Ravi Maths Tuition

5 Molecular Basis of Inheritance

12th Standard

Biology

Multiple Choice Question 140 x 1 = 140

1) Jumping genes given by Barbara Mclintock are also called

(a) Transposons (b) Mutons (c) Cistrons (d) Vectors

2) Nitrogenous base sequence in one strand of DNA is ATGCTTGA, the sequence in the complementary strand will be

(a) TAGGTAGT (b) TACGAACT (c) TACGTACT (d) TCCGAACT

3) That the mode of DNA replication is semiconservative was demonstrated by

(a) Khorana (b) Watson and Crick (c) Meselson and Stahl (d) Tayler

4) In DNA replication, leading strand replicates in

(a) 5' ------ > 3' direction continuously (b) 3'------ > 5' direction continuously

(c) 5'----- > 3' directiom discontinuosly (d) 3,------- > 5' direction discontinuously

5) Temin and Baltimore are associated with the discovery of

(a) RNA synthesis (b) Transcription (c) Reverse transcription (d) photorespiration

6) How many codons code for amino acids?

(a) 64 (b) 61 (c) 68 (d) 60

7) How many base pairs are present in DNA cut by endonuclease

(a) 2 (b) 4 (c) 6 (d) 8

8) In DNA, guanine and cytosine are bonded with how many hydrogen bonds?

(a) 1 (b) 2 (c) 3 (d) 4

9) Hargobind Khorana got Nobel Prize for

(a) Gene synthesis (b) Determining genetic code (c) Producing disease resistant maize

(d) Discovery of transposons

10) "One gene-one enzyme" hypothesis state that

(a) One gene codes for one enzyme (b) One gene codes for one polypeptide

(c) One gene codes for many enzymes (d) One gene regulates all enzymes

11) Out of 64 codons how many codons do not code for any amino acid?

(a) 62 (b) 61 (c) 3 (d) 1

12) The correctly matched pair is

(a) Okazaki fragments-splicing (b) RNA polymerase-RNA primer (c) Central dogma_codon

(d) Restriction endonuclease-genetic engineering

13) Initiator (starting) codon in eukaryotes is

(a) AUG (b) AAG (c) CCU (d) GGC

14) Intrinsic flow of information means

(a) Transcription (b) Translation (c) Both of the above (d) None of the above

15) DNA polymerase that helps in DNA replication is of

(a) Two types (b) Three types (c) Four types (d) Only one type

16) One of these is not prepared directly from DNA

(a) Another DNA (b) mRNA (c) Protein (d) rRNA

17) Nucleoside is

(a) Nitrogenous base + Sugar (b) Nitrogenous base + sugar + phospate (c) Sugar + phosphate
(d) Nitrogenous base + phosphate

18) During splicing, the exons are joined and the enzyme which catalyzes this reaction is

(a) RNA ligase (b) RNA catalase (c) RNA permease (d) RNA polymerase

19) Which of the following is important for transcriptiom?

(a) DNA methylase (b) CAAT box (c) Promoter (d) DNA polymerase

20) Out of the total 64 codons, 61 codons code for 20 amino acids, this suggest

(a) Degeneracy of codons (b) Overlapping of codons (c) Redundancy of codons
(d) Ambiguous nature of codons

21) Anticodon site is located on

(a) DNA (b) tRNA (c) rRNA (d) mRNA

22) Beadle and Tatum did classical experiments on Neurospora crassa to prove

(a) One enzyme can correct one gene (b) One gene produces one enzyme
(c) Many genes produce one enzyme (d) None of these

23) During replication of a bacterial chromosome DNA synthesis starts from a replication origin site and

(a) is facilitated by telomerase (b) moves in one direction of the site (c) moves in bi-directional way
(d) RNA primers are involved

24) During transcription, if the nucleotide sequence of the DNA strand that is being coded is ATACG, then the nucleotide sequence in the mRNA would be

(a) TCTGG (b) UAUGC (c) UATGC (d) TATGC

25) Balbiani rings are found in

(a) Polytene chromosome (b) dicot stems (c) lambrush chromosome (d) all chromosomes

26) A gene of operon which synthesizes a repressor protein is

(a) regulator gene (b) operator gene (c) structural gene (d) promotor gene

27) Which one of the following group of codons is called as degenerate codons?

(a) UAA, UAG and UGA (b) GUA, GUG, GCA, GCG and GAA
(c) UUC, UUG, CUU, CUC, CUA and CUG (d) UUA, UUG, CUU, CUC, CUA and CUG
(e) AAC, AAG, GAC and CGG

28) During protein synthesis in an organism at one point the process comes to a halt. Select the group of the three codons from the following, from which any one of the three could bring about this halt

(a) UUU, UCC, UAC (b) UUC, UUA, UAC (c) UAG, UGA, UAA (d) UUG, UCA, UCG

29) The two polynucleotide chains in DNA are

(a) Discontinuous (b) Antiparallel (c) Semiconservative (d) Parallel

30) During transcription, RNA polymerase holoenzyme binds to a gene promoter and assumes a saddle-like structure. What is its DNA-binding sequence?

(a) AATT (b) CACC (c) TATA (d) TTAA

31) Central dogma of genetic information is modified by the discovery of

(a) Reverse transcriptase (b) DNA polymerase (c) RNA polymerase (d) Ligase

32) tRNA consisting of three unpaired bases constitute

(a) Codon (b) Anticodon (c) Clover-leaf model (d) Acceptor loop

33) The codon AUG is

(a) Ochre (b) Amber (c) Initiation codon (d) Termination codon

34) During the replication of DNA, the synthesis of DNA as lagging strand takes place in segments, these segments are called

(a) Double helix segments (b) Satellite segments (c) Kornberg segments (d) Okazaki segments

35) Meselson and Stahl experiment proved

(a) DNA is genetic material (b) Central dogma (c) Transformation
(d) Semi conservative DNA replication (e) Transduction

36) The haploid content of human DNA is

(a) $3.3x10^9$bp (b) $3.3x10^9$kbp (c) $4.6x10^6$bp (d) 48501 bp (e) $1.65x10^9$bp

37) The distance between the genes a,b,c,d in mapping units are
a-d=3.5; b-c=1; a-b=6;
c-d=1.5; a-c=5
Find out the sequence of arrangement of these genes

(a) acdb (b) abcd (c) adbc (d) acbd (e) adcb

38) The basic of DNA fingerprinting is

(a) The double helix (b) Errors in base sequence (c) Polymorphism in sequence
(d) DNA replication (e) DNA coiling

39) Which of the following be named for DNA produced from RNA?

(a) A-DNA (b) B-DNA (c) C-DNA (d) Z-DNA

40) In the DNA molecule

(a) The proportion of adenine in relation to thymine varies with the organism
(b) There are two strands which run antiparallel one in 5'→3' direction and other in 3'→5'
(c) The total amount of purine nucleotides and pyrimidine nucleotide is not always equal
(d) There are two strands which run parallel in the 5'→3' direction

41) Which one of the following pairs of codons is correctly matched with their function or the signal for the particular amino acid?

(a) AUG, ACG-Start/methionine (b) UUA, UCA-Leucine (c) GUU, GCU-Alanine (d) UAG, UGA-stop

42) The term genome denotes

(a) Haploid set of chromosomes (b) Bivalent (c) Monovalent (d) Diploid chromosomal set

43) The number of stop codons which do not code for any amino acid is

(a) 1 (b) 2 (c) 3 (d) 4

44) DNA sequences that code for protein are known as

(a) Intron (b) Exons (c) Control regions (d) Intervening sequences

45) During replication of DNA, Okazaki fragments are formed in the direction of

(a) 3'→5' (b) 5'→3' (c) 5'→5' (d) 3'→3'

46) mRNA directs the building of proteins through a sequence of

(a) Exons (b) Introns (c) Codons (d) Anticodons

47) The antiparallel nature of DNA refers to

(a) Its charged phosphate group

(b) The formation of hydrogen bonds between bases from opposite strands

(c) The opposite direction of the two strands

(d) The pairing of bases on one strand with bases on the other strand

48) What is not true for genetic code?

(a) It is nearly universal (b) It is degenerate (c) It is unambiguous

(d) A codon in mRNA is read in a non-contiguous fashion

49) Removal of introns and joining the exons in a defined order in a transcription unit is called

(a) Tailing (b) Transformation (c) Capping (d) Splicing

50) Whose experiments cracked the DNA and discovered unequivocally that a genetic code is a 'triplet'?

(a) Hershey and Chase (b) Nirenberg and Mathaei (c) Morgan and Sturtevant

(d) Beadle and Tatum

51) The human chromosomes with the highest and least number of genes in them are respectively:

(a) chromosome 21 and Y (b) chromosome 1 and X (c) chromosome 1 and Y

(d) chromosome X and Y

52) Who amongst the following scientists had no contribution in the development of the double helix model for the structure of DNA?

(a) Rosalind Franklin (b) Maurice Wilkins (c) Erwin Chargaff (d) Meselson and Stahl

53) DNA is a polymer of nucleotides which are linked to each other by 3'-5' phosphodiester bond. To prevent polymerisation of nucleotides, which of the following modifications would you choose?

(a) (a) Replace purine with pyrimidines (b) (b) Remove/Replace 3' OH group in deoxyribose

(c) (c) Remove/Replace 2' OH group with some other group in deoxyribose (d) (d) Both 'b' and 'c'

54) Discontinuous synthesis of DNA occurs in one strand, because:

(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

55) Which of the following stops in transcription is catalysed by RNA polymerase?

(a) Initiation (b) Elongation (c) Termination (d) All of the above

56) Control of gene expression takes place at the level of:

(a) DNA-replication (b) Transcription (c) Translation (d) None of the above

57) Regulatory proteins are the accessory proteins that interact with RNA polymerase and affect its role in transcription. Which of the following statements is correct about regulatory protein?

(a) They only increase expression (b) They only decrease expression

(c) They interact with RNA polymerase but do not affect the expression

(d) They can act both as activators and as repressors

58) Which was the last human chromosome to be completely sequenced:

(a) Chromosome 1 (b) Chromosome 11 (c) Chromosome 21 (d) Chromosome X

59) Which of the following are the functions of RNA?

(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

60) 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=32%, Thymine=17%. Considering the Chargaffs rule it can be concluded that:

(a) it is a double stranded circular DNA (b) it is single stranded DNA

(c) it is a double stranded linear DNA (d) No conclusion can be drawn

61) If Meselson and Stahl's experiment is continued for four generations in bacteria, the ratio of $15_N/15_N$:$15_N/14_N$: $14N/14_N$ containing DNA in the fourth generation would be:

(a) 1:1:0 (b) 1:4:0 (c) 0:1:3 (d) 0:1:7

62) If the sequence of nitrogen base of the coding strand of DNA in a transcription unit is:
5' - A T G A A T G - 3', the sequence of bases in its RNA transcript would be:

(a) 5' - A U G A A U G - 3' (b) 5' - U A C U U A C - 3' (c) 5' - C A U U C A U -3'

(d) 5' - G U A A G U A - 3'

63) The RNA polymerase holoenzyme transcribes:

(a) the promoter, structural gene and the terminators region (b) the promoter,

(c) the structural gene and the terminators regions (d) the structural gene only

64) If the base sequence of a codon in mRNA is 5' - AUG-3', the sequence of tRNA pairing with it must be:

(a) 5' - UAC -3' (b) 5' - CAU -3' (c) 5' - AUG -3' (d) 5' - GUA -3'

65) The amino acid attaches to the tRNA at its:

(a) 5' - end (b) 3' - end (c) Anti codon site (d) DHU loop

66) To initiate translation, the mRNA first binds to:

(a) The smaller ribosomal sub-unit (b) The larger ribosomal sub-unit (c) The whole ribosomal

(d) No such specificity exists

67) In E.coli, the lac operon gets switched on when:

(a) lactose is present and it binds to the repressor (b) repressor binds to operator

(c) RNA polymerase binds to the operator (d) lactose is present and it binds to RNA plymerase

68) The one aspect which is not a salient feature of genetic code is its being

(a) specific (b) degenerate (c) ambiguous (d) universal

69) The 3' to 5' phosphodiester linkages of a polynucleotide chain join

(a) one DNA strand with other DNA strand (b) one nucleoside with other nucleoside

(c) one nucleotide with other nucleotide (d) one nitrogenous base with pentose sugar

70) The lac oparon consists of

(a) four regulatory genes only (b) one regulatory and 3 structural genes

(c) two regulatory gene and 2 structural genes (d) three regulatory genes and three structural genes

71) DNA gyrase, the enzyme that participates in the process of DNA replication is a type of

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

72) Which one of these statements is not correct during protein synthesis

(a) UAA codon codes for lysine (b) UGG codon codes for tryptophan

(c) Cysteine is coded by UGU and UGC codones (d) tyrosine is coded by UAU and UAC codons

73) In genetic fingerprinting, 'the probe' refers to

(a) a radioactively labelled double stranded RNA molecule

(b) a radioactively labelled double stranded DNA molecule

(c) a radio-actively labelled single stranded DNA molecule

(d) a radioactively labelled single stranded RNA molecule

74) In a DNA molecule distance between two bases is

(a) 2 nm/20 $\dot{A}$ (b) 0.2 nm/2 $\dot{A}$ (c) 3.4 nm/34 $\dot{A}$ (d) 0.34 nm/3.4 $\dot{A}$

75) Purine posses nitrogen at

(a) 1,2,4,6 position (b) 1,3,5,7 position (c) 1,3,7,9 position (d) 1,2,6 and 8th position

76) Which one is diaminodicarboxylic amino acid?

(a) Cystine (b) Lysine (c) Crsteine (d) Aspartic acid

77) Transposons are:

(a) house keeping genes (b) jumping genes (c) transporting genes (d) stationary genes

78) How many effective codons are there for the synthesis of twenty amino acids?

(a) 64 (b) 32 (c) 60 (d) 61

79) Which of the following is structural sub-unit of DNA

(a) Protein (b) Carbohydrate (c) RNA (d) Nucleotides

80) In lac operon i gene codes for:

(a) inducer of lac operon (b) repressor of lac operon (c) hydrolysis of disaccharide (d) permease

81) Which one of the following have dual function? It codes for methionine and acts as initiator codon

(a) AUG (b) AUC (c) ACU (d) ACA

82) A typical nucleosome contains

(a) 100bp of DNA helix (b) 200bp of DNA helix (c) 300bp of DNA helix (d) 400bp of DNA helix

83) Which of the following sequence will be produced as a result of transcription of the DNA sequence - CGATTACAG

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

84) RNA polymerase II is responsible for transcription of

(a) rRNA (b) hnRNA (c) tRNA (d) snRNA

85) Nitrogenous bases present present in DNA

(a) Adenine Guanine Cytosine, Thiamine (b) Adenine Guanine Cytosine Uracil

(c) Adenine Thiamine Uracil (d) Guanine and Uracil

86) A nucleoside differs from a nucleotide in not having

(a) sugar (b) glucose (c) Nitrogen base (d) Phosphate group

87) If the total amount of adenine and thiamine in a double stranded DNA is 45%, the amount of guanine in this DNA will be

(a) 22.5% (b) 27.5% (c) 45% (d) 55%

88) Okazaki is known for his contribution to the understanding of

(a) transcription (b) translation (c) DNA replication (d) mutation

89) Restriction endonucleases are enzymes which

(a) Remove nucleotides from ends of DNA molecule

(b) make cuts at specific positions within the DNA molecule

(c) recognise a specific nucleotide sequence for binding of DNA ligase

(d) restrict the action of enzyme DNA polymerase

90) Which one of the following palindromic base sequences in DNA can be easily cut at about the middle by some particular restriction enzyme.

(a) 5' CACGTA 3';3' CTCAGT 5' (b) 5' CGTTCG 3';3' ATGGTA 5' (c) 5' GATATC 3';3' CTACTA 5'

(d) 5' GAATTC 3';CTTAAG 5'

91) Given below is a sample of a portion of DNA strand giving the base sequence on the opposite strands. What is so special shown in it?

