

Chapter 6 Molecular Basis of Inheritance

1. The DNA site where DNA-dependent RNA- polymerase binds for transcription, is called

- (a) operator
 - (b) promotor
 - (c) regulator
 - (d) receptor
-

2. Operon model for regulation of transcription was proposed by

- (a) Meselson and Stahl
 - (b) Jacob and Monod
 - (c) Watson and Crick
 - (d) Hershey and Chase
-

3. Eukaryotic RNA polymerase III catalyses the synthesis of

- (a) mRNA
 - (b) rRNA
 - (c) hnRNA
 - (d) tRNA
-

4. The sequence of nitrogen bases in a # segment of a coding strand of DNA is ' AATGCTTAGGCA. What will be the sequence of nitrogen bases in the wRNA transcribed by it?

- (a) UUA CGA AUC CGU
 - (b) AAU GCU AAC CGA
 - (c) AAU GCA AUC CGU
 - (d) AAU GCU UAG GCA
-

5. In the lac operon of E.coli, the i gene codes for

- (a) inducer
- (b) repressor
- (c) lactase
- (d) β -galactosidase

6. Which of the following sets of codons contains only termination codons?

- (a) UAA, UGA, UAG
- (b) UAA, UUU, UGG
- (c) UAA, UAG, UAC
- (d) UUU, UCC, UGG

7. The central dogma of molecular biology (genetic information flow) was modified by the discovery of

- (a) RNA polymerase
- (b) DNA ligase
- (c) Reverse transcriptase
- (d) DNA polymerase

8. The fact that a purine base always paired through hydrogen bonds with a pyrimidine base leads to, in the DNA double helix [NCERT Exemplar]

- (a) the antiparallel nature
- (b) the semiconservative nature
- (c) uniform width throughout DNA
- (d) uniform length in all DNA.

9. The promoter site and the terminator site for transcription are located at [NCERT Exemplar]

- (a) 3' (downstream) end and 5' (upstream) end, respectively of the transcription unit.
- (b) 5' (upstream) end and 3' (downstream) end, respectively of the transcription unit.
- (c) the 5' (upstream) end.
- (d) the 3' (downstream) end.

10. The human chromosome with the highest and least number of genes in them are respectively [NCERT Exemplar]

- (a) Chromosome 21 and Y
- (b) Chromosome 1 and X
- (c) Chromosome 1 and Y
- (d) Chromosome X and Y

11. Discontinuous synthesis of DNA occurs in one strand, because [NCERT Exemplar]

- (a) DNA molecule being synthesised is very long.
- (b) DNA dependent DNA polymerase catalyses polymerisation only in one direction (5' → 3').
- (c) it is a more efficient process.
- (d) DNA ligase has to have a role.

12. Which of the following are the functions of RNA? [NCERT Exemplar]

- (a) It is a carrier of genetic information from DNA to ribosomes synthesising polypeptides.
- (b) It carries amino acids to ribosomes
- (c) It is a constituent component of ribosomes
- (d) All of the above.

13. In E.coli, the lac operon gets switched on when [NCERT Exemplar]

- (a) lactose is present and it binds to the λ , repressor.
- (b) repressor binds to operator.
- (c) RNA polymerase binds to the operator.
- (d) lactose is present and it binds to RNA polymerase.

14. The net electric charge on DNA and histone, is

- (a) positive, negative
- (b) negative, positive
- (c) negative, negative
- (d) positive, positive.

15. If the sequence of the nitrogen bases in the coding strand of DNA is 5'- ATGAATT-3', the sequence of bases in the RNA transcribed by it will be _____ .

16. _____ step in transcription is catalysed by the enzyme DNA-dependent RNA polymerase.

17. Lac operon shows the control of gene expression at the _____ level, in E.coli.

18. The enzyme DNA polymerase catalyses the polymerisation of nucleotides in the _____ direction, for the lagging strand.

19. The last chromosome to be completely sequenced in the Human Genome Project (HGP) is _____ .

20. RNA polymerase II in eukaryotes catalyses the transcription of _____ .

21. The presence of _____ group in every ribonucleotide makes RNA labile and reactive.

22. Meselson and Stahl experimentally proved the _____ replication of DNA.

23. During splicing in eukaryotes, the _____ are joined to from the RNA.

24. _____ factor functions as the initiation factor in the transcription of prokaryotes.

25. Match the terms in Column I with those in Column II.

| Column I | Column II |
|------------------|--|
| A. Transcription | 1. A set of three bases on <i>t</i> RNA that is complementary to the bases of codon on <i>m</i> RNA. |
| B. Anticodon | 2. A unit of DNA that codes for a polypeptide. |
| C. Cistron | 3. Process of synthesis of polypeptide as dictated by <i>m</i> RNA. |
| D. Translation | 4. Process by which <i>m</i> RNA carries the information from nucleus to ribosomes. |

26. Match the codons in Column I with the amino acids in Column II.

| Column I | Column II |
|----------|----------------|
| A. UUU | 1. Termination |
| B. AUG | 2. Tyrosine |

| | |
|--------|------------------|
| C. UAA | 3. Phenylalanine |
| D. AGU | 4. Methionine |
| E. UAC | 5. Serine |

27. Polycistronic *mRNA* is generally found in eukaryotes. [True/False]

28. The process of translation of *mRNA* begins, when the *mRNA* encounters the large subunit of ribosome [True/False]

29. VNTR belongs to a class of satellite DNA, called micro-satellite. [True/False]

30. If a double-stranded DNA contains 20% cytosine, it will have 20% guanine in it. [True/False]

31. Termination/Stop codons do not have any *tRNAs* [True/False]

Directions (Q32 to Q35): Mark the odd one in each of the following groups.

