



CET25B5 MOLECULAR BASIS OF INHERITANCE

Class 12 - Biology

Time Allowed: 1 hour and 30 minutes

Maximum Marks: 75

1. Locations on sites in the human DNA where single base DNA differences occurs are called: [1]
 - a) VNTR
 - b) SSCP
 - c) Repetitive DNA
 - d) SNP
2. In Hershey and Chase experiments, radioactive ^{32}P was used to culture bacteriophages which resulted in radioactive: [1]
 - a) Plasma membrane of bacteria
 - b) Bacterial capsule
 - c) Viral proteins
 - d) Viral DNA
3. Which of the following DNA sequences qualifies to be designated as a palindrome? [1]
 - a) 3' GACCAG - 5' in one strand
 - b) 5' - GACCAG - 3' in one strand
 - c) 5' - GACGAG - 3'
 - d) 5 - AGCGCT - 3'
 - 3' - CTGGTC - 5'
 - 3' TCGCGA - 5'
4. DNA gyrase, the enzyme that participates in the process of DNA replication is a type of: [1]
 - a) Reverse transcriptase
 - b) DNA topoisomerase
 - c) DNA polymerase
 - d) DNA ligase
5. DNA fragments generated by the restriction endonucleases in a chemical reaction can be separated by: [1]
 - a) Centrifugation
 - b) Electrophoresis
 - c) Polymerase chain reaction
 - d) Restriction mapping
6. During DNA replication in prokaryotes DNA is anchored to: [1]
 - a) Chromosome
 - b) Mesosome
 - c) Nucleolus
 - d) Ribosome
7. The amino acid attaches to the tRNA at its: [1]
 - a) Anti codon site
 - b) 3' - end
 - c) DHU loop
 - d) 5' - end
8. Which enzyme is used in transcription? [1]
 - a) DNA polymerase III
 - b) DNA ligase
 - c) Amino acid synthetase
 - d) RNA polymerase
9. Which of the following sequences will be produced as a result of transcription of the DNA sequence CGATTACAG? [1]

- a) GCTAATGTC
b) GCUAATCTG
c) GCUAAUGUC
d) CGUAAUCUG

10. Identify the element used by Hershey and Chase to label the protein in their experiment, from the following options: [1]
a) S^{32}
b) P^{35}
c) P^{32}
d) S^{35}

11. T.O. Diener discovered a: [1]
a) Infectious protein
b) Free infectious DNA
c) Free infectious RNA
d) Bacteriophage

12. In DNA adenine and thymine are paired with how many hydrogen bonds? [1]
a) Four
b) Two
c) One
d) Three

13. To initiate translation, the mRNA first binds to: [1]
a) The smaller ribosomal sub-unit
b) The larger ribosomal sub-unit
c) No such specificity exists
d) The whole ribosome

14. The RNA polymerase holoenzyme transcribes: [1]
a) the structural gene only
b) the structural gene and the terminator region
c) the promoter, structural gene and the terminator region
d) the promoter and the terminator region

15. The enzyme required to catalyze the polymerisation of deoxynucleotides is: [1]
a) Transacetylase
b) β -galactosidase
c) DNA polymerase
d) DNA ligase

16. All of the following are part of an Operon except : [1]
a) Structural genes
b) An enhancer
c) A promoter
d) An operator

17. Which of the following rRNA acts as structural RNA as well as ribozyme in bacteria? [1]
a) 23 SrRNA
b) 18 SrRNA
c) 5.8 SrRNA
d) 5 SrRNA

18. Satellite DNA is important because it: [1]
a) Shows high degree of polymorphism in population and also the same degree of polymorphism in an individual, which is heritable from parents to children.
b) Does not code for proteins and is the same in all members of the population.
c) Codes for proteins needed in cell cycle.
d) Codes for enzymes needed for DNA replication.

