

Subject: **Biochemistry**
Paper name: **Molecular Biology**
Paper No: **BC-4**
Semester: **IV Semester**

A. Multiple choice questions [75 (15 from each unit)]

1. Which of the following statement is false about DNA?
 - a) Located in chromosomes
 - b) Carries genetic information from parent to offspring
 - c) Abundantly found in cytoplasm
 - d) There is a precise correlation between amount of DNA and number of sets of chromosome per cell
2. What stores the genetic information in DNA?
 - a) Sugar
 - b) Phosphate
 - c) Nitrogenous base
 - d) All of these
3. Fredrick Griffith's experiment involving *Streptococcus pneumoniae* lead to the discovery of
 - a) DNA as genetic material
 - b) RNA as genetic material
 - c) Protein as genetic material
 - d) Transforming principle
4. Which of the following combination is a correct observation for the transformation experiment performed by Griffith?
 - a) Type IIIS (living) + mouse = dead
 - b) Type IIIS (heat killed) + mouse = dead
 - c) Type IIR (living) + mouse = dead
 - d) Type IIIS (heat killed) + type IIR (living) + mouse = living
5. Definite results proving DNA to be genetic material was given by
 - a) Fredrick Griffith
 - b) Hershey and Chase
 - c) Avery, Macleod and MacCarty
 - d) Meselson and Stahl

6. What were the main criteria taken under consideration for the experiment by Hershey and Chase?
 - a) DNA contains phosphorus, protein contains sulfur
 - b) Protein contains phosphorus, DNA contains sulfur
 - c) Both DNA and protein contains phosphorus and not sulphur
 - d) Both DNA and protein contains sulfur and not phosphorus

7. The method of DNA replication where original strand is used as a template to build a new strand is called
 - a) Conservative mode of replication
 - b) Semi- conservative mode of replication
 - c) Dispersive mode of replication
 - d) All of these

8. Replication fork is the junction between the two
 - a) Unreplicated DNA
 - b) Newly synthesized DNA
 - c) Newly separated DNA strands and newly synthesized DNA strands
 - d) Newly separated DNA strands and the unreplicated DNA

9. Which of the following does not affect DNA replication?
 - a) Antiparallel nature of DNA
 - b) End specificity of polymerase
 - c) SSB protein
 - d) Helicase

10. Which of the following is used in prokaryotic replication?
 - a) DNA polymerase I
 - b) DNA polymerase II
 - c) DNA polymerase III
 - d) All of these

11. Which of the following types of DNA polymerase has 3'→5' exonuclease activity?
 - a) DNA polymerase I
 - b) DNA polymerase II
 - c) DNA polymerase III
 - d) All of these

12. DNA polymerase II can polymerase upto _____ nucleotides per minute at 37°C.
 - a) 50
 - b) 500

- c) 5000
- d) 50000

13. DNA polymerase III has _____ subunits.

- a) 4
- b) 6
- c) 8
- d) 10

14. The enzyme that catalyzes the polymerization/ synthesis of new DNA molecules is

- a) DNA ligase
- b) DNA polymerase
- c) DNA gyrase
- d) DNA helicase

15. The enzyme used to join bits of DNA is

- a) DNA ligase
- b) Primase
- c) Endonuclease
- d) Topoisomerase

16. The enzyme responsible for synthesizing RNA in prokaryotic cells is

- a) ATP Synthase
- b) Reverse transcriptase
- c) Helicase
- d) RNA polymerase

17. Which among the following activities does reverse transcriptase not exhibit?

- a) RNase activity
- b) DNA dependent DNA Polymerase activity
- c) ATPase activity
- d) RNA dependent DNA polymerase activity

18. Transcription can be inhibited by

- a) Actinomycin D
- b) Rifampin
- c) α -Amanitin
- d) All of the above

19. Which RNA forms part of the ribosomes?
- mRNA
 - rRNA
 - tRNA
 - All of the above
20. Which among the following processes uses segments of DNA to produce complementary RNA strand?
- Transcription
 - Translation
 - Transformation
 - Replication
21. The central dogma states that information flows from
- RNA → DNA → Proteins
 - Proteins → DNA → RNA
 - DNA → RNA → Proteins
 - Proteins → RNA → DNA
22. Which of these modifications help to protect mRNA from being degraded by nucleases and aid in translation?
- addition of unusual bases
 - folding of RNA
 - splicing
 - addition of poly A tail and 5' cap
23. The 5' → 3' RNA polymerase activity of RNA polymerase is exhibited by which sub-unit?
- β
 - β'
 - α
 - σ
24. The newly formed RNA transcript produced by RNA polymerase grows in which direction?
- 3' → 5' direction on 3' → 5' DNA strand
 - 5' → 3' direction on 5' → 3' DNA strand
 - 3' → 5' direction on 5' → 3' DNA strand
 - 5' → 3' direction on 3' → 5' DNA strand

