REV-01
MMB/23/28

2023/06

SET A

M.Sc. MICROBIOLOGY
SECOND SEMESTER
MOLECULAR BIOLOGY
MMB-201

[USE OMR SHEET FOR OBJECTIVE PART]

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

Objective

Time: 30 mins. **Marks: 20**

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

1. Who described the structure of the DNA double helix?
   a. Peter Mitchell
   b. Andre Jagendorf
   c. Ernest Uribe
   d. Watson and Crick

2. Which of the following is true about DNA polymerase?
   a. It can synthesize DNA in the 5′ to 3′ direction
   b. It can synthesize DNA in the 3′ to 5′ direction
   c. It can synthesize mRNA in the 3′ to 5′ direction
   d. It can synthesize mRNA in the 5′ to 3′ direction

3. The term chromosome was coined by.....
   a. Sutton
   b. Boveri
   c. Waldeyer
   d. Hoffmeister

4. Mode of DNA replication in *E.coli* is:
   a. Conservative and unidirectional
   b. Conservative bidirectional
   c. Semiconservative and unidirectional
   d. Semiconservative and bidirectional

5. How many autosomes are present in a human being?
   a. 20 pairs
   b. 22 pairs
   c. 23 pairs
   d. 44 pairs

6. Which of the following process does not occur in prokaryotes?
   a. Replication
   b. Transcription
   c. Splicing
   d. Translation

7. Chromatin is composed of.....
   a. DNA
   b. DNA and proteins
   c. DNA, RNA, and proteins
   d. None

8. If the plasmid and the foreign DNA are cut by the same restriction endonuclease, recombinant DNA can be formed by joining both by:
   a. Ligase
   b. EcoRI
   c. Polymerase III
   d. Taq polymerase

9. The centromere is that part of the chromosome where.....
   a. Nicking occurs
   b. Chromatids are attached
   c. Nucleoli are formed
   d. Crossing-over takes place

10. A chromosome with a centromere near the middle is called.....
    a. Metacentric
    b. Acrocentric
    c. Telocentric
    d. Submetacentric

11. Which of the following is NOT the step of mRNA processing?
    a. 5′-5′ capping
    b. RNA silencing
    c. Polyadenylation
    d. Removal of introns

12. Anticodon is present in:
    a. DNA
    b. tRNA
    c. rRNA
    d. mRNA

13. Name the term where a single pre-mRNA is processed into a number of products.
    a. Alternate splicing
    b. Polyadenylation
    c. Removal of exons
    d. All of the above

14. Which of the following RNAs are the most abundant in an animal cell?
    a. mRNA
    b. tRNA
    c. miRNA
    d. rRNA

15. The RNA polymerase that is required for the synthesis of mRNA is:
    a. RNAP I
    b. RNAP II
    c. RNAP III
    d. RNAP IV

16. What are the characteristics of rough pneumococci strains?
    a. Non-capsulated and pathogenic
    b. Non-capsulated and non-pathogenic
    c. Capsulated and pathogenic
    d. Capsulated and non-pathogenic

17. During translation, proteins are synthesized:
    a. By ribosomes using the information from DNA
    b. By lysosome using the information from DNA
    c. By ribosomes using the information from rRNA
    d. By ribosomes using the information from mRNA

18. Which of the following purine bases is present in RNA?
    a. Uracil
    b. Thymine
    c. Cytosine
    d. Guanine

19. The enzyme involved in activation of tRNA:
    a. ATP synthetase
    b. Aminoacetylt RNA
    c. AminoacyltRNA
    d. None of the above

20. During translation, the function of peptidyl transferase is:
    a. Transfer of phosphate group
    b. Amino acid activation
    c. Binding of ribosomal subunits to mRNA
    d. Peptide bond formation between adjacent amino acids

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Descriptive

Time : 2 hr. 30 mins. **Marks : 50**

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

1. How can you define central dogma in your own words? Is the replication of DNA in both prokaryotes and eukaryotes same? Justify your answer. Explain the mechanism of replication on prokaryotes. What is the difference in catalysis of DNA polymerase and DNA ligase enzyme during replication of DNA? Explain. What will be the consequence in absence of DNA gyrase enzyme? 1+2+4+2+1=10
2. Mention the importance of cell division on DNA replication. Do you think regulation of replication is important? Justify your answer. What is the difference in mechanism of rolling circle and theta mode of plasmid replication? What is the importance of DNA repair? Explain with the help of nucleotide excision repair. Given is a sequence of mRNA, make the sense DNA strand -3'AUUACGCCUAAGGGC5' 1+1+2+4+2=10
3. How can you differentiate between the need for DNA replication and transcription by a cell? Explain it in your own words. Do you think transcription is a whole genome act? Justify your answer. Explain the mechanism of transcription on eukaryotes. What is the importance of regulatory elements during transcription and what role they play during regulation? 2+1+4+3=10
4. Explain the mechanism of spicing or hnRNA and its importance to a cell. What is a genetic code and how can you explain Wobble hypothesis? Explain different elements important for initiation of translation of mRNA.What are the sites in ribosomes involved during elongation? Explain their importance. Why in prokaryotes transcription is directly followed by translation? Justify. 2+2+3+2+1=10
5. Define DNA. Describe and explain the structure of DNA with the help of Watson and Crick's model. Also, give appropriate diagrams. 10
6. Describe and explain the structure of tRNA with an appropriate diagram. 10
7. What are the different types of chromosomes based on the position of the centromere? Explain with appropriate diagrams. 10
8. What is an Operon? Describe the Lac Operon in details. 10

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