19. Viroids differ from viruses in having: [1]
- a) RNA molecule with protein coat.
 - b) RNA molecule without protein coat.
 - c) DNA molecules without protein coat.
 - d) DNA molecule with protein coat.
20. Repressor protein is produced by: [1]
- a) Regulator gene
 - b) Structural gene
 - c) Promotor gene
 - d) Operator gene
21. If the base sequence of a codon in mRNA is 5'-AUG-3', the sequence of tRNA pairing with it must be: [1]
- a) 5' - UAC - 3'
 - b) 5' - GUA - 3'
 - c) 5' - CAU - 3'
 - d) 5' - AUG - 3'
22. Semiconservative replication of DNA was first demonstrated in: [1]
- a) *Salmonella typhimurium*
 - b) *Streptococcus pneumoniae*
 - c) *Drosophila melanogaster*
 - d) *Escherichia coli*
23. What forms the basis of DNA fingerprinting? [1]
- a) Relative difference in the DNA occurrence in blood, skin and saliva
 - b) Relative amount of DNA in ridges and grooves of fingerprints
 - c) Relative proportions of purines and pyrimidines in DNA
 - d) Satellite DNA (repetitive sequences of DNA) that show high degree of polymorphism
24. In human beings 99.9% of genome sequence are same in all individuals only 0.1% of genome differ that: [1]
- a) make every individual similar in phenotypic appearance.
 - b) make every individual genetically similar.
 - c) make every individual unique in phenotypic appearance.
 - d) make a genetic variation for evolution.
25. Nucleotide arrangement in DNA can be seen by: [1]
- a) Ultra centrifuge
 - b) Transcriptase
 - c) Electron microscope
 - d) X-ray crystallography
26. DNA fingerprinting or genetic finger printing is the process of: [1]
- a) Matching the fingerprint of different persons.
 - b) Analyzing VNTR samples of DNA obtained from body fluid or cells.
 - c) Finding similarities of finger shapes of different individuals.
 - d) Comparing the DNA of two individuals.
27. Which of the following combinations do not apply to DNA? [1]
- a. Deoxyribose, Guanine
 - b. Ribose, Adenine
 - c. Deoxyribose, Uracil
 - d. Guanine, Thymine

- a) (a) and (d)
c) (c) and (d)

b) (a) and (b)
d) (b) and (c)

28. Which one is referred as soluble RNA? [1]
a) mRNA
b) rRNA
c) tRNA
d) ssRNA

29. Select the correct match: [1]

 - Alfred Hershey and Martha Chase - TMV
 - Matthew Meselson and F. Stahl - Pisum sativum
 - Alec. Jeffreys - Streptococcus pneumoniae
 - Francois Jacob and Jacques Monod - Lac Operon

a) Matthew Meselson and F. Stahl - Pisum sativum
b) Francois Jacob and Jacques Monod - Lac Operon
c) Alfred Hershey and Martha Chase - TMV
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30. Copying genetic information from one strand of DNA into RNA is: [1]
a) Transcription
b) Transduction
c) Transformation
d) Translation

31. Which was the last human chromosome to be completely sequenced? [1]
a) Chromosome 1
b) Chromosome 21
c) Chromosome 11
d) Chromosome X

32. Transposons are: [1]
a) Transporting genes
b) Jumping genes
c) Stationary genes
d) House-keeping genes

33. The first genetic material could be: [1]
a) Protein
b) DNA
c) RNA
d) Carbohydrates

34. The haploid content of human DNA is [1]
a) 3.3×10^6 bp
b) 3.3×10^9 bp
c) 6.6×10^9 bp
d) 4.6×10^6 bp

35. Initiation codon for methionine is: [1]
a) AAA
b) UUU
c) AUG
d) UAA

36. In lac operon, lactose is the substrate for enzyme beta-galactosidase and its regulates: [1]
a) Only switching of OFF of the operon
b) Switching ON and OFF of the operon
c) Neither switching ON or OFF of operon
d) Only switching ON of the operon

