated by:

A. Induction only
B. Repression and attenuation
C. Enhancers
D. Sigma factors
Answer: B. Repression and attenuation

14. Which enzyme adds acetyl groups to histones?

A. Histone deacetylase
B. DNA methylase
C. HAT (Histone acetyltransferase)
D. RNA polymerase II
Answer: C. HAT (Histone acetyltransferase)

15. DNA methylation typically:

A. Increases gene expression
B. Blocks gene expression
C. Has no effect
D. Promotes splicing
Answer: B. Blocks gene expression

16. Enhancers function by:

A. Binding repressors
B. Binding activators and looping DNA
C. Recruiting ribosomes
D. Blocking transcription
Answer: B. Binding activators and looping DNA

17. miRNAs regulate gene expression by:

A. Binding DNA promoters
B. Degrading or inhibiting translation of mRNAs
C. Altering histones
D. Promoting RNA polymerase binding
Answer: B. Degrading or inhibiting translation of mRNAs

18. Chromatin accessibility is altered by:

A. DNA replication
B. Chromatin remodeling complexes
C. RNA polymerase I
D. tRNA charging
Answer: B. Chromatin remodeling complexes

19. siRNA primarily functions to:

A. Enhance transcription
B. Silence gene expression by cleaving mRNA
C. Activate splicing
D. Bind to DNA polymerase
Answer: B. Silence gene expression by cleaving mRNA

20. DNAse I hypersensitive sites indicate:

A. Inactive chromatin
B. Highly condensed chromatin
C. Accessible, active chromatin
D. DNA damage
Answer: C. Accessible, active chromatin

21. What does a trans-regulatory element do?

A. Binds DNA on the same chromosome
B. Encodes proteins (like TFs) that regulate genes
C. Methylates promoter DNA
D. Encodes noncoding RNAs only
Answer: B. Encodes proteins (like TFs) that regulate genes

22. Basal transcription factors are required for:

A. Translation initiation
B. RNA Pol II recruitment to core promoter
C. DNA replication
D. mRNA export
Answer: B. RNA Pol II recruitment to core promoter

23. The TATA box is found in:

A. E. coli promoter
B. Eukaryotic core promoters
C. 3′-UTR
D. Introns
Answer: B. Eukaryotic core promoters

24. Which editor modifies RNA post-transcriptionally?

A. ADAR (A-to-I editing)
B. DNA polymerase
C. RNA Pol I
D. Ribosome
Answer: A. ADAR (A-to-I editing)

25. Ubiquitination often leads to:

A. TF binding
B. Chromatin remodeling
C. Protein degradation
D. mRNA splicing
Answer: C. Protein degradation

26. A repressor decreases expression by:

A) Breaking down mRNA
B) Blocking RNA polymerase
C) Promoting histone acetylation
D) Removing introns
Answer: B

27. An inducible operon is:

A) Always on
B) Turned off by default, turned on by inducer
C) Controlled only by repressors
D) Only in eukaryotes
Answer: B

28. A repressible operon is:

A) Always off
B) On unless corepressor present
C) Only inducible
D) Only in viruses
Answer: B

29. RNA editing involves:

A) Inserting or altering nucleotides in RNA
B) Changing DNA sequence
C) Adding histones
D) Removing proteins
Answer: A

30. Telomeres influence gene expression via:

A) Telomerase only
B) Chromatin structure at chromosome ends
C) Promoters
D) mRNA splicing
Answer: B

Unit – IV Regulation of gene Expression-II

1. **Peptide linkage is ?**
   a) –CO-NH-
   b) –Co-NH2-
   c) –COOH-NH-
   d) –CH-N2-
   Answer: (a) –CO-NH-

2. A genomic DNA possesses functioning units, a group of genes under the influence of promoters known as
(a) genes
(b) operons
(c) anticodon
(d) codon
Answer: (b) Operons

3.There are these many histones in the core of a nucleosome
(a) 8
(b) 6
(c) 4
(d) 2
Answer: (a) 8

4. Protein folding is a process in which a polypeptide folds in to _____
a) 2-D structure
b) Globular form
c) 3-D structure
d) Linear form
Answer: c 3-D structure

5. Which of these heat shock proteins prevent protein misfolding and maintain polypeptide chain in the unfolded state.
a) Hsp60
b) Hsp28
c) Hsp70
d) Hsp32
Answer: c Hsp70

6. How many types of protein degradation pathways are seen in a eukaryotic cell?
a) 1
b) 2
c) 3
d) 4
Answer: b 2

7. Ubiquitin has _____ of amino acids.

a) 70
b) 75
c) 76
d) 72

Answer: c 76

8 Dicer converts double-stranded RNAs into _____

a) snRNA
b) siRNA
c) mRNA
d) tRNA

Answer b siRNA

9. Drosha is an _____

a) enzyme
b) micro RNA
c) messenger RNA
d) satellite DNA

Answer: a Enzyme

10. siRNA are produced by _____

a) Transcription
b) DNA damage
c) RNA damage
d) Enzymatic action

Answer: d Enzymatic action

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A. Histone deacetylase
B. DNA methylase
C. HAT (Histone acetyltransferase)
D. RNA polymerase II
Answer: C. HAT (Histone acetyltransferase)

18. What is the role of E3 ubiquitin ligase?

A) Degrades ubiquitin
B) Directs proteins to ribosomes
C) Attaches ubiquitin to target proteins
D) Recycles ATP
Answer: C Attaches ubiquitin to target proteins

19. Enhancers function by:

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C. Recruiting ribosomes
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Answer: B. Binding activators and looping DNA

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Answer: D. RNA polymerase errors

26. The autophagosome fuses with which organelle?

A) Golgi apparatus
B) Endoplasmic reticulum
C) Lysosome
D) Nucleus
Answer: C Lysosome

27. Which enzymes degrade proteins inside lysosomes?

A) Lipases
B) Proteases (e.g., cathepsins)
C) Kinases
D) Phosphatases
Answer: B Proteases (e.g., cathepsins)

28. DNA methylation typically:

A. Increases gene expression
B. Blocks gene expression
C. Has no effect
D. Promotes splicing
Answer: B. Blocks gene expression

29. Which molecule can be a signal for both autophagy and proteasomal degradation?

A) ATP
B) NADH
C) Ubiquitin
D) Glucose
Answer: C Ubiquitin

30. What is the main cellular structure responsible for degrading proteins in eukaryotic cells?

A) Ribosome
B) Lysosome
C) Proteasome
D) Nucleus
Answer: C Proteasome