5'--------GAATTC--------3'

3'--------CTTAAG--------5'

(a) replication completed (b) deletion mutation (c) start codon at the 5' end

(d) palindromic sequence of base pairs

92) The unequivocal proof of DNA as the genetic material came from the studies on a

(a) bacterium (b) fungus (c) viroid (d) bacterial virus

93) In history of biology, human genome project led to the development of

(a) biotechnology (b) biomonitoring (c) bioinformatics (d) biosystematics

94) Which one of the following is not a part of a transcription unit in DNA?

(a) The inducer (b) A terminator (c) A promoter (d) The structural gene

95) Removal of RNA polymerase III from nucleoplasm will affect the synthesis of:

(a) tRNA (b) hn RNA (c) m RNA (d) r RNA

96) PCR and Restriction Fragment Length polymorphism are the methods for:

(a) Study of enzymes (b) Genetic transformation (c) DNA sequencing (d) Genetic fingerprinting

97) Ribosomal RNA is actively synthesized in

(a) Lysosomes (b) Nucleolus (c) Nucleoplasm (d) Ribosomes

98) If one strand of DNA has the nitrogenous base sequence as ATCTG, what would be the complementary RNA strand sequence

(a) TTAGU (b) UAGAC (c) AACTG (d) ATCGU

99) A test cross is carried out to

(a) determine the genotype of a plant at F_2 (b) predict whether two traits are linked

(c) assess the number of alleles of a gene

(d) determine whether two species or varieties will breed successfully

100) What is it that forms the basis of DNA fingerprinting?

(a) The relative proportions of purines and pyrimidines in DNA

(b) The relative difference in the DNA occurrence in blood, skin and saliva

(c) The relative amount of DNA in the ridge and grooves of the fingerprints

(d) Satellite DNA occurring as highly repeated short DNA segments

101) Which one of the following represents a palindromic sequence in DNA?

(a) 5'-GAATTC-3' (b) 5'-CCAATG-3' (c) 5'-CATTAG-3' (d) 5'-GATACC-3'
3'-CTTAAG-5' 3'-GAATCC-5' 3'-GATAAC-5' 3'-CCTAAG-5'

102) Crick, one of the discoverer of DNA double helical structure, was the man of

(a) Physics (b) Chemistry (c) Zoology (d) Botany

103) The number of codons that code different amino acids is

(a) 16 (b) 31 (c) 61 (d) 64

104) Some amino acids are coded by more than one

(a) unambiguous (b) degenerate (c) universal (d) initiator

105) Out of 64 codons, the number of codons with GGG is

(a) 1 (b) 2 (c) 4 (d) 6

106) The DNA site where DNA dependent RNA polymerase binds for transcription, is called

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

107) 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

108) Eukaryotic RNA polymerase III catalyses the synthesis of

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

109) 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 mRNA transcribed by it?

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

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

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

111) 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

112) 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

113) The fact that a purine base always paired through hydrogen bonds with a pyrimidine base leads to, in the DNA double helix

(a) the antiparallel nature (b) the semiconservative nature (c) uniform width throughout DNA

(d) uniform length in all DNA.

114) The promoter site and the terminator site for transcription are located at

(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.

115) The net electric charge on DNA and histone, is

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

116) Match the terms in Column I with those in Column II.

Column I	Column II
A. Transcription	1. Aset of three bases on tRNA that is complementary to the bases of codon on mRNA.
B. Anticodon	2. A unit of DNA that codes for a polypeptide.
C. Cistron	3. Process of synthesis of polypeptide as dictated by mRNA.
D. Translation	4. Process by which mRNA carries the information from nucleus to ribosomes

(a) A - 4, B-1, C - 2, D - 3 (b) A - 1, B-4, C - 2, D - 3 (c) A - 4, B-1, C - 3, D - 2

(d) A - 3, B-1, C - 2, D - 4

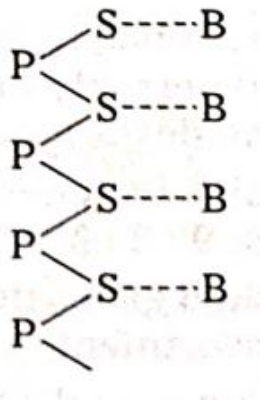
117) Match the codons in Column I with the amino acids in Column II.

Column I	Column II
A. UUU	I. Termination
8. AUG	2. Tyrosine
C. UAA	3. Phenylalanine
D. AGU	4. Methionine
E. UAC	5. Serine

(a) A - 3, B - 4, C - 1, D - 5, E - 2 (b) A - 2, B - 4, C - 1, D - 5, E - 3

(c) A - 1, B - 4, C - 3, D - 5, E - 2 (d) A - 3, B - 1, C - 4, D - 5, E - 2

118) The type of bond represented by the dotted line '.....' in a schematic polynucleotide chain is



(a) hydrogen bond (b) peptide bond (c) N-glycosidic linkage (d) phosphodiester bond

119) Listed below are some amino acids and their corresponding mRNA codons.

Amino acid	mRNA codons
Phenylalanine	UUU
Lysine	AAG
Arginine	CGA
Alanine	GCA

Select the DNA sequence that would code for the following polypeptide sequence. Polypeptide : Alanine - Arginine - Lysine - Phenylalanine

(a) CGT GCT TTC AAA (b) CGT GCT TTC TTT (c) CGU GCU UUC AAA (d) CGU GCU UUC TTT

120) Using a DNA template, how many new DNA molecules would be generated after 10 cycles of amplification in PCR?

(a) 512 (b) 1024 (c) 2048 (d) 256

121) If the sequence of nitrogen bases of the coding strand in a transcription unit is 5' -ATGAATG-3', the sequence of bases in its RNA transcription would be

(a) 5'-AUGAAUG-3' (b) 5'-UACUUAC-3' (c) 5'-CAUUCAU-3' (d) 5'-GUAAGUA-3'

122) How many base pairs will be there in 20 nucleosomes in a DNA double helix?

(a) 4000 (b) 40 (c) 20 (d) 2000

123) Match the following genes of the lac operon listed in column A with their respective products listed in column 'B'.

	A (Genes)		**B (Products)**
A.	'i' gene	1.	β - galactosidase
B.	'z' gene	2.	Lac permease
C.	'a' gene	3.	Repressor
D.	'y' gene	4.	Transacetylase

Select the correct option.

(a)

A	B	C	D
1	3	2	4

(b)

A	B	C	D
3	1	2	4

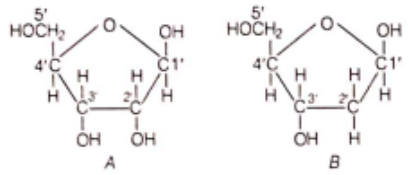
(c)

A	B	C	D
3	1	4	2

(d)

A	B	C	D
3	4	1	2

124) Observe structures A and B given below. Which of the following statements are correct?



(a) A is having 2-OH group which makes it less reactive and structurally stable, whereas Bis having 2-H group which makes it more reactive and unstable

(b) A is having 2-OH group which makes it more reactive and structurally unstable, whereas Bis having 2-H group which makes it less reactive and structurally stable

(c) A and B both have-OH groups which make it more reactive and structurally stable

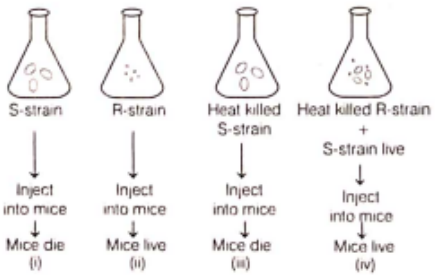
(d) A and B both are having-OH groups which make it less reactive and structurally stable

125) The correct feature of double-helical structure of DNA as given by Watson and Crick is

(a) right-handed helix, pitch is 3.4 nm (b) left-handed helix, pitch is 3.8 nm

(c) right-handed helix, pitch is 3.8 nm (d) left-handed helix, pitch is 3.4 nm

126) Study the given diagrammatic representation of Griffith's experiment to demonstrate transformation in bacteria.



Select the option which is incorrectly representing the experiment.

(a) (i) and (ii) (b) (iii) and (iv) (c) (ii) and (iii) (d) (ii) and (iv)

127) If E. coli were allowed to grow in the culture medium for 80 minutes by Matthew Meselson and Franklin Stahl in their experiments, the proportion of light and hybrid density DNA molecule would have been

(a) 87.5% of light density DNA and 12.5% of hybrid density DNA

(b) 75.0% of light density DNA and 25% of hybrid density DNA

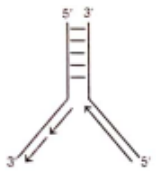
(c) 50% of light density DNA and 50% of hybrid density DNA

(d) 12.5% of light density DNA and 87.5% of hybrid density DNA

128) A DNA molecule is 160 base pairs long. If it has 20% adenine, how many cytosine bases are present in this DNA molecule?

(a) 48 (b) 96 (c) 64 (d) 192

129) Which one of the following diagram correctly represents DNA replication in eukaryotes?

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

130) Transcription unit is represented in the diagram given below.

Identify site (i),factor (ii) and enzyme (iii) responsible for carrying out the process.

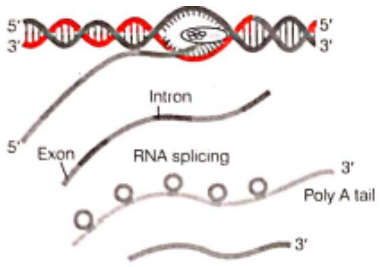
(a) (i) Promoter site, (ii) Bho factor, (iii) RNA polymerase

(b) (i) Terminator site, (ii) Sigma factor, (iii) RNA polymerase

(c) (i) Promoter site, (ii) Sigma factor, (iii) RNA polymerase

(d) (i) Promoter site, (ii) Sigma factor, (iii) DNA polymerase

131) A diagrammatic illustration of the process of transcription by RNA polymerase-Il in eukaryote is given below. Choose the most appropriate statement with respect to the fate of the precursor of mRNA transcribed that will be



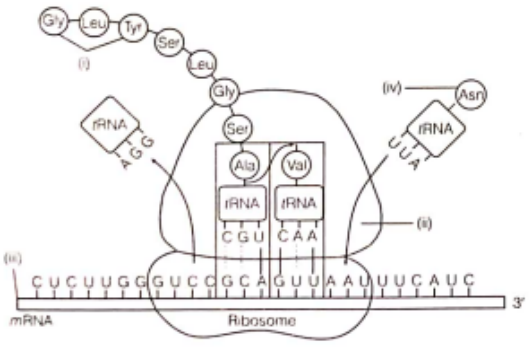
(a) Translation will take place once the precursor of mRNA leaves the nucleus

(b) Translation on mRNA will not take place once the precursor of mRNA leaves the nucleus

(c) Translation will take place in the nucleus

(d) The precursor of mRNA has to be processed further in next step before being translated

132) In the given figure of translation machinery of eukaryotes, select the correct labellings for (i), (ii), (iii) and (iv).



(a) (i) Codon, (ii) Anticodon, (iii) tRNA, (iv) 3' end of mRNA

(b) (i) Anticodon, (ii) Codon, (iii) 3' end of mRNA, (iv) 5' end of mRNA

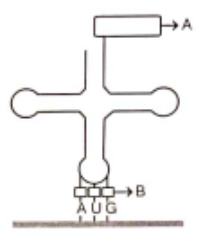
(c) (i) Polypeptide chain, (ii) Large subunit of ribosome, (iii) 5' end of mRNA, (iv) tRNA

(d) (i) Ribozyme, (ii) Polypeptide chain, (iii) rRNA, (iv) 5' end of tRNA

133) 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.
3 AUCAGGUUUGUGAUGGUACGA S

(a) Phenylalanine, methionine (b) Cysteine, glycine (c) Alanine, proline (d) Serine, valine

134)



AUG on the mRNA will result in the activation of which of the following RNA having correct combination of amino acids?

(a)

Site A	Site B
(a) UAC	Methionine

(b)

Site A	Site B
(b) Methionine	UAC

(c)

Site A	Site B
(c) Methionine	AUG

(d)

Site A	Site B
(d) AUG	Methionine

135) Select the important goals of HGP from the given options.
(i) Store the information for data analysis.
(ii) Cloning and amplification of human DNA.
(iii) Identify all the genes present in human DNA.
(iv) Use of DNA information to trace human history.

(a) (i) and (ii) (b) (ii) and (iii) (c) (i) and (iii) (d) (ii) and (v)

136) What are minisatellites?

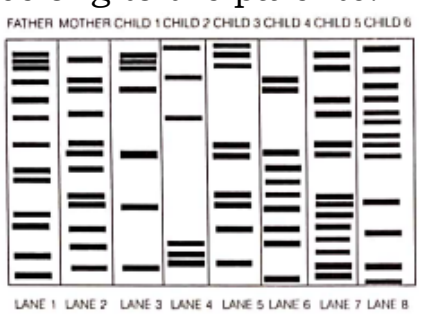
(a) 10-40 bp sized small sequences within the genes

(b) Short coding repetitive region on the eukaryotic genome

(c) Short non-coding repetitive sequence forming large portion of eukaryotic genome

(d) Regions of coding strands of the DNA

137) There was a mixup at the hospital after a fire accident in the nursery division. Which of these children belong to the parents?



(a) All of the children. (b) Children 2, 3 and 6 (c) Children 1 and 3 (d) Children 2 and 4

138) Which among the following statements does not stand true for DNA replication?

(a) Replication initiates randomly at any place in DNA by DNA polymerase

(b) In eukaryotes, DNA replication takes place at S-phase of cell cycle

(c) Failure of cell division after DNA replication results in polyploidy

(d) The model for semiconservative DNA replication was given by Watson and Crick

139) A eukaryotic cell, post-transcription prepares itself for synthesis of proteins, so as to mert its metabolic needs. The modified mitNA translates into proteins through a sequential stepwise process, Identify the correct sequence of steps in translation and select the correct option

I. Amino acylation of AINA

II. Attachment of larger subunit of ribosome to miRNA-IINA met complex.

III. Linking of adjacent amino acids to form a polypeptide.

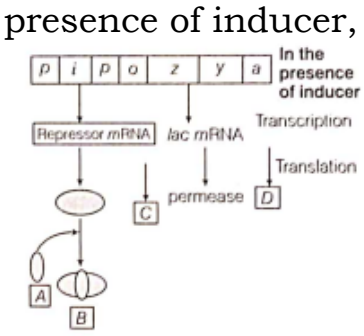
IV. Codon-anticodon reaction between INA and amino acyl RNA complex.

V. Attachment of mRNA with smaller subunit of ribosome.

(a) I → II → V → IV → III (b) II → III → I → IV → V → VI (c) I → V → IV → II → III

(d) II → IV → V → I → III

140) The figure given below shows the functioning of lac operon.
Identify the components in its functioning and select the correct codes.
A prokaryotic bacterial cell, regulates the expression of genes and switches on the lac operon in the presence of inducer, le lactose.



(a) A-Promoter, B-Inactive repressor, C-β - galactosidase, D-Transacetylase

(b) A-Transacetylase, B-Inducer C-Inactive repressor, D-β-galactosidase

(c) A-Inducer, B-Inactive repressor, C-β-galactosidase, D-Transacetylase

(d) A-Inactive repressor, B-Transacetylase, C-Promoter, D-β-galactosidase

Fill up / 1 Marks 10 x 1 = 10

141) 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 _____.

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

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

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

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

146) RNA polymerase II in eukaryotes catalyses the transcription of _____.

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

148) Meselson and Stahl experimentally proved the _____ replication of DNA.

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

150) _____factor functions as the initiation factor in the transcription of prokaryotes.

True or False 5 x 1 = 5

151) Polycistronic mRNA is generaUy found in eukaryotes.

(a) True (b) False

152) The process of translation of mRNA begins, when the mRNA encounters the large subunit of ribosome.

(a) True (b) False

153) VNTR belongs to a class of satellite DNA, called microsatellite.

(a) True (b) False

154) If a double-stranded DNA contains 20% cytosine, it will have 20% guanine in it.