37. Which one of the following is not applicable to RNA ? [1]

- a) Complementary base pairs
b) 5' Phosphoryl and 3' hydroxyl ends
c) Heterocyclic nitrogenous bases
d) Chargaff's rule
38. A woman whose blood group is unknown marries a man with blood group **B**. The first child born to the couple has blood group **O** whereas their second child born after four years has blood group **AB**. The possible blood group of the woman and its genotype on the basis of ABO blood grouping is: [1]
- a) Blood group B, $I^B I^O$
b) Blood group A, $I^A I^O$
c) Blood group AB, $I^A I^B$
d) Blood group O, $I^O I^O$
39. If a radiolabel is used to tag a DNA molecule, the technique used to localise would be: [1]
- a) Fluorescence microscopy
b) X-ray crystallography
c) Electron microscope
d) Autoradiography
40. Which of the following is not required for any of the technique of DNA fingerprinting available at present: [1]
- a) Restriction enzymes
b) Zinc finger analysis
c) DNA-DNA hybridization
d) Polymerase chain reaction
41. DNA replication takes place during: [1]
- a) S-phase
b) G_1 phase
c) G_2 phase
d) Prophase
42. Typically DNA content of about 100000 cells or 1 microgram is required for DNA fingerprinting. If the sample obtained is less it is increased by: [1]
- a) Transcription of DNA in cells
b) Elimination of DNA in cells
c) Translation of DNA in cells
d) Polymerase chain reaction (PCR) by amplification process
43. Which one of the following pairs of codons is correctly matched with their function or a signal for particular amino acid? [1]
- a) UAG, UGA - stop
b) AUG, ACG - start/methionine
c) UUA, UCA - leucine
d) GUU, GCU - alanine
44. A typical nucleosome contains: [1]
- a) 200 bp of DNA helix
b) 100 bp of DNA helix
c) 400 bp of DNA helix
d) 300 bp of DNA helix
45. Retrovirus have genetic material: [1]
- a) RNA only
b) DNA only
c) Either DNA or RNA only
d) DNA or RNA only
46. During DNA replication, the addition of nucleotides on the lagging strand occurs: [1]
- a) Discontinuously
b) At a faster rate than leading strand.
c) Towards the replication fork.
d) Continuously
47. Autoradiogram of VNTR probe gives many band of different size. It differ from individual to individual except: [1]

- a) Heterozygotic twins
b) Real brothers
c) Monozygotic twins or identical twins
d) Real sisters
48. Identify palindrome sequence from the following: [1]
a) 5'-ATCG'-3'
3'-TAGC-5'
b) 5'-AAAAA-3'
3'-TTTTT-5'
c) 5'-CCCCC-3'
3'-GGGGG-5'
d) 5'-GAATTC-3'
3'-CTTAAG-5'
49. The pyrimidine base which confers stability to DNA over RNA is: [1]
a) Adenine
b) Guanine
c) Cytosine
d) Thymine
50. The genetic material of a virioid is: [1]
a) DNA
b) Protein
c) RNA
d) Carbohydrate
51. What is antisense technology? [1]
a) A cell displaying a foreign antigen used for synthesis of antigens.
b) When a piece of RNA that is complementary in sequence is used to stop expression of specific gene.
c) Production of somaclonal variants in tissue culture.
d) RNA polymerase producing DNA.
52. In genetic fingerprinting, the **probe** refers to _____. [1]
a) A radioactively labelled double stranded DNA molecule.
b) A radioactively labelled double stranded RNA molecule.
c) A radioactively labelled single stranded DNA molecule.
d) A radioactively labelled single stranded RNA molecule.
53. For DNA fingerprinting, the DNA is obtained from: [1]
a) WBCs, hair root cells, and body secretion
b) Hair root cells only
c) White blood corpuscles only
d) Body secretion only
54. In lac operon, the genes a, i, y and z code respectively for: [1]
a) Transacetylase, repressor protein, permease, β -galactosidase
b) Permease, transacetylase, repressor protein, β -galactosidase
c) Repressor protein, permease, β -galactosidase, transacetylase
d) Transacetylase, permease, β -galactosidase, repressor protein
55. One gene-one enzyme hypothesis of Beadle and Tatum was experimentally proved on: [1]
a) Neurospora crassa
b) Saccharomyces
c) Lathyrus odoratus
d) Claviceps
56. In a DNA molecule distance between two bases is: [1]