25. What does mRNA do?
- a) forms part of ribosomes
 - b) carries amino acids to ribosomes
 - c) carry information in the form of genetic code
 - d) help in reverse transcription
26. Which among the following is a part of the promoter region of transcription of DNA?
- a) TATA
 - b) -35 sequence
 - c) Both a) and b)
 - d) Neither a) nor b)
27. Rho independent termination is based on the formation of:
- a) Hairpin loop
 - b) Supercoils
 - c) Helix
 - d) All of the above
28. Which is true for RNA polymerase?
- a) synthesizes RNA from 3' → 5' direction
 - b) utilizes deoxyribonucleotide triphosphates for RNA formation
 - c) does not require primer
 - d) consists of two sub-units
29. The non-coding intervening sequences in mRNA are called:
- a) exons
 - b) introns
 - c) spliceosome
 - d) promoters
30. The methyl group of 5' cap of mRNA is donated by?
- a) S-Adenosyl-methionine
 - b) Cysteine
 - c) Serine
 - d) glutamine
31. Genetic code consists of
- a) 2 letters
 - b) 3 letters
 - c) 4 letters
 - d) 5 letters

32. The initiation codon AUG codes for
- a) Tryptophan
 - b) Methionine
 - c) Phenyl alanine
 - d) Glycine
33. Wobble hypothesis was proposed by
- a) Crick
 - b) Watson
 - c) Nelson
 - d) Nirenberg
34. The nitrogenous base that is not found in the genetic code is
- a) uracil
 - b) adenine
 - c) cytosine
 - d) thymine
35. How many different codons are possible?
- a) 4
 - b) 24
 - c) 64
 - d) infinite
36. Codons that specify the amino acids often differ in the
- a) first base
 - b) second base
 - c) third base
 - d) none of the above
37. The codons that do not code for an amino acids are called
- a) initiation codons
 - b) propagation codons
 - c) termination codons
 - d) universal codons
38. Most of the amino acids have more than one codon, this phenomenon is termed as
- a) Wobble
 - b) Universality

- c) Specificity
 - d) Degeneracy
39. Which of the following is not a termination codon?
- a) UAA
 - b) UAG
 - c) UGC
 - d) UGA
40. A gene whose expressible nucleotide sequence overlaps with that of the sequence of another gene is called:
- a) house keeping gene
 - b) regulatory gene
 - c) overlapping gene
 - d) regulatory gene
41. The structural gene 'Z' of lac operon is responsible for the synthesis of the enzyme(s):
- a) β -Galactosidase
 - b) Permease
 - c) Acetylase
 - d) All of the above
42. A lac repressor is a tetramer repressed when bound to the inducer. The trp repressor is a:
- a) heterodimer which uses glucose as corepressor
 - b) homodimer which uses tryptophan as corepressor
 - c) tetramer inactivated on inducer binding
 - d) tetramer activated on inducer binding
43. Which statement is not true for tryptophan operon?
- a) two polycistronic mRNAs are produced
 - b) is a repressible operon
 - c) codes for three structural genes
 - d) all of the above
44. Which of the following acts as an inducer of lac operon?
- a) allolactose
 - b) lactose
 - c) galactose
 - d) glucose

45. Lac operon will be turned on when
- lactose is less than glucose
 - lactose is less in the medium
 - lactose is more than glucose
 - glucose is enough in the medium
46. Ribosomes are made up of
- DNA and Proteins
 - RNA and Proteins
 - DNA and RNA
 - only Proteins
47. Peptidyl-transferase center (PTC) is located in
- tRNA
 - mRNA
 - Smaller subunit of Ribosomes
 - Larger subunit of Ribosomes
47. Svedberg units (S-value) measures
- Size
 - Length
 - Sedimentation velocity
 - Sequence
48. Assembly of ribosomes begin in
- Nucleolus
 - Nucleus
 - Cytosol
 - Plasma membrane
49. Prokaryotes have _____ ribosomes, while Eukaryotes have _____ ribosomes
- 80 S, 70 S
 - 50 S, 40 S
 - 70 S, 80 S
 - 50 S, 30 S
50. tRNA carrying methionine comes and binds first at the
- A site
 - P site
 - E site
 - none of these