(a) True (b) False

155) Termination / Stop codons do not have any tRNAs

(a) True (b) False

1 Marks 263 x 1 = 263

156) How does the flow of genetic information in HIV deviate from the 'central dogma' proposed by francis crick?

157) Which one out of Rho factor and sigma factor, act as initiation factor during transcription in prokaryote?

158) Which of the two subunits of ribosome encounters an mRNA?

159) Which one is tailed with adenylate residue between 3' end and 5'end of hnRNA?

160) Name the two basic amino acids that provide positive charge to histone proteins.

161) Mention the role of codons AUG and UGA during protein synthesis.

162) Mention the contribution of genetic maps in human genome project.

163) State which human chromosome has:
(i) the maximum number of genes and
(ii) the one which has the least number of genes

164) Mention any two ways in which single nucleotide polymorphism (SNPs) identified in human genome can bring out revolutionary changes in biological and medical sciences?

165) Mention two functions of the codon,AUG.

166) Name the enzyme involved in the continuous replication of DNA strand Mention the polarity of the template strand.

167) How does HIV differ from a bacterio-phage?

168) Name the positively charged protein around which has negatively charged DNA wrapped.

169) Why is hnRNA required to undergo splicing?

170) Mention the two additional processings which hnRNA needs to undergo after splicing so as to become functional.

171) When and at what end does the 'tailing' of hnRNA take place?

172) At which ends do 'capping' and 'tailing' of hnRNA occur, respectively?

173) How is the length of DNA usually calculated?

174) In an experiment DNA is treated with a compound which tends to place itself amongst the stacks of nitrogenous base pairs. As a result of this the distance between two consecutive base pairs increases from 0.34nm to 0.44 nm. Calculate the length of DNA double helix, which has 2×10^9bp in the presence of saturating amount of this compound.

175) What would happen if histones were to be mutated and made rich in amino acids and glutamic acid in place of basic amino acids such as lysine and arginine?

176) In some viruses DNA is synthesised using RNA template. What term is given to such a DNA?

177) What will be the ratio of $^{15}N/^{15}N$:$^{15}N/^{14}N$: $^{14}N/^{14}N$ containing DNAs,if Meselson and Stahl experiment is cotinued for four generations in the bacteria?

178) Name of the two types of nuclieic acids in living systems.

179) What is the number of base pairs in the haploid genome of humans?

180) How is nitrogenous base attached to the pentose sugar in a nucleotide?

181) Name the two types of nitrogenous bases.

182) How is a nucleotide different from a nuclioside different from a nucleoside?

183) How are the consecutive nucleotides linked together in a polynucleotide strands?

184) What forms the backbone of a polynucleotide strand of a nucleic acid?

185) Write the other chemical name for thymine.

186) Who discovered the nucleic acid DNA? What was it called then?

187) Who provided the X-ray diffraction data of DNA for the proposal of double-helix model of DNA?

188) Who proposed the double helical model of DNA?

189) State Chargaff's base complementarity rule.

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

191) How are the two strands of DNA held together?

192) Why does the distance between the two polynucleotide strands of DNA remain almost constant?

193) How many base pairs are present in one full turn of DNA helix?

194) What is the base pairing pattern of DNA?

195) What is the distance between consecutive base pairs in DNA?

196) What term is given to the flow of information from RNA to DNA (instead of from DNA to RNA) in certain viruses?

197) What is the approximate length of DNA in a typical mammalian nucleus?

198) If the length of DNA of E.coli is 1.36 mm,calculate the number of base pairs in it.

199) What is nucleoid?

200) Some proteins are positively charged while some are negatively charged.What determines the charge of the protein?

201) Name the amino acid residues the histones are present in a nucleosome?

202) How many molecules of histones are present in a nucleosome?

203) How many (approximately) base pairs are present in a nucleosome?

204) Define transformation

205) Name one organism where RNA is the genetic material.

206) Why do RNA viruses undergo mutation and evolution faster than most of the other viruses?

207) Write the scientific name of the plant on which taylor et al performed their experiments.

208) When does DNA replicate in the cell cycle of eukaryotes?

209) How long does the replication of human DNA take place?

210) How many base pairs are polymerised by DNA polymerase in a second?

211) Specify the direction in which DNA-polymerase synthesises the polynucleotide.

212) Mention the role of DNA polymerase other than polymerising deoxyribonucleotides during DNA synthesis.

213) In what direction is the leading strand synthesised during DNA synthesis?

214) In what direction does discontinuous synthesis of a DNA strand take place?Why?

215) Mention the polarity of the template DNA strand on which continuous synthesis of a new strand of DNA take place.

216) What is origin of replication?

217) What is replication fork?

218) Name the enzyme which can do proof reading during DNA synthesis in bacterial cells.

219) Why are vectors needed for replication of DNA during rDNA technology?

220) Define transcription.

221) Name the property of DNA that governs transcription.

222) Name the process in which the unwanted mRNA regions are removed and the wanted regions are joined.

223) What is the term used for the regions of a gene which become part of mRNA and code for the different regions of proteins?

224) What do you call a non-coding intervening nucleotide sequences in a eukaryotic gene?

225) What is meant by hnRNA?

226) Who first suggested that codons are triplets?

227) How many nucleotides will there be in three codons? How many amino acids will this number of bases code for?

228) While an mRNA strand is being translated in the ribosome subunit, the triplets in sequence were UAC and UAG. One of them codes for tyrosine. What is the significance of the other? Pick out the codons and specify.

229) Give the initiation codon for protein synthesis.Name the amino acid it codes for.

230) Due to an error during transcription ATG of DNA formed UAG in mRNA. What would happen to the polypetide chain during translation by this changed mRNA?

231) How do the tRNA molecules appear in
(i)two-dimentional and
(ii)three-dimentional view?

232) Define translation

233) What are peptide bonds?

234) Name the cellular factory responsible for synthesis of proteins.

235) When does translation start?

236) Which is the site of control of gene expression in prokaryotes?

237) The accessibility of promoter region of prokaryotic DNA is often regulated by the interaction of a protein with a certain sequence of DNA. What name is given to such a DNA sequence?

238) Who proposed the operon concept?

239) What function does Beta galactosidase carry out?

240) Name the inducer of lac operon in E.coli.

241) What does the gene 'a' code for in the lac operon of E.coli?

242) When was the Human Genome Project launched and when was it completed?

243) Name the branch of biology that HGP is closely associated with.

244) Name two plants whose genomes have been sequenced

245) Who developed the principle/ method of automated DNA sequencer?

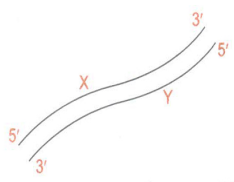
246) When was the sequencing of chromosome 1 completed?

247) Name the last of the human chromosome to be sequenced.

248) What percentage of human genome codes for proteins?

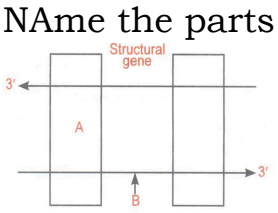
249) Write the number of genes found on chromosome 1 and y-chromosome respectively of humans.

250) Who discovered the technique of DNA fingerprinting?

251) 

A structural gene has two DNA strands X and Y shown above. Identify the template strand.

252) NAme the parts 'A' and 'B' of the transcription unit given below:



253) If the sequence of coding strand in a transcription unit is written as follows:
5'- ATGCATGCATGCATGCATGCATGCATGC -3'
Write down the sequence of mRNA.

254) What is the function of histones in DNA packaging?

255) The enzyme DNA polymerase on E.coli is a DNA-dependent polymerase and also has the ability to proof-read the DNA strand being synthesised. Explain. Discuss the dual polymerase.

256) Given below is the sequences of the coding strand of DNA in a transcription unit 3'
AATGCAGCTATTAGG -5'. write the sequence of:
a) It's complementary strand
b)The mRNA.

257) Based on your understanding of genetic code, explain the formation of any abnormal haemoglobin molecule. what are the known consequence of such a change?

258) Sometimes cattle or even human beings give birth to their young ones that are having extremely different sets of organs like limbs/position of eye(s) etc. comment.

259) Name any three viruses which have RNA as the genetic material

260) Name the genetic material for majority of organisms,

261) List the function of RNA.

262) How many nucleotides are present in a bacteriophage $\Phi \times 174$?

263) List the number of base pair in
(i) Lambda bacteriophage
(ii) E.coli and
(iii) Haploid content of human DNA

264) Comment two chains of DNA have antiparallel polarity

265) What is the length of DNA in a typical mammalian cell?

266) If the length of E-coli DNA is 1.36 nm, how many, base pairs are present in DNA.

267) How is DNA held by some proteins of cytoplasm in E.coli?

268) What is the difference between DNAs and DNAase?

269) Suggest one evidence to prove that RNA was first genetic material.

270) Why was RNA unstable?

271) What made DNA as genetic material

272) A process of replication is completed in how much time in human?

273) What is the averge rate of polymerization

274) Name three kinds of polymerases.

275) What is splicing?

276) How does development and differentiation of embryo take place to form adult at molecular level?

277) Expand UTR.

278) Where are URTs present in mRNA stand?

279) Write significance of UTRs.

280) Name the technique which provided valuable information on the three-dimensional model of DNA.

281) What is the diameter of double helix of DNA?

282) Write out the amino acid sequences that would be translated when the following mRNA molecules combine with a ribosome:
(a) A-U-G-C-A-U-A-G-A-A-G-G-C-C-U-A-U-U-G-U-A
(B) C-A-U-G-U-U-U-C-U-U-U-A-A-A-G-G-U-C-G-U-U

283) Write out the mRNA sequence that would be transcribed from the following strand of DNA, and the amino acid sequence that would be translated when the mRNA combines with a ribosome
T-A-C-A-A-G-T-A-C-T-T-G-T-T-T-C-T-T

284) What are helicases?

285) Name the enzyme which one can break and reseal the strand of DNA.

286) What is the role of primase?

287) What are Okazaki fragments?

288) How many bases code for one amino acid?

289) What is codon?

290) Name any two non-sense codon.

291) Define Wobble position

292) During DNA replication used for 5'-3' strand and newly formed strand 3'-5' strand?

293) Name the components 'a' and 'b' in the nucleotide with a purine, given below

294) What are the raw materials for DNA synthesis?

295) Can DNA be synthesizes in vito?

296) Name the RNA that carries information about the sequence of amino acids in a polypeptide.

297) What is the function of tRNA?

298) Give the site of protein synthesis.

299) What is an anticodon?

300) Name three nonsense codons

301) Name the enzyme that joins the short pieces in the "lagging strand" of DNA during replication

302) Name the amino acids which have only one codon each

303) What is a genetic code?

304) The genetic code is nonoverlapping and degenerate.It is so?

305) Is there any base triplet that codes for more than one amino acid?

306) What are the two major functions of DNA?

307) A polypeptide of 600 amino acids will be coded for by a linear sequence of how many bases in(a) nRNA and (b) DNA?

308) Of the 64 possible code triples,how many code for amino acids and how many for stop signals?

309) Are there any base triplets that code for amino acids and also for start signals?Name these

310) What is proof-reading in DNA synthesis?

311) Which base triplets code for the amino acid phenylalanine?

312) What is introns?

313) The amino acid arginine has 6 mRNA codons:CGU,CGC,CGA,CGG,AGA and AGG.Give the DNA codons for it.

314) Who proposed the operon model?

315) Name the technique used for separating DNA fragments in the laboratory

316) How is the action of exonuclease different from that of endonuclease?

317) Name two sulphur containing and two basic amino acids.

318) What are histones?

319) What is nucleosome?

320) Some amino acids are coded by more than one codon.Such a genetic code is

321) The Structural gene in prokaryotes is polycistronic

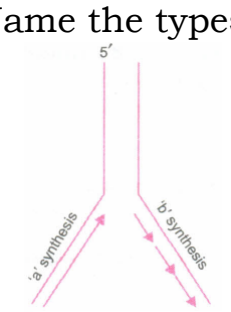
322) F.Griffith conducted experiment with bacteriophages

323) One codon codes for only one amino acid.The genetic code is

324) VNTRs is an abbrevation of

325) In which direction are the leading and lagging strands synthesized during DNA replication?Name the enzyme responsible for this process.

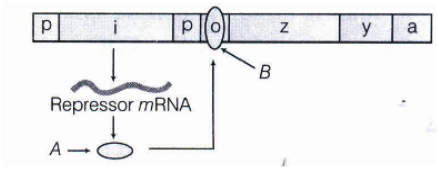
326) Name the types of synthesis 'a' and 'b' occurring in the replication fork of DNA as shown below:



327) Write the function of rRNA.

328) What conclusion was drawn from the blender experiment performed by Hershey and Chase?

329) Give below is a schematic representation of a lac operon in the absence of an inducer.Identify A and B in it.



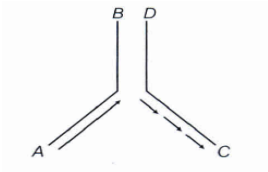
330) Mention the role of the codons AUG and UGA during protein synthesis.

331) Name the transcriptionally active region of chromatin in a nucleus.

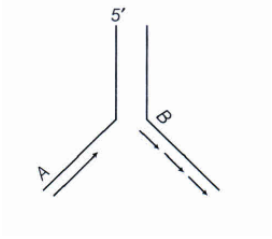
332) In a nucleus, the number of ribonucleoside triphosphates is 10 times the number of deoxyribonucleoside triphosphates, but only deoxyribonucleotides are added during the DNA replication. Suggest a mechanism.

333) During in vitro synthesis of DNA, a researcher used 2',3' dideoxycytidine triphosphate as raw nucleotide in place of 2'-deoxycytidine. What would be the consequence?

334) Mention the polarity of the DNA strands A-B and C-D shown in the replicating fork given below.



335) Give the name of the type of synthesis A and B in the replication fork of DNA as shown below.



336) What is a cistron?

337) Where does transcription and translation occur in bacteria and eukaryotes respectively?

338) Give an example of a codon having dual function.

339) Mention one difference to distinguish an exon from an intron

340) Suggest a technique to a researcher who needs to separate fragments of DNA.

341) According to de-Vries what is saltation?

342) Retroviruses have no DNA. However the DNA of the infected host cell does possess viral DNA. How is it possible?

343) Name the enzyme that transcribes hn-RNA in eukaryotes.

344) Name the negatively charged and positively charged components of a nucleosome

345) Write the two specific codons that a translational unit of m-RNA is flanked by one on either sides

346) Why is it not possible for an alien DNA to become a part of a chromosome anywhere along its length and replicate normally?

347) How is repetitive/satellite DNA separafud from bulk genomic DNA for various genetic experiments?

348) Name the specific components and the linkage between them that form deoxyadenosine.

349) Which one of an intron and an exon is the reminiscent of antiquity?

350) Why does hnRNA need to undergo splicing ? Where does splicing occur in the cell ?

351) Mention two applications of DNA polymorphism.

352) State a method of cellular defense which works in all eukaryotic organisms.

353) PCR requires very high temperature conditions where most of the enzymes get denatured. How was this problem resolved in a PCR ?

354) If total number of base pair is multiplied with distance between two consecutive bases, length of DNA comes out to be appropriate 2.2 m .How is the packaging of DNA helix done in a tiny nucleus of dimensions of approximately 10^{-6} m?

355) In Griffith experiment why Streptococcus pneumoniae with smooth shiny colonies(S- strain) is virulent in nature. Explain stepwise the Griffith's experiment?

356) How is the transforming principle explained by this experiment?

357) How Oswald Avery, Colin Macleod and Maclyn MC Corty while determining the biochemical nature of transforming principle in Griffith's experiment proved that DNA is the heredity material?

358) Harshey & Chase selected radioactive ^{35}S ,^{35}P and decided to include the radiation studies in their experiments. What was the logic behind this decision?

359) How could Harshey and Chase by their experimentation proved that it was not protein but DNA from the virus entered the Bacteria. What did they conclude from their experiment?

360) State the qualities of a genetic material? Out of DNA & RNA, which one fulfills all the prerequisites of being a genetic material and why?