32. UAA, UGG, UAG, UGA

33. 5S *rRNA*, *snRNA*, *hnRNA*, *tRNA*

34. Har Gobind Khorana, Marshal Nirenberg, Severo Ochoa, Alec Jeffreys.

35. Promoter, Inducer, Operator, Terminator.

36. Name the two types of nucleic acids in living systems.

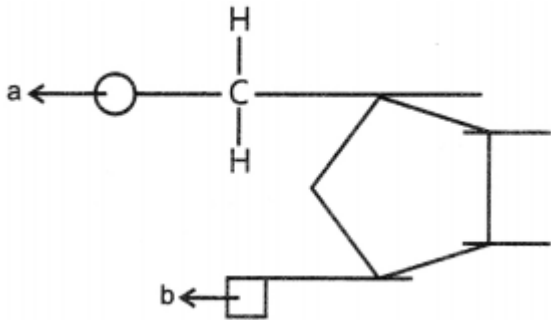
37. How is the length of DNA usually defined?

38. Name the specific components and the linkage between them that form deoxyadenosine. [Delhi 2013C]

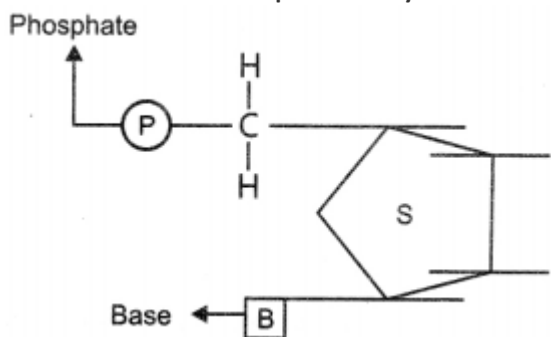
39. Name the specific components and the linkages between them that form deoxyguanosine. [All India 2013C]

40. In which position is the phosphate group linked to a nucleoside? Name the linkage too.

41. Name the components 'a' and 'b' in the nucleotide with a purine, given below:



42. Mention the carbon positions to which the nitrogenous base and the phosphate molecule are respectively linked in the nucleotide given below:



43. Mention the position of the ribonucleotide, where the OH group is present.

44. Who discovered the nucleic acid DNA? What was it called then?

45. The two strands of DNA have antiparallel polarity. What does it mean?

46. If the base adenine constitutes 30 per cent of an isolated DNA fragment, then what is the expected percentage of the base cytosine in it? [Delhi 2011C; HOTS]

47. How does the flow of genetic information in HIV7 deviate from the 'central dogma' proposed by Francis crick? [Foreign 2013]

48. How does HIV differ from a bacteriophage? [Delhi 2010C]

49. How is the length of DNA usually calculated?

50. How many base pairs would a DNA segment of length 1.36 mm have? [Foreign 2017]

51. What is a nucleoid?

52. Name the positively charged protein around which the negatively charged DNA is wrapped. [AH India 2010C]

53. Name two basic amino acids that provide positive charge to histone proteins. [Delhi 2012C]

54. Write the role of histone proteins in packaging of DNA in eukaryotes. [Foreign 2017]

55. Name the negatively charged and positively charged components of a nucleosome. [Delhi 2015C]

56. Name the transcriptionally active region of chromatin in a nucleus. [Delhi 2015]

57. Define transformation.

58. Write the conclusion Griffith arrived at, at the end of his experiments with *Streptococcus pneumoniae*. [All India 2017C]

59. What are bacteriophages?

60. Why is RNA more reactive in comparison to DNA? [Delhi 2015C]

Or
Why do RNA viruses undergo mutation and evolution faster than most of the DNA viruses? [HOTS]

61. Write the scientific name of the plant on which Taylor et al performed their experiments.

62. How long does the replication of human DNA take place?

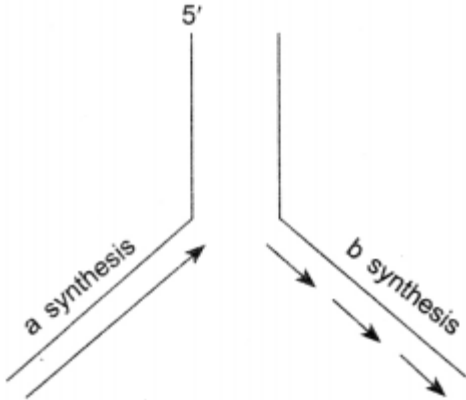
63. Name the enzyme and state its property that is responsible for continuous and discontinuous replication of the two strands of a DNA molecule. [Delhi 2013]

64. What is a replication fork?

65. Mention the direction in which:
(a) the leading strand is synthesised.
(b) discontinuous synthesis of DNA occurs.

66. Name the enzyme involved in the continuous replication of DNA strand. Mention the polarity of the template strand. [All India 2010]

67. Name the types of synthesis 'a' and 'b' occurring in the replication fork of DNA as shown below:



68. Name the enzyme that joins the small fragments of DNA of a lagging strand during DNA replication. [Delhi 2013C]

69. Why are vectors needed for replication of DNA during *rDNA* technology? [HOTS]

70. What will happen if DNA replication is not followed by cell division in a eukaryotic cell? [All India 2014C]

71. Define transcription.

72. Name the enzyme and the direction in which it catalyses the polymerisation of ribonucleotides.

73. Mention one difference to distinguish an exon from an intron. [Foreign 2016]

74. When and at what end does the 'tailing' of *hnRNA* take place?

75. At which ends do 'capping' and 'tailing' of *hn*RNA occur, respectively?