51. The release of tRNA from the E site is triggered by, tRNA entering
- A site
 - P site
 - E site
 - mRNA
52. Elongation factors EF-Tu and EF-Ts uses energy from the hydrolysis of
- ATP
 - ADP
 - GTP
 - GDP
53. In Adenylation the carboxyl group of amino acid is attached to the phosphate group of ATP through which of the following bond
- Peptide bond
 - Ether bond
 - Ester bond
 - Hydrogen bond
54. Shine-Dalgarno (S-D sequence) helps in
- Translation initiation
 - Translation elongation
 - Translation termination
 - Disassembly of Ribosomal units
55. Stop codons are recognize by proteins called
- Intiation factos (IF)
 - Elongation factors (EF-Ts)
 - Release factors (RFs)
 - GTPase
56. _____ conserved three amino acid sequence (glycine glycine glutamine, GGQ) that is essential for polypeptide release.
- Class I Release factors
 - Class II Release factors
 - Class III Release factors
 - Ribosome recycling factor (RRF)

57. _____ does not play role in determining the charging of tRNA with specific aminoacid
- acceptor stem of tRNA
 - anticodon loop of tRNA
 - Ribosomes
 - amino-acyl tRNA synthetase
58. Open reading frame are the
- Translated region
 - Untranslated region
 - does not have any function
 - specialized proteins
59. The ribosomes present in Mitochondria and Chloroplast are
- 40 S
 - 50S
 - 60S
 - 70 S
60. Ribosomes are found predominantly attached to the ER in
- In Eukaryotes
 - In Prokaryotes
 - In Viruses
 - None of the above
61. The origin of replication from plasmid pBR322 could have a vector copy number of
- 10 - 20 copies /cell
 - 10 - 25 copies /cell
 - 25 - 50 copies /cell
 - 35 - 70 copies /cell
62. A region of vector which can be cut by more than 1 restriction enzymes is known as
- Cutting sites
 - Cloning sites
 - Multiple cloning site
 - Antibiotic resistance
63. The function of antibiotic resistance gene in a vector is to provide
- To carry foreign gene
 - To help in selection
 - To replicate foreign gene
 - To formed a mutants

64. Size of pBR322 is around
- a) 2.2 kb
 - b) 1.6 kb
 - c) 3.8 kb
 - d) 4.4 kb
65. The function of cos sequences (cohesive ends) in a Bacteriophage λ is to
- a) linearized circular DNA
 - b) Circularized linear DNA
 - c) Gain entry inside cell
 - d) Carry foreign gene
66. Monoclonal antibodies are identical immunoglobulins, generated from a single _____
- a) T Cell
 - b) B cell
 - c) Macrophage
 - d) RBC
67. The yield of MAb production in suspension culture can be increased by encapsulating the hybridomas
- a) Chitosan
 - b) Hydro gel
 - c) Agar medium
 - d) Alginate gels
68. In DNA Isolation, DNA reacts with _____ and form a white precipitate
- a) Alcohol
 - b) Benzene
 - c) Lysozyme
 - d) Protease
69. Which of the following is used for joining two DNA fragments
- a) Lysozyme
 - b) Restriction nuclease
 - c) ligases
 - d) Rnase
70. Modification enzymes acts by adding _____ group to adenine or cytosine within the recognition site.
- a) Formyl group
 - b) Aldehyde group

- c) Ketone group
 - d) Methyl group
71. Which of the following is a Palindromic sequence
- a) -ATTTGCC-
-ATTTGCC-
 - b) 5'-CGCCTTT-3'
3'-GCGAAA-5'
 - c) 5'-GGATCC-3'
3'-CCTAGG-5'
 - d) 5'-ATGCTT-3'
3'-TACGAA-5'
72. Golden rice is a transgenic variety of rice (*Oryza sativa*) which contain good quantities of
- a) Vitamin A
 - b) Vitamin B
 - c) Vitamin C
 - d) Vitamin D
73. Which of the following organisms are largely used in Bioremediation
- a) *Saccharomyces Cerevisiae*
 - b) *Salmonella typhi*
 - c) *Bacillus thuriangiensis*
 - d) *Pseudomonas putida*
74. Severe Combined Immunodeficiency Patients lack
- a) DAA gene
 - b) ADA gene
 - c) ADD gene
 - d) DDA gene
75. Which of the following is a blunt end cutters
- a) Hae III
 - b) Eco RI
 - c) BamHI
 - d) Sal I