361) RNA was the first genetic material. Justify the statement?

362) Why Meselson and Stahl grow E.coli in a medium containing ^{15} NH_4Cl for many generation. In which medium were they transferred later on? What were their observations? Analyse their results to prove that DNA is Semi Conservative in Nature?

363) What will happen if a cell fails to divide after DNA replication? Name the main enzyme for the process of replication. This enzyme catalyses polymerization only in one direction that is 5'- 3'. What happens due to this during replication? What is the role of DNA ligase and origin of replication in DNA replication?

364) Give the scientific term for the process of copying genetic message from one strand of DNA into RNA. Only one strand of DNA is used during transcription. Why?

365) i)The DNA strand with Polarity 3'-5' acts as a template during transcription. Why?
ii) The other strand with polarity 5'- 3' is called coding strand. Why?

366) In Arushi Murder Case the criminals could be identified with the help of special Biotechnological procedure. Name the technique used and where is it carried out?

367) In a Forensic Laboratory, a scientist during his research stared cutting the nucleotide polymer with the help scissor. Name the special type of scissor used by him and also the material that was cut.

368) It is found that in the Transcription process the DNA strand with 3' $\rightarrow$5' is always transcribed.Why?

369) Where are UTRs located on m RNA ? Find out the UTRs from this segment of mRNA -5' UCG AGC AUG CCC GCG UUU UAG GAG GAA 3'

370) What is the importance of Lactose in Lac-Operon?

371) What are the different attachment sites on t RNA?

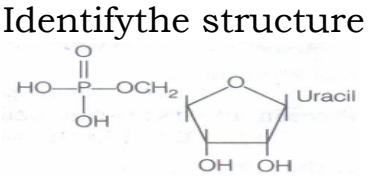
372) Expand BAC and YAC . What for they are used?

373) What will happen if both template and coding strands of a DNA segment take part in the transcription process?

374) Mention the two events when DNA is unzipped in a cell.

375) Name the chromosomes with highest and fewest number of genes.

376) Identifythe structure given below.



377) Who proposed the nucleosome model? State the function of rRNA.

378) During DNA synthesis in bacteria, which enzyme is required?

379) What will happen if DNA replication is not followed by cell division in a eukaryotic cell?

380) All terminater codons begin with nucleotide of which base?

381) State the sequence of structural gene in lac operon.

382) Given below is a statement state whether it as true or false. If false give reason. Sequencing of whole genome with both the coding and non-coding regions is EST.

383) Why were protein discarded from being the genetic material?

384) Who discovered DNA as genetic material?

385) Name the strand which undergoes discontinuous replication.

386) Which one is removed during splicing-introns or exons?

387) Which was the last human chromosome to be completely sequenced?

388) Mention the number:
(a) bases in the DNA of phage, φ 174
(b) base pairs in the DNA of phages (λ)

389) How many hydrogen bonds are present between the A- T and G-C pairs, respectively?

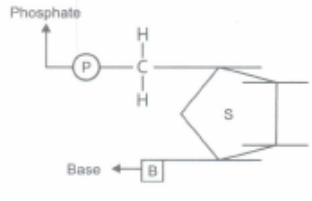
390) Why is the enzyme DNA-polymerase called DNAdependent DNA-polymerase?

391) What is hnRNA?

392) Name the two types of nucleic acids in living systems.

393) In which position is the phosphate group linked to a nucleosid? Name the linkage too.

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



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

396) How may base pairs would a DNA segment of length 1.36 mm have?

397) What is a nucleoid?

398) Write the role of histone proteins in packaging of DNA in eukaryotes.

399) Write the conclusion Griffitb arrived at, at the end of his experiments with Streptococcus pneumoniae.

400) What are bacteriopbages?

401) What is a replication fork?

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

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

404) A region of a coding DNA strand has the following nucleotide sequence:
- A T G C -
What shall be the nucleotide sequence in
(i) sister DNA segment, it replicates, and
(ii) m-RNA polynucleotide it transcribes?

405) Write the function of RNA polymerase II.

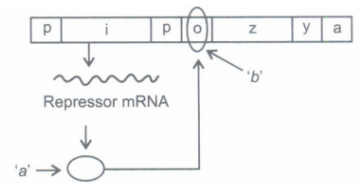
406) What represents the dominance of RNA world?

407) Name the enzyme that is referred to as Ochoa enzyme.

408) Name one amino acid, which is coded by only one codon.

409) What is ribozyme?

410) Given below is a schematic representation of a lac operon in the absence of an inducer. Identify 'a' and 'b' in it.



411) Name the free-living, non-pathogenic nematode, whose genome has been sequenced.

412) Why should the DNA be cut into smaller fragments for sequencing?

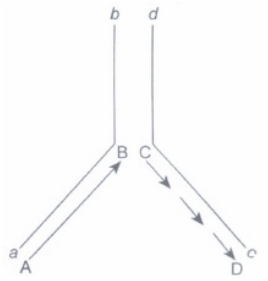
413) Name the scientist who developed the method to determine the sequence of amino acids in proteins.

414) What formed the basis for assigning the genetic and physical maps on the human genome?

415) Name the largest of the known human gene and the number of bases it contains.

416) (a) What per cent of human genome codes for proteins?
(b) What per cent of discovered gene's functions are unknown?

417) Mention how DNA polymorphism does arise in a population?

418) 

A DNA replication fork is shown above. Answer the following questions based on that.
(a) Identity the polarity of the strands a - b and c-d.
(b) Name the enzyme that catalyses the process.
(c) What are the newly synthesised strands A - B and C - D known as?

Find the odd one 4 x 1 = 4

419) UAA, UGG, UAG, UGA

420) 5S rRNA, snRNA, hnRNA, tRNA

421) Har Gobind Khorana, Marshal Nirenberg, Severo Ochoa, Alec Jeffreys.

422) Promoter, Inducer, Operator, Terminator.

Assertion and reason 32 x 1 = 32

423) **Assertion :** The uptake of DNA during transformation is an active, energy requiring process.

Reason: Transformation occurs in only those bacteria, which possess the enzymatic machinery involved in the active uptake and recombination.

Codes :

(a) Both assertion and reason are true and reason is the correct explanation of assertion.

(b) Both assertion and reason are true but reason is not the correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Both assertion and reason are false

424) **Assertion:** R-type of Pneumococcus is non-virulent.

Reason: R-type of Pneumococcus can be virulent by having transformation with S - type of Pneumococcus.

Codes :

(a) Both assertion and reason are true and reason is the correct explanation of assertion.

(b) Both assertion and reason are true but reason is not the correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Both assertion and reason are false

425) **Assertion:** Adenine and guanine are double - ring bases.

Reason: Adenine and guanine are pyrimidines.

Codes :

(a) Both assertion and reason are true and reason is the correct explanation of assertion.

(b) Both assertion and reason are true but reason is not the correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Both assertion and reason are false

426) **Assertion:** B-DNA has a constant diameter of 20 Â.

Reason: A pyrimidine always pairs with a purine.

Codes :

(a) Both assertion and reason are true and reason is the correct explanation of assertion.

(b) Both assertion and reason are true but reason is not the correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Both assertion and reason are false

427) **Assertion:** Sequences of bases in one polynucleotide chain of DNA can determine the sequence of bases in the other chain.

Reason: In a DNA, amount of adenine equals that of thymine and amount of guanine equals that of cytosine, i.e., A = T and C = G.

Codes :

(a) Both assertion and reason are true and reason is the correct explanation of assertion.

(b) Both assertion and reason are true but reason is not the correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Both assertion and reason are false

428) **Assertion:** Z-DNA follows a zig-zag course.

Reason: Z-DNA is left handed

Codes :

(a) Both assertion and reason are true and reason is the correct explanation of assertion.

(b) Both assertion and reason are true but reason is not the correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Both assertion and reason are false.

429) **Assertion:** The concept of one gene-one enzyme was changed to one gene-one polypeptide.

Reason: Each enzyme may consist of two or more different polypeptides.

Codes :

(a) Both assertion and reason are true and reason is the correct explanation of assertion.

(b) Both assertion and reason are true but reason is not the correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Both assertion and reason are false

430) **Assertion:** Core enzyme catalyses chain elongation of RNA.

Reason: The presence of sigma factor is required for initiation of transcription.

Codes :

(a) Both assertion and reason are true and reason is the correct explanation of assertion.

(b) Both assertion and reason are true but reason is not the correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Both assertion and reason are false

431) **Assertion:** tRNA acts as an adapter molecule.

Reason: tRNA recognizes codon sequence of mRNA during translation.

Codes :

(a) Both assertion and reason are true and reason is the correct explanation of assertion.

(b) Both assertion and reason are true but reason is not the correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Both assertion and reason are false

432) **Assertion:** The genetic code is degenerate.

Reason: For a particular amino acid more than one codons can be used.

Codes :

(a) Both assertion and reason are true and reason is the correct explanation of assertion.

(b) Both assertion and reason are true but reason is not the correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Both assertion and reason are false

433) **Assertion:** Same tRNA can recognise more than one codons differing only at the third position.

Reason : The specificity of a codon is particularly determined by the first two bases

Codes :

(a) Both assertion and reason are true and reason is the correct explanation of assertion.

(b) Both assertion and reason are true but reason is not the correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Both assertion and reason are false.

434) **Assertion:** The subunits of ribosomes come together only at the time of protein formation.

Reason: Mg^{2+} causes their association or dissociation.

Codes :

(a) Both assertion and reason are true and reason is the correct explanation of assertion.

(b) Both assertion and reason are true but reason is not the correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Both assertion and reason are false.

435) **Assertion:** Initiation step of protein synthesis in prokaryotes and eukaryotes has several differences.

Reason: They both form mRNA - tRNA complex with smaller subunit of ribosome.

Codes :

(a) Both assertion and reason are true and reason is the correct explanation of assertion.

(b) Both assertion and reason are true but reason is not the correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Both assertion and reason are false.

436) **Assertion:** UAA, UAG and UGA terminate protein synthesis.

Reason: They are not recognised by tRNA.

Codes :

(a) Both assertion and reason are true and reason is the correct explanation of assertion.

(b) Both assertion and reason are true but reason is not the correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Both assertion and reason are false.

437) **Assertion:** Ribosomes attached to endoplasmic reticulum release proteins into lumen of ER.
Reason: Such proteins are used for formation of hydrolytic enzymes or are modified.
Codes :
(a) Both assertion and reason are true and reason is the correct explanation of assertion.
(b) Both assertion and reason are true but reason is not the correct explanation of assertion.
(c) Assertion is true but reason is false.
(d) Both assertion and reason are false.

438) **Assertion:** Constitutive genes are continuously being expressed.
Reason : Constitutive genes are frequently needed for various metabolic functions.
Codes :
(a) Both assertion and reason are true and reason is the correct explanation of assertion.
(b) Both assertion and reason are true but reason is not the correct explanation of assertion.
(c) Assertion is true but reason is false.
(d) Both assertion and reason are false.

439) **Assertion:** Synthesis of tryptophan is self regulatory.
Reason: Tryptophan works both as co-repressor and through feedback inhibition.
Codes :
(a) Both assertion and reason are true and reason is the correct explanation of assertion.
(b) Both assertion and reason are true but reason is not the correct explanation of assertion.
(c) Assertion is true but reason is false.
(d) Both assertion and reason are false.

440) **Assertion:** No lac mRNA is made in the presence of glucose.
Reason: In the presence of glucose and lactose activity of lac operon is not needed.
Codes :
(a) Both assertion and reason are true and reason is the correct explanation of assertion.
(b) Both assertion and reason are true but reason is not the correct explanation of assertion.
(c) Assertion is true but reason is false.
(d) Both assertion and reason are false.

441) **Assertion:** Lactose in lac operon is promoter gene.
Reason: Lactose inactivates the repressor gene.
Codes :
(a) Both assertion and reason are true and reason is the correct explanation of assertion.
(b) Both assertion and reason are true but reason is not the correct explanation of assertion.
(c) Assertion is true but reason is false.
(d) Both assertion and reason are false

442) **Assertion:** Regulator and operator genes are not associated with constitutive genes.
Reason: Constitutive genes need not be repressed.
Codes :
(a) Both assertion and reason are true and reason is the correct explanation of assertion.
(b) Both assertion and reason are true but reason is not the correct explanation of assertion.
(c) Assertion is true but reason is false.
(d) Both assertion and reason are false.

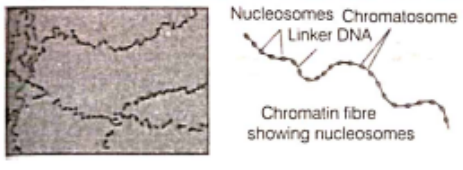
443) **Assertion (A)** The sugar-phosphate backbone of two chains in DNA double helix show anti-parallel polarity.
Reason (R) The phosphodiester bonds in one strand go from a 3' carbon of one nucleotide to a 5' carbon of adjacent nucleotide, whereas those in complementary strand go vice versa.
(a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
(b) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A),
(c) Assertion (A) is true, but Reason (R) is false
(d) Assertion (A) is false, but Reason (R) is true

444) **Assertion (A)** ln molecular diagnosis, single stranded DNA or RNA tagged with radioactive molecule is called a probe.
Reason (R) A probe always searches and hybridises with its complementary DNA in a clone of cells.
(a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
(b) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A),
(c) Assertion (A) is true, but Reason (R) is false
(d) Assertion (A) is false, but Reason (R) is true

445) Assertion (A) : DNA has two chains having antiparallel polarity.
Reason (R) : In one chain of DNA at one end has a free phosphate moiety 5' end of ribose sugar and at other end the ribose has a free 3' OH group.
(a) If both A and Rare true and R is the correct explanation of A
(b) If both A and R are true, but R is not the correct explanation of A
(c) If A is true, but R is false
(d) If A is false, but R is true

446) Assertion (A) : Cytidine is a nucleoside.
Reason (R) : A nucleoside is formed by the combination of sugar and phosphate group.
(a) If both A and Rare true and R is the correct explanation of A
(b) If both A and R are true, but R is not the correct explanation of A
(c) If A is true, but R is false
(d) If A is false, but R is true

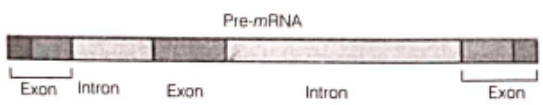
447) Given below is the nucleosome model in which the histone proteins are bounded by DNA. One nucleosome contains about 200 base pairs of DNA helix. Study the structure and comment upon the appropriateness of the Assertion and the Reason



Assertion (A) : Histones are basic in nature.
Reason (R) : DNA being negatively charged, wrap around histone to octamer. These are rich in the amino acids lysine and arginine.
(a) If both A and Rare true and R is the correct explanation of A
(b) If both A and R are true, but R is not the correct explanation of A
(c) If A is true, but R is false
(d) If A is false, but R is true

448) Assertion (A) : Replication on one strand of DNA is continuous and on another it is discontinuous
Reason (R) : The DNA polymerase works in 3' → 5' direction.
(a) If both A and Rare true and R is the correct explanation of A
(b) If both A and R are true, but R is not the correct explanation of A
(c) If A is true, but R is false
(d) If A is false, but R is true

449) Given below picture represents heterogenous nuclear RNA (in RNA) that refers to the bulk of transcribed RNA hnRNA undergoes processing to mRNA. Based on the above information and given pictures comment upon the appropriateness of Assertion and Reason.



