B.Sc. BIOTECHNOLOGY
FOURTH SEMESTER
MOLECULAR BIOLOGY
BBT-401

(Use separate answer scripts for Objective & Descriptive)

Duration: 3 hrs. **Full Marks: 70**

(PART-A : Objective)

Time: 20 min. **Marks: 20**

Choose the correct answer from the following: ***1X20=20***

1. Hydroxyl is absent at..... carbon in deoxyribose sugar.
   a. 1 b. 2
   c. 3 d. 4

2. In a polynucleotide chain.....is present at the 3rd carbon of 3′ region.
   a. Free hydroxyl b. Free phosphate
   c. Free OH of phosphate d. Hydrogen

3. Primary transcript is the product of.....
   a. Replication b. Transcription
   c. Post transcriptional modification d. Translation

4. RNA replicases are.....
   a. RNA dependent DNA polymerases b. DNA dependent DNA polymerases
   c. RNA dependent RNA polymerases d. DNA dependent RNA polymerases

5. Ternary complex is formed of.....
   a. DNA, RNA, and histone b. RNA, DNA and polymerase
   c. RNA, protein and histone d. Amino acid, DNA and RNA

6. The product of RNA polymerase II is.....
   a. rRNA b. tRNA
   c. DNA d. mRNA

7. Splicing site is.....
   a. GU-GA b. AG-UG
   c. GU-AG d. AG-GU

8. The amino acid coded by a single codon is .....
   a. Methionine b. Glycine
   c. Lysine d. Isoleucine

9. The .....nucleotide of the codon is Wobble site.
   a. 1st b. 2nd
   c. 3rd d. 4th

10. The 1st tRNA binds at the.....site of ribosome.
    a. A b. P
    c. E d. Codon

11. The mutation which causes termination of protein synthesis is
    a. Same-sense mutation
    b. Mis-sense mutation
    c. Non-sense mutation
    d. None of the above

12. Which of the following is a method of isolation of mutants?
    a. screening
    b. enrichment
    c. selection
    d. All of the above

13. Mutant which cannot grow in the absence of a particular component in the media is known as
    a. auxotroph
    b. prototroph
    c. pleiotroph
    d. None of the above

14. Proflavin and acridine orange induce
    a. Transitions
    b. Transversions
    c. Inversions
    d. Frameshift mutations

15. Outcomes of point mutations include
    a. Nonsense mutation
    b. Missense mutation
    c. Silent mutation
    d. All of above

16. The sequence of DNA acting as template is AGCTACGA. Then the order of bases in mRNA will be
    a. 5′ TCGATGCT 3′
    b. 5′ TCGAUGCT 3′
    c. 5′ UCGUAGCU 3′
    d. 5′ UCGAAGCU 3′

17. Identify the odd one among the following?
    a. Ethidium bromide
    b. Proline
    c. Proflavin
    d. Dioxin

18. Proteins that block the passage of RNA polymerase are called:
    a. Activators
    b. Repressors
    c. Enhancers
    d. Operators

19. In the absence of glucose, E. coli can import lactose to change into glucose and galactose because CAP binds to the
    a. cAMP
    b. DNA
    c. lac operon
    d. Promoter

20. In the context of prokaryotic gene expression, which of the following is the most appropriate definition of an operator?
    a. A cluster of genes that are regulated by a single promoter.
    b. A DNA-binding protein that regulates gene expression.
    c. A non-coding, regulatory DNA sequence that is bound by RNA polymerase.
    d. A non-coding, regulatory DNA sequence that is bound by a repressor protein.

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(PART-B : Descriptive)

Time: 2 hrs. 40 min. **Marks: 50**

[Answer question no.1 & any four (4) from the rest]

1. What is B DNA? Make full chemical structure of polynucleotide. 3+7=10

2. What is RNA polymerase? Explain function of subunits of RNA polymerase. 4+6=10

3. What do you understand by genetic code? Explain its characteristics. 3+7=10

4. Write the process of amino acid activation and translation initiation in detail. 5+5=10

5. Describe the tryptophan operon? Explain the regulation of the *trp* operon in the presence and absence of tryptophan. 2+8=10

6. How mutagens differ from carcinogens? How will you study the carcinogenic nature of a chemical compound? 2+8 =10

7. Explain the initiation of DNA replication in an E.coli. How does a germline cell replicate the telomeric region? 5+5=10

8. Write short notes on *any two:* 5×2 =10
   a. Intergenic suppressors
   b. Structure of *lac* operon
   c. Base-excision repair

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