B. Fill up the blanks [15 (3 from each unit)]

1. DNA unwinding is done by enzyme_____
2. Semi-conservative mode of replication was first demonstrated in_____
3. Primase is responsible for the formation of _____
4. There exists a specific nucleotide sequences called _____ where replication begins.
5. _____are short sequence of DNA nucleotides synthesized discontinuously at the lagging strand during replication.
6. The specific region on RNA where the enzyme binds before transcription begins is known as_____ region
7. There are_____ number of codons available for the 20 amino acids found in proteins.
8. The phenomenon in which a single tRNA can recognize more than one codon is called_____.
9. The lactose operon is an inducible operon whereas the tryptophan operon is a_____operon.
10. Reverse transcription is the process of synthesizing DNA from RNA by the enzyme_____.
11. A protein named_____, having ATPase activity binds to the growing RNA and terminates transcription.
12. RNA polymerase with the σ subunit is called a holoenzyme and without the σ subunit is called_____.
13. Polyadenylation of m RNA is catalyzed by the enzyme_____.
14. An mRNA coding for more than one protein is known as _____.
15. Tryptophan Operon contains_____ number of structural genes.
16. In eukaryotes, Ribosomes are found predominantly attached to the _____
17. Matured Ribosomes from Nucleus enters Cytoplasm through _____
18. Prokaryotes 30S subunit have a _____RNA subunit and comprise of 1540 nucleotides
19. The two subunits of ribosomes are bound around the polymers of mRNA in a beads like string known as _____
20. T arm is a 4 to 5 bp stem containing the sequence T Ψ U where Ψ is _____
21. Bt toxin is coded by a gene name _____
22. A bacterial host with a prophage is called a _____
23. In 1973, _____developed techniques to make recombinant DNA
24. GAATC is a recognition site for _____
25. _____are gene whose phenotypic expression is easy to monitor

Key Answers

A. Multiple choice questions [replace x]

- | | | | | | | |
|--------|--------|--------|--------|--------|--------|--------|
| 1. c) | 2. c) | 3. d) | 4. a) | 5. b) | 6. a) | 7. b) |
| 8. d) | 9. c) | 10. c) | 11. a) | 12. a) | 13. d) | 14. b) |
| 15. a) | 16. c) | 17. c) | 18. d) | 19. b) | 20. a) | 21. c) |
| 22. d) | 23. a) | 24. d) | 25. c) | 26. c) | 27. a) | 28. c) |
| 29. b) | 30. a) | 31. b) | 32. b) | 33. a) | 34. d) | 35. c) |
| 36. c) | 37. c) | 38. d) | 39. c) | 40. c) | 41. a) | 42. b) |
| 43. c) | 44. a) | 45. c) | 46. d) | 47. c) | 48. a) | 49. c) |
| 50. b) | 51. a) | 52. c) | 53. c) | 54. a) | 55. c) | 56. a) |
| 57. c) | 58. a) | 59. d) | 60. a) | 61. c) | 62. c) | 63. b) |
| 64. d) | 65. b) | 66. b) | 67. d) | 68. a) | 69. c) | 70. d) |
| 71. c) | 72. a) | 73. d) | 74. b) | 75. a) | | |

B. Fill up the blanks [replace x]

1. Helicase
2. *Drosophila melanogaster*
3. RNA primer
4. Origin of replication
5. Okazaki fragments
6. Promoter
7. 61
8. Wobble hypothesis
9. Repressible
10. Reverse transcriptase
11. Rho-protein
12. Core enzyme
13. Polyadenylate polymerase
14. Polycistronic mRNA
15. five
16. Endoplasmic Reticulum
17. Nuclear pore complexes (NPC)
18. 16 S
19. polyribosomes or polysomes
20. pseudouridine
21. *cry*
22. lysogen
23. Stanley Cohen and Herbert Boyer
24. Eco RI
25. Reporter genes