Assertion (A) : hnRNA is larger than mRNA.
Reason (R) : hnRNA has non-coding introns which are not required for translation.
(a) If both A and Rare true and R is the correct explanation of A
(b) If both A and R are true, but R is not the correct explanation of A
(c) If A is true, but R is false
(d) If A is false, but R is true

450) Assertion (A) : Most of the amino acids are represented by more than one codon.
Reason (R) : The genetic code is non-ambiguous.
(a) If both A and Rare true and R is the correct explanation of A
(b) If both A and R are true, but R is not the correct explanation of A
(c) If A is true, but R is false
(d) If A is false, but R is true

451) Assertion (A) : In transcription, the strand with 5'→ 3' polarity acts as the template strand.
Reason (R) : The enzyme RNA polymerase catalyses the polymerisation in only one direction, i.e. 5'→3
(a) If both A and Rare true and R is the correct explanation of A
(b) If both A and R are true, but R is not the correct explanation of A
(c) If A is true, but R is false
(d) If A is false, but R is true

452) Assertion (A) : During protein synthesis the correct amino acid is brought to the ribosome and Inserted at its place in the growing polypeptide chain.
Reason (R) : This insertion is facilitated by the interaction between the mRNA anticodons and codons on /RNA
(a) If both A and Rare true and R is the correct explanation of A
(b) If both A and R are true, but R is not the correct explanation of A
(c) If A is true, but R is false
(d) If A is false, but R is true

453) Assertion (A) : A fully processed hnRNA is called mRNA.
Reason (R) : hnRNA undergoes, splicing and other post-transcriptional like modifications, capping and tailing
(a) If both A and Rare true and R is the correct explanation of A
(b) If both A and R are true, but R is not the correct explanation of A
(c) If A is true, but R is false
(d) If A is false, but R is true

454) Assertion (A) : In E. coli, the lac operon gets switched on in presence of lactose.
Reason (R) : Lactose binds to the repressor.
(a) If both A and Rare true and R is the correct explanation of A
(b) If both A and R are true, but R is not the correct explanation of A
(c) If A is true, but R is false
(d) If A is false, but R is true

2 Marks 136 x 2 = 272

455) If the sequence of the coding strand in a transcription unit is written as follows
5' - ATGCATGCATGCATGCATGCATGCATGC - 3'
write down the sequence of mRNA

456) If the sequence of one coding strand of DNA is written as follows:
5' - ATGCATGCATGCATGCATGCATGCATGC -3'
write down the sequence of complementary strand in 5'⟶3' direction.

457) How did Hershey and Chase differentiate between DNA and protein in their experiment while proving that DNA is the genetic material?

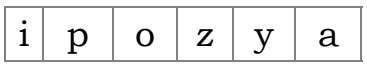
458) List two essential roles of ribosomes during translation.

459) In the medium where E.coli was growing, lactose was added, which induced the lac operon. Then, why does lac operon shut down some time after addition of lactose in the medium?

460) If a double stranded DNA has 20 percent of cytosine, calculate the percent of adenine in the DNA.

461) Which one out of an intron and an exon,is the reminiscent of antiquity?

462) 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?

463) 

Given above is a schematic representaion of the lac operon in E.Coli. What is the significant role of 'i' gene in switching 'on' or 'off' the operon?

464) Draw a schematic diagram of a part of double-stranded dinucleotide DNA chain, having all the four nitrogenous bases and showing the correct polarity

465) Draw a schematic diagram of lac operon in its 'switched off' position. Label the following:
(i)The structural genes
(ii)Repressor bound to its correct position
(iii)Promoter gene
(iv)Regulatory gene

466) Difference between acquire positive charge?

467) How do histones acquire positive charge?

468) State the dual role of deoxyribonucleoside triphosphates during DNA replication

469) Write the full form of VNTR.How is VNTR different from 'probe'?

470) Mention the role of ribosomes in peptide bond formation. How does ATP facilitate it?

471) Make a labelled diagram of an RNA dinucleotide showing its 3' - > 5' polarity.

472) How is the translation of mRNA terminated?

473) Explain the dual function of AUG codon.Give the sequence of basis it is transcribed from and its anticodon.

474) Name the category of codons UGA belongs to.Mention another codon of the same category.Explain their role in protein synthesis.

475) Give one function each of histone protein and non-histone chromosomal protein in an eukaryotic cell.

476) Write two possible uses of single nucleotide polymorphism.

477) Compare the roles of the enzymes DNA-polymerase and DNA-ligase in the replication fork of DNA.

478) (a) Differentiate between template strand and coding strand of DNA.
(b) Name the source of energy for the replication of DNA.

479) Difference between mRNA and tRNA

480) Briefly describe polymorphism

481) Differentiate between Reprtitive DNA and Satellite DNA

482) Recall the experiment of Frederick Griffith.If RNA instead of DNA was the genetic material would the heat-killed S-strain of the bacteria have transformed the R-strain into S-strain? Explain your answer

483) What is the cause of discontinuous synthesis of DNA on one of the parental strands of DNA?What happens to these short stretches of the DNA synthesised?

484) What are the functions of
(i) methylated guanosine cap and
(ii) poly A-tail in a mature mRNA?

485) A low level of expression of lac operon occurs at all the time. Can you explain the logic behind this phenomenon?

486) Mention the number of base pairs in the DNA of each of the following:
(i)ϕ174 phage
(ii)Lambda phage
(iii)Escherichia coli
(iv)Human being

487) What are 5'-end and 3'-end of a poly-nucleotide chain?

488) What is chromatin? Why are they seen as bead-on-string structure under electron microscope?

489) Write two chemical difference between DNA and RNA.

490) Give two reasons why both the strands of DNA are not copied during transcription

491) What is a promoter in a transcription unit? Where is it located in DNA with reference to the structural gene(s)?

492) Why is it that transcription and translation can be coupled in prokaryotic cells but not in eukaryotic cells?

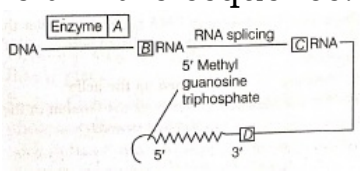
493) What is a terminator in a transcription unit?Where is it located in a structural gene? Mention its significance in transcription.

494) Which of the two -the coding strand or the template strand of DNA will the transcribed RNA resemble more?Why? How will they yet differ from each other?

495) Structural genes may be monocistronic or polycistronic.Bring out the differences between the two.

496) Distinguish between the codons and anticodons.

497) Given below is a sequence of steps of transcription in a eukaryotic cell. Fill up the blanks (A,B,C and D) left in the sequence.



498) ATGGAGTACTTCGTGTGA is the coding strand of DNA in a transcription unit.
(i)Write the mRNA transcribed from this DNA segment.
(ii)How many amino acids does it code for?Why?

499) Describe frameshift mutations.

500) Who postulated an adoptor molecule to link the genetic code and the amino acids? What are its functions?

501) Pick out the untranslated regions from the following mRNA and mention their location.
5' - ACGUCAUGGCGUUUUAGGAGGAA -3'

502) Mention the possible levels of regulation of gene expression in eukaryotes.

503) Regulation of lac operon can be visualised as regulation of enzyme synthesis by its substrate. Explain the statement.

504) Mention the two assumptions that led to HGP

505) Name four non-human organisms whose genomes have been sequenced.

506) Name the two most commonly employed hosts and the vectors for human gene cloning.

507) Describe the two major approaches to sequencing of genomes.

508) Name the enzymes involved in DNA replication other than DNA polymerase and ligase. Name the key function for each of them.

509) Explain the two factors responsible for conferring stability to double helix structure of DNA

510) Study the given portion of double stranded polynucleotide chain carefully. Identify a,b,c and 5' end of the chain.

511) Who coined the term 'genetic code'?What does it mean?

512) Define genetic material

513) How does DNA express its biological information?

514) What is the function of biological strand of DNA?

515) A particular strain of Neuropora crassa required citrulline in the medium while the wild type did not.How do you refer to the former?Why is it so called?

516) Give the site and time of occurrence of transcription

517) how is the first ribonucleotide different from others in the RNA chain?

518) What changes happen during processing of RNA?

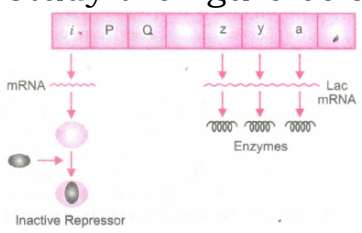
519) What is transcription unit?

520) What are auxotrophs?

521) What are two functions of DNA polymerase?

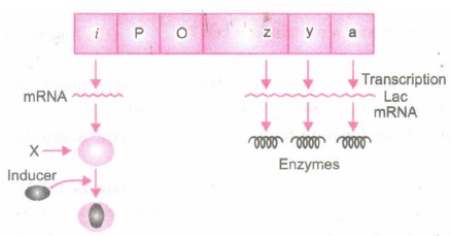
522) How can DNA segments, separated by gel electrophoresis, be visualised and located?

523) Study the figure below and answer the questions:



(a)What does the figure express?
(b)When does the transcription of lac mRNA stop?
(c)Name the enzyme transcribed by the gene 'Z'

524)



(a) Name the molecule 'X' synthesised by '*i*' gene.How does this molecule get inactivated?
(b)Which one of the structural genes code for β-galactosidase?
(c)When will the transcription of this gene stop?

525) (i) Accoring to Watson and Crick model,the DNA molecule consists of_____long,parellel strands.The two strands are_____around a common axis in a regular manner to form a____helix.
(ii)These strands are made of ___ units.Each such units consists of_____,_____and_____
(iii)In each chain,nitrogenous base molecules are joined to the sugar molecules by_____bonds and project into the space enclosed in the helix at about____to the long axis of the helix
(iv)The nitrogenous bare may be a 9-membered,double ringed____or a 6-membered single ringed___
(v)The double helix of DNA has a constant diameter of___and one complete spiral (turn) of the helix is ___long and has____base pairs.
(vi)The mode of DNA replication is
(vii)Enzyme___cannot initiate the synthesis of a new DNA strand,although it can catalyze the growth of a DNA chain.Therefore,a short chain of ___is formed on the DNA template at the 5' end.This is called___
(viii)During DNA replication,one new strand formed in continuous stretch in the 5'-3' direction.it is called____strand.Other strand is formed in small fragments called_____Which are later joined to form a continuous strand termed___strand

526) Write the functions of RNA polymerase-I and RNA-polymerase-III

527) Write the names of various nitrogenous based found in RNA

528) Explain the role of enzyme nucleases and ligases

529) What do you understand by genome.

530) Name the scientists who started the DNA finger printing technique in India.

531) (i) Name the scientist who suggested that the genetic code should be made of a combination of three nucleotides.
(ii) Explain the basis on which he arrived at this conclusion.

532) Unambiguous, universal and degenerate are some of the terms used for the genetic are some of the terms used for the genetic code.Explain the salient features of each of them.

533) There in only one possible sequence of amino acids when deduced from a given set of nucleotides.But multiple nucleotide sequences can be deduced from a single amino acid sequence .Explain this phenomenon.

534) A single base mutation in a gene may not 'always' result in loss or gain of function.Do you think the statement is correct?Define your answer.

535) Different between codons and anticodons.

536) Explain when is a genetic code said to be
(i) Degenerate (ii) Universal

537) Name a few enzymes involved in DNA replication other than DNA polymerase and ligase. Name the key function for each of them.

538) State the difference between the structural genes in a transcription unit of prokaryotes and eukaryotes.

539) Why hnRNA is required to undergo splicing?

540) Why is RNA more reactive in comparison to DNA?

541) Discuss the role the enzyme DNA ligase plays during DNA replication.

542) State the functions of Ribozyme and release factor in protein synthesis respectively

543) Protein synthesis machinery revolves around RNA but in the course of evolution it was replaced by DNA. Justify

544) A template strand is given below. Write down the corresponding coding strand and the mRNA strand that can be formed along with their polarity.
3' ATGCATGCATGCATGCATGCATGC 5'

545) Draw a neat labelled sketch of a replicating fork of DNA.

546) Differentiate between a cistron and an exon.

547) Following are the features of genetic codes.What does each one indicate ? Stop codon, Unambiguous codon, Degenerate codon, Universal codon.

548) Name the cells HIV (Human Immunodeficiency Virus) gains entry into after infecting the human body. Explain the events that occur in these cells

549) What is aminoacylation ? State its significance

550) One of the salient features of the genetic code is that it is nearly universal from bacteria to humans. Mention two exceptions to this rule. Why are some codes said to be degenerate?

551) Where does peptide bond formation occur in a bacterial ribosome and how?

552) Draw a labelled diagram of a nucleosome. Where is it found in a cell?

553) Describe the structure of a nucleosome.

554) Show DNA replication with the help of a diagram only.

555) Briefly describe transcription.

556) Differentiate between the genetic codes given below
(i) Unambiguous and universal
(ii) Degenerate and initiator

557) A genetic code is specific and nearly universal. Justify.

558) What is amino acylation? State its Significance.

559) Explain arninoacylation of tRNA.

560) DNA is unzipped twice in a cell. Mention the two events and the enzymes responsible for it.

561) Can you find out why the distance between two polynucleotide chains in DNA remains almost constant?

562) In some viruses, the flow of information is in reverse direction, that is, from RNA to DNA. Can you suggest a simple name to the process?

563) If the length of E.coli DNA is 1.36 mm, then can you calculate the number of base pairs in E.coli?

564) Theoretically, how many such beads (nucleosomes): do you imagine, are present in a mammalian cell?

565) Can you think of any difference between DNAs and DNase?

566) Can you recall the two chemical differences between DNA and RNA?

567) If E.coli was, allowed to grow for 80 minutes (in Meselson and Stahl) experiments, what would be the proportions of light and hybrid-density DNA molecules?

568) A hypothetical sequence from a transcription unit is represented below:
3'-ATGCATGCATGCATGCATGCATGC-5' - Template Strand
5'-TACGTACGTACGTACGTACGTACG-3' - Coding Strand
Can you now write the sequence ofRNA transcribed from the above DNA?

569) If following is the sequence ofnucleotides in mRNA, predict the sequence of amino acids coded by it (take help of the checkerboard).
AUGUUUUUCUUCUUUUUUUUC
Now try the opposite. Following is the sequence of amino acids coded by the mRNA. Predict the sequence of nucleotides in the RNA.
Met-Phe-Phe-Phe-Phe-Phe-Phe.
Do you face any difficulty in predicting the opposite?
Can you now correlate which two properties of genetic code you have learnt?

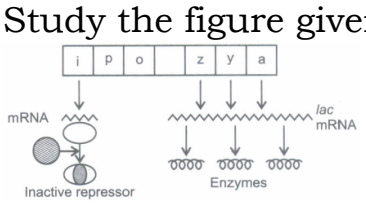
570) Remember, glucose or galactose cannot act as inducers for lac operon. Can you think for how long the lac operon would be expressed?

571) 99.9 per cent of base sequence among humans is the same. Assuming human genome as 3×10^9 bp, in how many base sequences, would there be differences?

572) How is the process of mRNA synthesis different from that in prokaryotes?

573) How are translational region and untranslational regions in mRNA different from each other?

574) Study the figure given below and answer the questions:



(a) How does the repressor molecule get inactivated?
(b) When does the transcription of lac mRNA stop?
(c) Name the enzyme transcribed by the gene 'z'.

575) Name the enzyme and state its property that is responsible for continuous and discontinuous replication of the two strands of a DNA molecule.

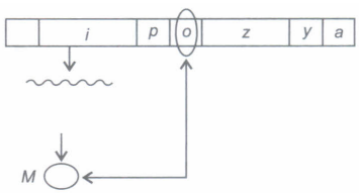
576) DNA is the genetic material in most ofthe organisms, while RNA is the genetic material in a few viruses. What are the four general/common functions performed by RNA in other organisms?

577) Although a prokaryotic cell has no defined nucleus, yet DNA is not scattered throughout the cell. Explain.

578) List any four properties of a molecule to be able to act as a genetic material.

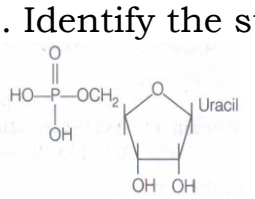
579) Mention the differences between D A replication and transcription.

580) State the role of AUG codon at the 5' end and UAG at 3' end of a certain mRNA during translation.

581) 

(a) Name the molecule 'M' that binds with the operator.
(b) Mention the consequences of such binding.
(c) What will prevent the binding of the molecule 'M' with the operator gene? Mention the event that follows.

582) . Identify the structure given below



583) If a double-stranded DNA has 20% of cytosine, calculate the percentage of adenine in the DNA.