$$a) \frac{0.34 \text{ nm}}{3.4 \text{ \AA}}$$

$$b) \frac{0.2 \text{ nm}}{2 \text{ \AA}}$$

$$c) \frac{2 \text{ nm}}{20 \text{ \AA}}$$

$$d) \frac{3.4 \text{ nm}}{34 \text{ \AA}}$$

57. If the sequence of nitrogen bases of the coding strand of DNA in a transcription unit is 5' - A T G A A T G - 3', [1]
the sequence of bases in its RNA transcript would be:

a) 5' - C A U U C A U - 3'

b) 5' - G U A A G U A - 3'

c) 5' - A U G A A U G - 3'

d) 5' - U A C U U A C - 3'

58. During protein synthesis, AUG functions as the initiator codon in mRNA. What should be the anticodon on the [1]
t-RNA molecule that picks up and brings the amino acid specified by this codon?

a) TAC

b) GUA

c) CAU

d) UAC

59. Semiconservative mode of replication of DNA was proved by: [1]

a) Griffith

b) Hershey and Chase

c) Watson and Crick

d) Meselson and Stahl

60. The portion of DNA which contains information for an entire polypeptide is called: [1]

a) Recon

b) Operon

c) Cistron

d) Muton

61. Formation of both peptide and glycosidic bonds involves: [1]

a) Esterification

b) Acidification

c) Hydration

d) Dehydration

62. Lac operon consists of: [1]

a) Only two regulator genes.

b) Two regulator gene and two structural genes.

c) One regulator and one structural gene.

d) One regulator gene and three structural genes.

63. The technique of DNA fingerprinting was initially developed by [1]

a) S. Mond

b) Alec Jefferys

c) Robert Sanford

d) D. Pollard

64. The experimental proof for semiconservative replication of DNA was first shown in a : [1]

a) Bacterium

b) Fungus

c) Plant

d) Virus

65. DNA has genetic properties was revealed for the first time by: [1]

a) Griffith

b) Avery

c) Chargaff

d) Wilkins

66. Some amino acids are coded by more than one codon hence the code is: [1]

a) Unambiguous

b) Initiator

- c) Universal d) Degenerate
67. Uracil is present in RNA at the place of: [1]
 a) Guanine b) Thymine
 c) Adenine d) Cytosine
68. While analysing the DNA of an organism a total number of 5386 nucleotides were found out of which the proportion of different bases were: Adenine = 29%, Guanine = 17%, Cytosine = 37%, Thymine = 17%. Considering the Chargaff's rule it can be concluded that: [1]
 a) It is a double stranded circular DNA b) It is a double stranded linear DNA
 c) No conclusion can be drawn d) It is single stranded DNA
69. DNA fragments are: [1]
 a) Either positively or negatively charged depending on their size b) Neutral
 c) Negatively charged d) Positively charged
70. AGGTATCGCAT is a sequence from the coding strand of a gene. What will be the corresponding sequence of the transcribed mRNA? [1]
 a) UCCAUAGCGUA b) AGGUAUCGCAU
 c) ACCUAUGCGAU d) UGGTUTCGCAT
71. The equivalent of structural gene is? [1]
 a) Cistron b) Recon
 c) Operon d) Muton
72. The sequence of amino acids in a protein is determined by: [1]
 a) t-RNA b) Genetic code
 c) r-RNA d) m-RNA
73. A gene of operon which synthesizes a repressor protein is [1]
 a) Structural gene b) Regulator gene
 c) Operator gene d) Promoter gene
74. Given below is a sequence of bases in mRNA of a bacterial cell. Identify the amino acid that would be incorporated at codon position 3 and codon position 5 during the process of its translation. [1]
 3' AUCAGGUUUGUGAUGGUACGA 5'
 a) Phenylalanine, Methionine b) Alanine, Proline
 c) Cysteine, Glycine d) Serine, Valine
75. Meselson and Stahl carried out centrifugation in CsCl_2 density gradient to separate: [1]
 a) The normal DNA from ^{15}N -DNA b) DNA from RNA
 c) DNA from protein d) DNA from tRNA