584) Which property of DNA double helix led Watson and Crick to hypothesise semiconservative mode of DNA replication? Explain.

585) If the base adenine constitutes 31% of an isolated DNA fragment, then write what will be the expected percentage of the base cytosine in it. Explain how did you arrive at the answer given.

586) Explain aminoacylation of tRNA.

587) Name the antibiotic that inhibits binding of amino acyl tRNA to ribosomes.

588) What are the assumptions that led to the human genome project?

589) When did rice genome project was started?

590) Name the last human chromosome to be completely sequenced?

3 Marks 250 x 3 = 750

591) Depending upon the chemical nature of template (DNA or RNA) and the nature of nucleic acids synthesised from it ?(DNA or RNA) list the types of nucleic acid polymerases.

592) Group the following as nitrogenous bases and nucleosides: Adenine, Cytidine, Thymine, Guanosine, Uracil and cytosine.

593) Explain (in one or two lines) the function of the followings:
(a) Promoter
(b) tRNA
(c) Exons

594) Why is the Human Genome Project called a mega project?

595) What is DNA fingerprinting? Mention its application.

596) Which property of DNA double helix led Watson and Crick to hypothesise semi-conservative mode of DNA replication? Explain.

597) Describe the structure of an RNA polynucleotide chain having four different types of nucleotides.

598) Explain the role of RNA polymerase in transcription in bacteria

599) Explain the role DNA-dependent RNA-polymerase in transcription

600) Given below are the sequences of nucleoides in a particular mRNA and amino acids coded by it
UUU AUG UUC GAC UUA GUG UAA
Phe - Met - Phe - Glu - Leu - Val
Write the properties of genetic code that can be and cannot be correlated from the above given data.

601) It is established that RNA is the first genetic material.Explain giving three reasons.

602) Why is RNA regarded as the first genetic material? Explain

603) (a)Name the enzyme responsible for the transcription of tRNA and the amino acid the initiator tRNA gets linked with
(b)Explain the role of initiator tRNA in initiation of protein synthesis.

604) How are the structural genes activated in the lac operon in E.coli?

605) What is hnRNA?Explain the changes hnRNA undergoes during the processing to from mRNA

606) State the conditions when 'genetic code' is said to be
(i)degenerate
(ii)unambiguous and specific
(iii)universal

607) Unambiguous universal and degenerate and some of the terms used for the genetic code.Explain the salient features of each one of them.

608) Explain the process of transcription in a bacterium

609) The base sequence in one of the strands of DNA is TAGCATGAT
(i)Give the base sequence of its complementry strand.
(ii)How are these base pairs held together in a DNA molecule?
(iii)Explain the base complementarity rule.Name the scientist who framed this rule.

610) Answer the following questions based on Meselson and Stahl's experiment
(a) Write the name of the chemical substance used as a source of nitrogen inthe experiment by them.
(b) Why did the scientist synthesise light and the heavy DNA molecules in the organism in the experiment?
(c) How did the scientists make it possible to distinguish the heavy DNA molecule from the light DNA molecule?Explain
(d) Write the conclusion the scientists arrived at after completing the experiment.

611) (a)Name the scientist who called tRNA an adptor molecule.
(b)Draw a clover leaf structure of tRNA showing the following:
(i)tyrosine attached to its amino acid site
(ii)anticodon for this amino acid in its correct site.
(c)What does the actual structure of tRNA look like?

612) Differentiate between the following
(i)Promoter and Terminator in a transcription unit.
(ii)Exon and intron in an unprocessed eukaryotic mRNA.
(ii)Inducer and Repressor in operons.

613) Monocistronic structural genes in eukaryotes have interrupted coding sequences. Explain. How are they different in prokaryotypes.

614) Expand 'BAC' and 'YAC'.Explain how they were used in sequencing o human genome.ss

615) Describe the elongation process of transcription in bacteria.

616) Draw a schematic representation of a dinucleotide.Lable the following
(i)The components of a nucleotide
(ii)5' end
(iii)N-glycosidic linkge.
(iv)Phosphodiester linkage

617) Explain the role of regulatory gene in lac operon.Why is the regulation of the operon called negative regulation?

618) (a)List the structural genes involved in the digestion o lactose in E.Coli. Highlight the function of any one
(b)What triggers the transcription of these genes?

619) (a)Why is tRNA called an 'adopter'?
(b)Draw and label a secondary strucuture of tRNA.How does the actual structure of tRNA look like?

620) How do initiation and termination of translation process occur in bacteria? Where are untranslated regions located in mRNA? Mention their role.

621) What are satellite DNA in a genome?
Explain their role in DNA fingerprinting.

622) (a)In a human genome,Which one of the chromosomes has the most genes and which one has the fewest?
(b)Scientists have identified about 1.4 million single nucleotide polymorphs in human genome. How is the information of their existence going to help the scientists?

623) A typical mammalian cell has 2.2m long DNA molecule,Whereas the nucleus in which it is packed measures about 10^{-6}m.Explain how such a long DNA molecule is packed within a tiny nucleous in the cell.

624) The length of a DNA molecule in a typical mammalian cell is calculated to be approximately 2.2m. How is the packing of this molecule done to accommodate it within the nucleus of the cell?

625) Explain the role of ^{35}S and ^{32}P in the experiments conducted by Hershey and Chase.

626) (i)Why does DNA replication occur in small replication forks and not in its entire length?
(ii)Why is DNA replication countinuous and discountinuous in a replication fork?
(iii)Explain the importance of 'origin of replication' in a replication fork.

627) Explain the process of charging of tRNA. Why is it essential in translation?

628) (a)One of the codons of mRNA in AUG.Draw the structure of tRNA adapter molecule for this codon.
(b)Name the RNA polymerase that transcribes tRNA in eukaryotes.
(c)What is unique about the amino acid this tRNA binds with.

629) What is meant by R-cells and S-cells with which Fredrick Griffith carried out his experiments on Diplococus pneumoniae? What did he prove from these experiments?

630) (a)Differentiate between euchromatin and heterochromatin.
(b)What is the function of non-histone chromosomal proteins?

631) There are certain complexities in eukaryotic transcription.Bring out the significance of such complexities.

632) There are 64 codons in the genetic code dictionary.
(a) How many of them code for amino acids?
(b) How many amino acid are coded?
(c) What term do you give to those codons,Which do not code for amino acids.

633) Explain the idea expressed in the following representation:
$DNA \rightleftharpoons RNA \longrightarrow Protein$

634) Write short notes on RNA polymerases of eukaryotic cells.

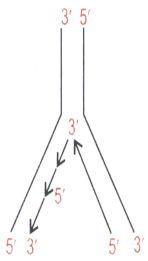
635) An mRNA strand has a series of codons out of which three are given below:
(i) AUG
(ii) UUU
(iii) UAG
(a) What will these RNA codons be translated into?
(b) What are the DNA codons that would have transcribed these RNA codons?

636) A tRNA is charged with the amino acid phenylalanine.
(i)At what end of the tRNA is the amino acis attached?
(ii)What is the mRNA codon that codes for phenylalanine?
(iii)Name the enzyme responsible for this attachment.

637) (a)A tRNA is charged with the amino acid methionine.
(i)Name the process involved in the attachment
(ii)Point out the mRNA codon and anticodon on tRNA for this amino acid.
(b)What is heterochromatin?

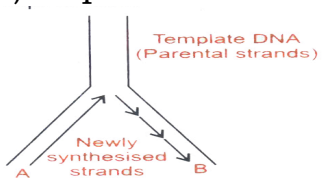
638) What is an operon? Name any four operons in E.coli.

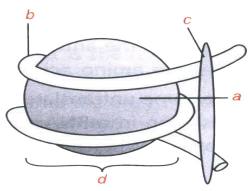
639) Enumerate the goals of HGP.

640) 

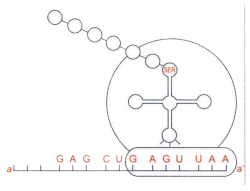
Why do you see two different types of replicating strands in the given DNA replication fork? Name these strands.

641) Write down the possible levels of regulation of gene expression in eukaryotes.

642) (a) Identify the polarity at A and B respectively in the figure given below:
(b) Explain the mechanism the figure represents


643) 

(a) What is this diagram representing?
(b) Name the parts a,b and c.
(c) In eukaryotes, the DNA molecules are organised within the nucleus. How is the DNA molecule organised in a bacterial cell in absence of a nucleus?

644) 

(a) Identify the polarity from a to a', in the above diagram and mention how many more amino acids are expected to be added to this polypeptide chain.
(b) Mention the DNA sequence coding for serine and the anticodon of tRNA for the same amino acid.
(c) Why are some untranslated sequence of bases seen in mRNA coding for a polypeptide? Where exactly are they present on mRNA?

645) 

Study the mRNA segment given above which is complete to be translated into a polypeptide chain.
(i) Write the codons 'a' and 'b'.
(ii) What do they code for?
(iii) How is peptide bond formed between two amino acids in the ribosome?

646) Define transformation in Griffith's experiment. Discuss how it helps in the identification of DNA as the genetic material.

647) Who revealed biochemical nature of transforming principle? How was it done?

648) Discuss the significance of heavy isotope of nitrogen.in Melson and Stahl's experiment.

649) Differences between polycistronic mRNA and monocistronic mRNA.

650) During DNA replication, why is it that the entire molecule does not open in one go? Explain replication fork. what is the two function that the monomers (dNTPs) play?

651) Retroviruses do no follow central dogma comment

652) Recall the experiment done by frederick Griffith, Avery, MacLeod and McCarty, where DNA was speculated to be the genatic material. If RNA, Instead of DNA was the genetic material, would the heat killed strain of Pneumococcus have tranformed the R-strain into virulent strain? Explain

653) You are repeating the hershey-chase experiment and are provided with two isotope 32_P and 15_N (in place of 35_S in the original experiment). How does yoou expect your results to be different

654) How has the sequencing of human genome opened new windows for the treatment of various genetic disorders? Discuss amongst your classmates.

655) The total number of genes in humans is far less (< 25000) than the previous estimate (up to 140000 genes).Comment

656) Now, Sequencing of total genome is getting less expensive day by day. soon it may be affordable for a common man to get his genome sequenced. what is your opinion could be advantage and disadvantage of this development

657) During the Vitro synthesis of DNA. a researcher used 2', 3' -di-deoxycytidine. triphosphate as a raw material in place of 2' -deoxycytidine triphosphate. what would be the consequence

658) What did background information Watson and crick had with them for developing a model of DNA? What was their own contribute

659) Comments on the utility of variability in a number of tendons repeat during DNA fingerprinting.

660) Compare the primary structure of nucleic acid and protein

661) Why was it believed earlier that proteins could be genetic material?

662) (a) What is the contribution of Avery, MacCleod and McCarty?
(b) How did the transformation experiments of Griffith differ from those of Avery and MacCleod?
(c) What was the significance of each?

663) What chemical properties do DNA and protein possess that allow researchers to specifically label one or the other of these macromolecules with a radioactive isotope?

664) Describe transformation.

665) What was the rationale of using and,32_P 35_S by Hershey and chase? Instead, if we use radiolabelled C and N, will the results be any different?

666) Make a table showing genetic material of different organisms

667) What are nucleic acids?

668) How is the length of DNA defined? Illustrate with example

669) Which three components make up the nucleotides?

670) Why is the DNA molecule compared to a spiralling staircase?

671) Give in brief characteristics of DNA molecule.

672) Write difference between prokaryotic DNA and eukaryotic DNA

673) (A) Why is RNA considered as first genetic material

674) Write a note on semiconservative mode of DNA replication

675) Differentiate between DNA polymerase and RNA polymerase

676) DNA polymerase I of E.coli is a single polypeptide of molecular weight 109,000. (a)What enzymatic activity other than polymerase activity does this polypeptide possess? (b) What are the in vivo function of these activities?

677) Differentiate between leading strand and lagging strand

678) Write a note on DNA synthesis in vitro

679) Write a note on repair replication

680) Briefly, discuss the enzymes and steps involved in repair replication

681) What is the role of m-RNA, t-RNA and r-RNA in protein synthesis?

682) RNA was first genetic material, DNA evolved later on. Explain

683) List three main differences between DNA and RNA

684) What are the three types of RNA molecule? How is each related to the concept of information flow?

685) List the requirements for transcription

686) Explain briefly transcription

687) Describe the initial process of transcription in bacteria.

688) Write difference between replication and transcription

689) Write briefly on each the following:
(i) oncogenes
(ii) reverse transcription

690) Define cistron, codon, anticodon, start signal and stop signal.

691) Explain briefly the genetic code

692) Briefly, explain wobble hypothesis

693) Explain initiation of polypeptide chain

694) What is the role of the ribosome during translation?

695) Briefly, describe termination of a polypeptide chain.

696) Differentiate
(i) Translation and Translocation
(ii) Transformation and Transduction

697) How do mutations affect proteins structure and functions?

698) DNA segment GAA, CAG, GCC, AGG, CTC was translated into polypeptide: Leucine, Valine, Arginine, Serine, Glutamine.
(i) What was the codon of the five amino acids?
(ii) What was the mRNA transcribed?
(iii) What would be the sequence of amino acids in the new polypeptide if in the first triplet adenine gets substituted by Guanine?

699) How is the wrong base removed before proceeding to add new bases in 5'- > 3' direction during replication of DNA

700) What were constitutive and non-constitutive genes?

701) "The genes and the polypeptide it codes for are said to be collinear"? Explain

702) What is the inducer in the lac operon? How does it ensure the "switching on" or of genes?
(a) Draw a schematic representation of lac operon.
(b) Explain how does this operon get switched 'on' or 'off'

703) Give the chief characteristic of a eukaryotic operon.

704) Differentiate between introns and exons

705) Differentiate aporepressor and corepressor

706) Differentiate induction and repressor

707) What is satellite DNA? Name their two types, mention the basis for their classification

708) What are the aims of bioinformatics?

709) What is rice genome sequencing?

710) Make a list of tool and services used in rice genome sequencing

711) Briefly, discuss the new finding of rice genome sequencing.

712) Name the enzyme and state its property that is responsible for continuous and discontinuous replication of the two strands of a DNA molecule

713) (a) Name the type of synthesis
(b) Occurrence in the types of synthesis and as shown below:

714) What is DNA polymerisation? Why is it important to study it

715) Make a simple sketch to show polynucleotide chain

716) Sketch a double helix of DNA

717) Sketch and explain clover leaf model of tRNA

718) One of the codon on mRNA is AUG. Draw the structure of tRNA adapter molecule for this codon. explain the uniqueness of this tRNA?

719) Write a note on messenger RNA

720) Explain central dogma of flow of information

721) Give a schematic structure of transcription unit. explain each component.
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722) Show the transcription in eukaryotes with the help of sketches only

723) What are the kinds of base pairing substitutions?

724) How does an excess of tryptophan cause a "switching off" of the tryptophan operon?

725) Explain repressible system of gene regulation.

726) Describe Griffith's experiment to demonstrate that DNA is the basic genetic material. What was an explanation for Griffith's observation given by Avery, McCarty and MacCleod?

727) What is the chemical that brings about transformation?

728) Provide experimental evidence for semi-conservative mode of replication of DNA

729) Make a table showing genetic codes and the corresponding amino acids coded by the genetic codes.

730) What are the two main events of protein synthesis? Describe transcription

731) Explain translation in detail

732) Explain the process of charging of tRNA

733) Show the components of Lac operon

734) What is principle of DNA fingerprinting

735) Discuss the sequencing of rice genome

736) Name the parts 'A' and 'B' of the transcription unit given below

737) (a) What is this diagram representing?
(b) Name the parts A, B and c.
(c) In the eukaryotes, the DNA molecule is organised within the nucleus. How is the DNA molecule organised in a bacterial cell in absence of a nucleus?

738) Why is genetic code a triplet one?

739) What are the following of mRNA and tRNA ?What anticodons will be required to recognize the following codons?
(i)AAU
(ii)CGA
(iii)UAC
(iv)GCA

740) Which molecule bears codons and which molecule bear anticodons?

741) Given below is a part of the template strand of a structural gene
$\overline{TAC \quad CAT \quad TAG \quad GAT}$
(a)Write its transcribed mRNA strand with its polarity
(b)Explain the mechanism involved in initiation of the transcription of this strand.

742) Draw a labelled schematic sketch of replication fork of DNA.Explain the role of the enzyme involved in DNA replication.

743) Match the items given in column I and with appropriate items(one or more) of column II:

Column I	**Column II**
(i)m-Rna	(a)UAA
(ii)Initiation codon	(b)Beadle and Tatum
(iii)Termination codon	(c)AUG
(iv)Anticodon	(d)Hetrogenoous nuclear RNA(hn RNA)
(v)One gene one enzyme hypothesis	(e)GUG
(vi)Semiconservative mode of DNA replication	(f)UAG
	(g)t-RNA
	(h)Meselson and Stahl

744) A primer comprising of 5 bases is required to allow copying of the following single standard DNA sequence 5'-ATGCCTAGGTC
Name the appropriate primer that should start DNA replication

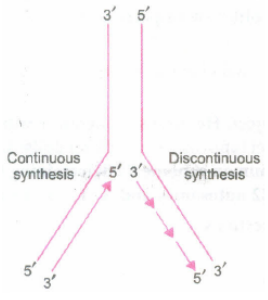
745) Calculate the total number of thymine-based present in the double strand DNA if it transcribes a mRNA which reads as follows:
5'-AUGCAUGCAUGCAUGCAGG-3'

746) How many histones make the core part of a nucleosome.What is the basis of binding DNA molecule to the histones?

747) Write the principle involved in the separation of DNA fragments by gel electrophoresis

748) Here some correct and some wrong statements.Correct only those statements which are wrong:
(a) The genetic code is universal
(b)The genetic code is ambiguous
(c)The genetic code is regenerated.
(d)Transfer RNA(tRNA)carry amino acids to mRNA codons and used again and again in transcription.
(e)UAA, UAG and UGC are terminator codon
(f)Lac operon consists of regulatory genes, operator gene,structural and promoter gene

749) Correct the following figure of replication fork.



750) (a)Name a genetic RNA and a non-genetic RNA
(b)Differntiate between prokaryotic mRNA and eukaryotic mRNA on the basis of any one character.

751) What do you understand by 5'-end and 3'-end?

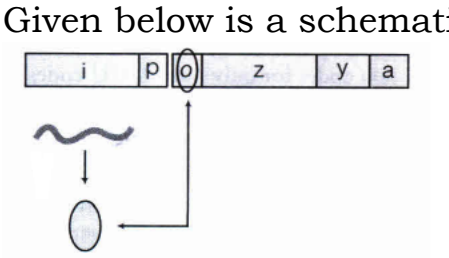
752) (i) Difference between unambiguous and degenerate codons.
(ii) Write two functions of the cotton AUG.

753) Identify by giving reasons, the salient features of genetic code by studying the following nucleotide sequence of mRNA strand and the polypeptide translated from it.
(AUG UUU UCU UUU UUU UCU UAG)
(Met - Phe - Ser-Phe - Phe - Ser)

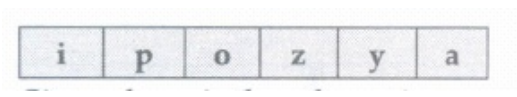
754) (i) Name the scientist who called tRNA an adapter molecule.
(ii) Draw a clover -leaf structure of tRNA showing the following:
(a) Tyrosine attached to its amino acid in its correct site(codon for tyr]osine is UCA).
(c) What does the actual structure of tRNA look like?

755) (i) A DNA segment has a total of 1000 nucleotides, out of which 240 of them are adenine containing nucleotides. How many pyrimidine bases this DNA segment possesses?
(ii) Draw a diagrammatic sketch of a portion of DNA segment to support your,answer.

756) Given below is a schematic representation of a lac operon.



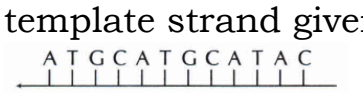
(i) Identify i and p.
(ii) Name the inducer for this operon and explain its function.

757) 

Given above is the schematic representation of lac operon of E. coli. Explain the functioning of this operon when lactose is provided in the growth medium of the bacteria.
(OR)
A considerable amount of lactose is added to the growth medium of E.coil.How is the lac operon switched on in the bacteria?Mention the state operon when lactose is digested.

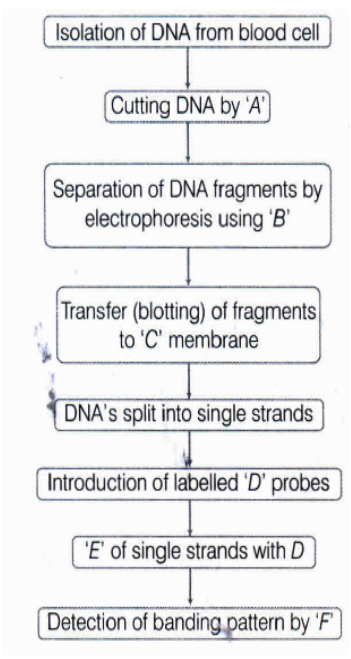
758) Explain the significance of satellite DNA in DNA fingerprinting technique.

759) (i) Construct a complete transcription unit with promoter and terminator on the basis of hypothetical template strand given below.



(ii) Write the RNA strand transcribed from the above transcription unit along with its polarity.

760) The following is the flowchart highlights the steps in DNA fingerprints technique.Identify A,B,C,D,E and F.

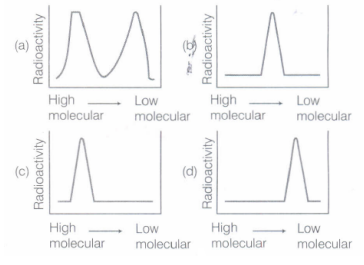


761) (i) Explain DNA polymorphism as the basis of genetic mapping of human genome.
(ii) State the role of VNTR in DNA fingerprinting.

762) 'A very small sample of tissue or even a drop of blood can help determine paternity.'Provide a scientific explanation to substantiate the statement.

763) There is a paternity dispute for a child.Which technique can solve the problem?Discuss the principal involved.

764) Replication was allowed to take place in the presence of radioactive deoxynucleotide precursors in E.coli that was mutant for DNA ligase.
Newly synthesised radioactive DNA was purified and strands were separated by denaturation.
These were centrifuged using density gradient centrifugation.Which of the following would be a correct result?



765) Do you think that the alternate splicing of exons may enable a structural gene to code for several isoproteins from one and the same gene ?If yes.how?If not, why so?

766) The generic code is, for the most part, universal, with few exceptions.Explain it by giving the example of mitochondria, the power house of cell.

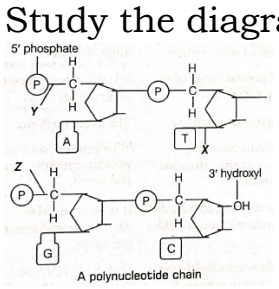
767) Cattle or even human beings, sometimes give to their young ones having extremely different sets of organs like limbs/position of eye(s) etc.Comment with respect of genetics involved in it.

768) Would it be appropriate to use DNA probes such as VNTR in DNA fingerprinting of a bacteriophage?

769) Describe the experiment that helped demonstrate the semi-conservative mode of DNA Replication.

770) (a) Why did Hershey and Chase use radioactive sulfur and radioactive phosphorus in their experiment?
(b) Write the conclusion they arrived at and how.

771) Study the diagram given below:



Name the linkages X, Y, Z, and the respective molecules formed by them.

772) Describe a palindrome with the help of an example

773) (a) A DNA segment has a total of 2,000 nucleotides, out of which 520 are adenine containing nucleotides. How many purine bases this DNA segment possesses?
(b) Draw a diagrammatic sketch of a portion of DNA segment to support your answer.

774) Why is DNA a better genetic material when compared to RNA?

775) Differentiate between a template strand and a coding strand of DNA

776) (a) Write what DNA replication.
(b) State the properties of DNA replication model.
(c) List any three enzymes involved in the process alongwith their functions

777) (a) Given below is a single stranded DNA molecule. Frame and label its sense and antisense RNA molecule.
5' ATGGGGCTC3' sense
(b) How the RNA molecules made from above DNA strand help in silencing of the specific RNA molecules?

778) (a) Why did Meselson and Stahl use ^{14}N and ^{15}N isotopes in the sources of nitrogen present in the culture medium in their experiment? Explain.
(b) Write the conclusion drawn by them from the experiment.

779) (i) Name tbe enzyme that catalyses the transcription of hnRNA
(ii) Why does the hnRNA need to undergo changes? List the changes hnRNA undergoes and where in the cell such changes take place.

780) Mention what enables his tones to acquire a positive charge.

781) (a) Explain with the help of Griffith's experiment how the search for genetic material was conducted and what was the conclusion drawn?
(b) How did Macleod, Mc Carty and Avery establish the Bio-Chemical nature of the so called "genetic material" identified by Griffith in his experiment.

782) Name negatively charged and positively charged components of nucleosomes

783) A DNA segment has a total of 1500 nucleotides out of which 410 are guanine containing nucleotides. How many Pyrimidine bases this DNA segment possesses.

784) How does the flow of information in HIV deviate from the Central Dogma proposed by Francis Crick

785) Name the type of linkage between
(i) Nitrogen base and pentose sugar
(ii) Pentose sugar and phosphate
(iii) Twoadjacent nucleotides
(iv) N-bases of both the strands of DNA

786) Calculate the length of DNA of bacteriophase lambda that has 48502 base pairs.

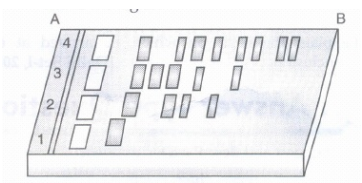
787) Suggest and describe a technique to obtain multiple copies of a gene of interest in vitro

788) Whereisan 'operator' locatedinaprokaryote DNA? How does an operator regulate gene expression at transcriptional level in a prokaryote? Explain.

789) (a) How many codons code for amino acids and how many are unable to do so ?
(b) Why are codes said to be
(i) degenerate and
(ii) unambiguous?

790) Write any three goals of Human Genome Project.

791) Given below is the diagram of agarose gel kept under UV light



(a) Mark the positive and negative terminals.
(b) What is the charge carried by DNA molecule and how does it help in its separation?
(c) How are the separated DNA fragments finally isolated?

792) (a) What do 'Y' and 'B' stand for in 'YAC' and 'BAC"used in Human Genome Project (HGP). Mention their role in the project.
(b) Write the percentage of the total human genome that codes for proteins and the percentage of discovered genes whose functions are known as observed during HGP.
(c) Expand 'SNPs' identified by scientists in HGP..

793) Following the collision of two trains a large number of passenger are killed. A majority of them are beyond recognition. Authorities want to hand over the dead to their relatives. Name a modern scientific method and write the procedure that would help in the identification of kinship.

794) Describe the termination process of transcription in bacterium.

795) Do both the strands of DNA have the same biological information? Explain

796) Give one similarity and one difference between RNA polymerase and DNA polymerase.

797) Name the phenotypic/genotypic disorder of following genotype
(i) Hb^A/Hb^A
(ii) Hb^A/Hb^S
(iii) Hb^S/Hb^S
(iv) X^hX
(v) X^hY

798) Point out the place where amino acid chain will separate from the given mRNA 5' ACG,GCA, UCG,GGA,UUU, UAG,UAC 3'

799) Why is the strand of DNA with 3'-5' polarity transcribed and not the other strand with 5'-- > 3' polarity?

800) In a typical nucleus, some regions of chromatin are stained light and others dark. Explain why is it so and what is its significance.

801) With the help of a schematic diagram, explain the location and role of the following in a transcription unit. Promoter, structural gene, terminator.

802) (i) How many codons code for amino acids and how many do not?
(ii) Explain the following giving one example of each.
(a) Unambiguous and specific codon
(b) Degeneration codon
(c) Universal codon
(d) Initiator codon

803) What is mutation? Explain with the help of an example how does a point mutation affect the genetic code. Name another type of mutation.

804) (i) List the two methodologies which were involved in human genome project. Mention how they were used?
(ii) Expand 'YAC'and mention what was it used for?

805) A number of passengers were severely burnt beyond recognition during a train accident. Name and describe a modern technique that can help hand over the dead to their relatives.

806) State the contribution of
(i) Nirenberg and Metthaei
(ii) HG Khurana, in the field of genetic code.

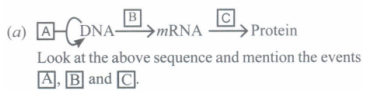
807) According to the human genome project, almost 99.9% nucleotide bases are exactly the same in all people. Reading this, Samya was confused about why people are discriminated on various issues if all of them are so similar. She asked about it to her biology teacher who explained that it is due to human thinking and behaviour that this difference has risen.
(i) Do you think the discrimination of people on the basis of colour, creed, caste, religion is correct? Give biologically sound reasons in support of your answer.
(ii) What percentage of the human genome codes for proteins?
(iii) Which chromosome has most genes on it?
(iv) When was HGP started? What is its aim?

808) With the help of a diagram explain the structure of DNA.

809) Write the sequence of steps involved in the sequencing of genome of an organism.

810) Mention three applications and future challenges of human genome project.

811) There is only one possible sequence of amino acids when deduced from a given sequence of nucleotides. But multiple nucleotide-sequences can be deduced from a single sequence of amino acids. Explain with reason.

812) 

Look at the above sequence and mention the events A, B and C.
(b) What does central dogma state in molecular biology? How does it differ in some viruses?

813) Identify A, B, C, D, E and F in the table given below:

S.No.	Component-I	Component-II	Chemical linkage bonding the two components	Product
(i)	A	B	C	Nucleoside
(ii)	Nucleoside	D	E	Nucleoside
(iii)	Nucleoside	Nucleoside	F	Dinucleotide

814) Explain the following salient features of a DNA molecule:
(a) Complimentarity of base pairs of its two chains.
(b) Antiparallel polarity of the two chains

815) Why is a DNA molecule considered as a better hereditary material than RNA molecule?

816) Why isDNA considered a better hereditary material than RNA ?

817) How was a heavy isotope of nitrogen used to provide experimental evidence to semiconservative mode of DNA replication?

818) Name the specific enzyme responsible for nucleotide polymerisation in DNA replication. Write two characteristic features of this enzyme. Name the region on E.coli DNA, where this enzyme can initiate replication.

819) Describe the initiation process of transcription in bacteria.

820) (a) What are the transcriptional products of RNA polymerase III?
(b) Differentiate between 'Capping' and 'Tailing'.
(c) Expand hnRNA

821) Explain the post-transcriptional modifications, the hnRNA undergoes in eukaryotic cells.

822) Name the three RNA polymerases found in eukaryotic cells and mention their functions.

823) The foUowing is the flow chart highlighting the steps in DNA fingerprinting technique. Identify a, b, c, d, e and f.
Isolation of DNA from blood cells
↓
Cutting of DNA by 'a'
↓
Separation of DNA fragments
by electrophoresis using 'b'
↓
Transfer (blotting) of fragments to 'c' gel
↓
DNA splits into single strands
↓
Introduction of labelled 'd' probes
↓
'e' of single-strands with 'd'
↓
Detection of banding pattern by 'f '

824) (a) Expand VNTR and describe its role in DNA fingerprinting.
(b) List any two applications of DNA fingerprinting techniques.

825) A criminal blew himself up in a local market, when the was chased by the cops. His face was beyond recognition. Suggest and describe a modern technique that can help establish his identity.

826) During a fire in an auditorium, a large number of assembled guests got burnt beyond recognition. Suggest and describe a modern technique that can help hand over the dead to their relatives.

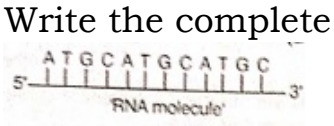
827) In a maternity clinic, for some reasons, the authorities are not able to hand over the two new-borns to their respective parents. Name and describe the technique that you would suggest to sort out the matter

828) A burglar in a huff forget to wipe off his blood stains from the place of crime, where he was involved in a theft and fight. Name the technique which can help in identifying the burglar from the blood stains. Describe the technique.

829) Forensic department was given three blood samples. Write the steps of the procedure carried out to get the DNA fingerprinting done for the above samples.

830) Explain the mechanism of DNA replication with the help of a replication fork. What role does the enzyme DNA-ligase play in a replication fork?

831) Construct and label a transcription unit from which the RNA segment given below has been transcribed. Write the complete name of the enzyme that transcribed this RNA.



832) Why both the strands of DNA are not copied during transcription? Explain.

833) (a) Name and write two characteristics of the type of DNA that forms the basis of DNA fingerprinting technique.
(b) Mention any two applications of this technique.

834) Predict the effect, if the codon UAU coding for an amino acid at the 25th position of a polypeptide of 50 amino acids is mutated to UAA.

835) ldentify the untranslated regions for the following mRNA and mention their location.
5' - ACGUCAUGGCGUUUUAGGAGGAA -3'

836) List the name of the countries whose scientists and administratorsattended rice genome meeting in South Carolina.

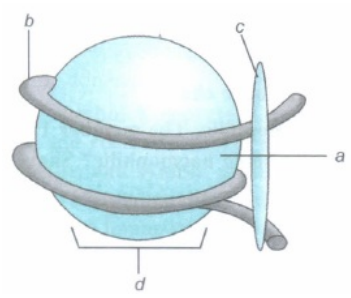
837) (a) Why does DNA replication occur within a replication fork and not in its entire length simultaneously?
(b) "DNA replication is continuous and discontinuous on the two strands within the e replication fork". Explain with the help of a schematic representation.

838) Explain the discovery made by Hershey and Chase using radioactive sulphur and phosphorus in their experiment.

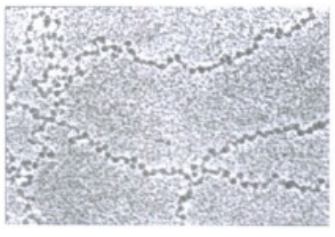
839) Why is it essential to have an RNA primer when DNA is getting replicated?

840) Human Genome Project (HGP) was a mega project launched in the year 1990 with some Important goals
(i) Enlist any four prime goals of HGP
(ii) Name any one common non-human animal model organism which has also been sequenced thereafter.

Case Study Questions 35 x 4 = 140

841) 

The diagram of a nucleosome is shown above.
(i) Identify the parts labeUed a, b, c and d in it.
(ii) Name the positively-charged and negatively charged components in it.

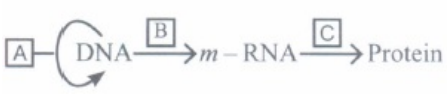
842) 

Given above is the electron micrograph (EM) picture of 'beads-on-string'.

a) What do the 'beads' represent?

(b) What do they constitute in a eukaryotic nucleus? When does its maximum condensation occur in a ceU?

(c) What is the function of non-histone chromosomal proteins in the nucleus?

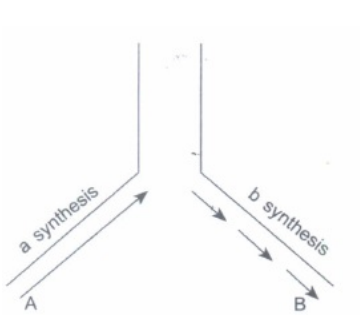
843) 

The Central dogma of molecular biology is shown above.

(a) Who proposed this?

(b) Identify the processes A, Band C in the above representation.

(c) Why is it not applicable to certain viruses?

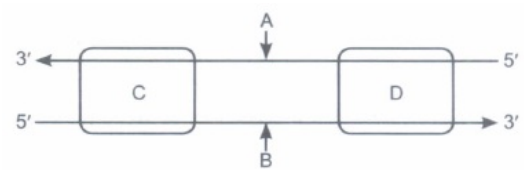
844) 

A DNA replication fork is shown above. Answer the following questions based on that.

(i) Why does DNA replication occur in such small forks?

(ii) What is a synthesis and b synthesis?

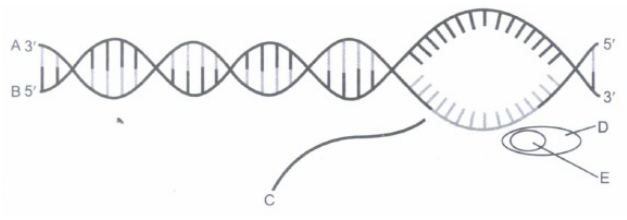
(iii) Mention the polarity at A and B.

845) 

A complete transcription unit is given above.

(a) Identify A, B, C and D in the figure.

(b) Name the enzyme that catalyses this process.

846) 

A particular stage in the transcription of a bacterium is given above. Answer the following questions:

(a) Name the stage in the process.

(b) Identify A, B, C, D and E in the diagram.

847) 

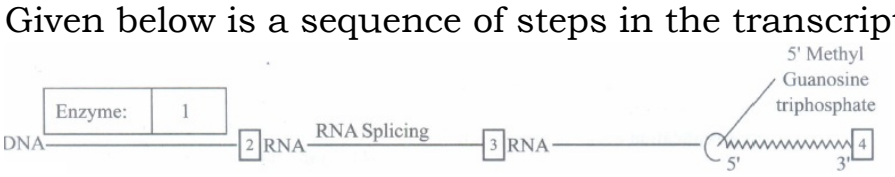
A stage in the process of transcription in a prokaryote is shown above.

(a) Name the stage in transcription.

(b) Identify A and B in the diagram.

(c) Can this process be coupled to translation ? Justify your answer.

848) Given below is a sequence of steps in the transcription in a eukaryotic cell.



(a) Fill in the blanks 1, 2, 3 and 4.

(b) Why is splicing necessary?

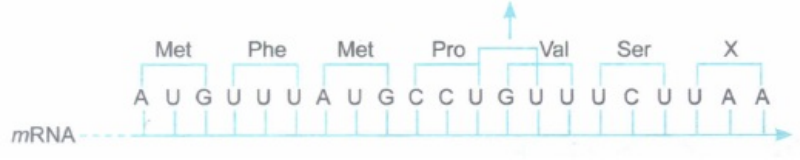
849)

A hypothetical mRNA with 12 codons is shown above.

(a) How many amino acids will be coded by this? Justify your answer.

(b) Mention the dual functions of the codon, AUG.

850) Read the sequence of nucleotides in the given segment of mRNA and the sequence of amino acids in the polypeptide translated by it.



Polypeptide: Met - Phe - Met - Pro - Val - Ser.

(a) Write the sequence of nucleotides in the template strand of DNA, along with its polarity, from which this mRNA has been transcribed.

(b) If the three bases (shown by the arrow) are deleted, what will be the amino acid sequence in the new polypeptide chain?

(c) What does the last codon (X) of this mRNA stand for?

851) A small stretch of DNA that codes for a polypeptide is given below:

3' ... CAT CAT AGA TGAAAC ... 5'

(a) Which type of mutation could have occurred in each type resulting in the following mistakes during replication of the above original sequence?

(*i*) 3' ... ...CAT CAT AGA TGA ATC... ... ... 5'

(*ii*) 3' ... ...CAT ATA GAT GAA AC... ... ... 5'

(b) How many amino acids will be translated in each of the above two cases?

852) Study the following carefully and explain why mutation (A) did not cause any sickle cell anaemia inspite of change in the molecular structure of the gene which codes for Haemoglobin, whereas a similar mutation (B) did.

(The question is based on properties of the genetic code. c = codon, a = amino acid, Hb = Haemoglobin).

Codons for Hb: C_1-C_2-C_3-C_4-C_5-GAA-GAA-C_8 .....

Amino acids in Hb: a_1-a_2-a_3-a_4-a_5-Glutamic acid-Glutamic acid-a_8 .....

(Normal Haemoglobin)

Mutation (A): C_1-C_2-C_3-C_4-C_5-GAG-GAA-C_8 .....

a_1-a_2-a_3-a_4-a_5-Glutamic acid-Glutamic acid-a_8 .....

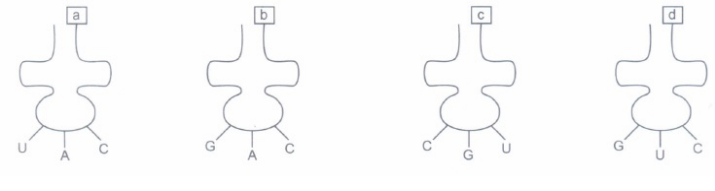
(Normal Haemoglobin)

Mutation (B): C_1-C_2-C_3-C_4-C_5-GUG-GAA-C_8 .....

a_1-a_2-a_3-a_4-a_5-Valine-Glutamic acid-a_8 .....

(Sickle cell Haemoglobin)

853)



Given above are four amino acyl-tRNAs with their anticodons.

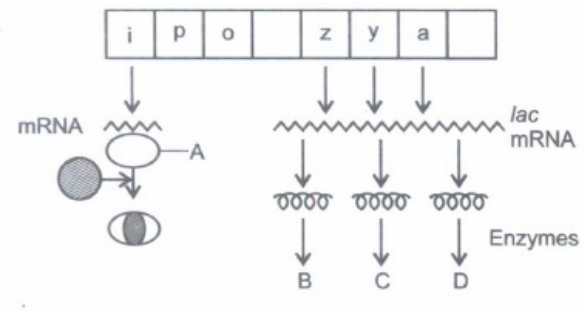
(a) Name the process by which the tRNA binds to the amino acid. Which end of the tRNA is the amino acid bound to?

(b) Find the sequence oftheir binding to the mRNA transcribed by a template strand of DNA having the base sequence as follows:

3' TAC CGT GAC GTC 5'.

(c) Write the sequence of bases on the mRNA transcribed.

854)



Lac operon in the 'switched on' position is shown above.

(a) Identify the molecule A and the enzymes B, C and D in the diagram.

(b) When will this operon get 'switched off'?

855) **Read the following and answer any four questions from (i) to (v) given below:**

Deoxyribonucleic acid (DNA) and ribonucleic acid (RNA) are the two types of nucleic acids found in the living systems. DNA acts as the genetic material in most of the organisms. Although RNA also acts as a genetic material in some organisms.

(i) In which of the following organisms, RNA acts as a genetic material?

(a) Escherichia coli **(b) Qβ Bacteriophage** **(c) Tobacco Mosaic viruses** **(d) Both (b) and (c)**

(ii) What is the reason for the additional stability of DNA in comparison to RNA?

(a) Presence of thymine **(b) Presence of uracil** **(c) Presence of OH group** **(d) Presence of deoxyribose sugar**

(iii) Which of the following criteria a molecule must fulfill to act as a genetic material?

(a) It should be able to generate its replica. **(b) It should be stable chemically and structurally**

(c) It should be able to express itself in the form of Mendelian character. **(d) All of these**

(iv) **Assertion:** RNA is liable and easily degradable.

Reason: The 2'-OH group present at every nucleotide in RNA is a reactive group.

(a) Both assertion and reason are true and reason is the correct explanation of assertion. **(b) Both assertion and reason are true but reas not the correct explanation of assertion.**

(c) Assertion is true but reason is false. **(d) Both assertion and reason are false.**

(v) Read the given statement and select the option that correctly fill in the blanks. Pyrimidines present in DNA are (i) and (ii) while pyrimidines present in RNA are (iii) and (iv) .

(a) (i)-Adenine, (iii)-Guanine, (iii)-Cytosine, (iv) Thymin **(b) (i)-Cytosine, (ii)- Thymine, (iii) -Cytosine, (iv)- Uracil**

(c) (i)-Cytosine, (ii) -Uracil, (iii) -Adenine, (iv)-Guanine **(d) (i) -Cytosine, (ii)- Uracil, (iii) -Cytosine, (iv)- Thymine.**

856) **Read the following and answer any four questions from (i) to (v) given below:**

In prokaryotes, DNA is circular and present in the cytoplasm but in eukaryotes, DNA is linear and mainly confined to the nucleus. DNA or deoxyribonucleic acid is a long polymer of nucleotides. In 1953, the first correct double helical structure of DNA was worked out by Watson and Crick. Based on the X-ray diffraction data produced by Maurice Wilkins and Rosalind Franklin. It is composed of three components, i.e., A phosphate group, a deoxyribose sugar and a nitrogenous base. Different forms of DNA are B-DNA, Z-DNA, A-DNA, C-DNA and D-DNA.

(i) Name the linkage present between the nitrogen base and pentose sugar in DNA.

(a) Phosphodiester bond **(b) Glycosidic bond** **(c) Hydrogen bond** **(d) None of these**

(ii) The double helix structure of DNA was proposed by

(a) James Watson and Francis Crick **(b) Earwin Chargaff** **(c) Federick Griffith** **(d) Hershey and Chase**

(iii) The double chain of B-DNA is coiled in a helical fashion. The spiral twisting of B-DNA duplex produces

(a) right and left part **(b) major and minor grooves** **(c) upper and lower sides** **(d) linear and circular part.**

(iv) **Assertion:** The two strands of DNA helix have uniform distance between them.
Reason: A large sized purine always paired opposite to a small sized pyrimidine.

(a) Both assertion and reason are true and reason is the correct explanation of assertion.
(b) Both assertion and reason are true but reason is not the correct explanation of assert
(c) Assertion is true but reason is false.
(d) Both assertion and reason are false.

(v) Which of the following describes the structure of B-DNA?

Polynucleotide chains	**Number of base pairs per complete turn of helix**
(a) Parallel	5
(b) Anti-parallel	10
(c) Parallel	15
(d) Anti-parallel	20

857) **Read the following and answer any four questions from (i) to (v) given below:**

DNA replication is a complex multistep process that requires enzymes, protein factors and metal ions. DNA replication in eukaryotes occurs in the nucleus during the S-phase of the cell cycle. It is semidiscontinuous in eukaryotes. In prokaryotes, replication takes place in the cytoplasm. DNA replication in bacteria occurs prior to fission. Nucleoid or viral chromosome is a single molecule of nucleic acid, it may be linear of circular. Nucleic acid in a virus is either DNA or RNA but never both.

(i) In viral DNA, how many origin of replication are present?

(a) Single **(b) Twice** **(c) Multiple** **(d) None**

(ii) Select the main enzyme involved in DNA replication.

(a) DNA ligase **(b) DNA dependent DNA polymerase** **(c) Topoisomerase** **(d) Helicase**

(iii) Read the given statement and select the option that correctly fill in the blanks. Enzyme (i)_ acts over the Ori site and unwinds the two strands of DNA by destroying (ii)_ bonds.

(a) (i)- Helicase, (ii) Glycosidic **(b) (i)- Helicase, (ii)- Hydrogen** **(c) (i)- Unwindase, (ii)- Phospho diester** **(d) (i)- Unwindase, (ii)- Glycosidic**

(iv) DNA strand, built up of Okazaki fragments is called

(a) lagging strand **(b) leading strand** **(c) complementary strand** **(d) parental strand.**

Select the incorrect statement, about DNA polymerase in eukaryotes.

(a) Polymerase α is required for initiation of replication.
(b) When the RNA primer gets removed the gap is filled by DNA polymerase β in eukaryotes.
(c) Polymerase ε helps in elongation of lagging strand.
(d) Polymerase δ is largest and main enzyme for DNA replication in eukaryotes.

858) **Read the following and answer any four questions from (i) to (v) given below:**

The process of copying genetic information from template strand of DNA into RNA is called transcription. It is mediated by RNA polymerase. Transcription takes place in the nucleus of eukaryotic cells. In transcription, only a segment of DNA and only one of the strands is copied into RNA.

(i) What are regions of transcription unit in a DNA molecule?

(a) Promoter **(b) Structural gene** **(c) Terminator** **(d) All of these**

(ii) Monocistronic structural genes are found in which organisms?

(a) Prokaryotes **(b) Bacteria** **(c) Viruses** **(d) Eukaryotes**

(iii) Which enzyme helps in tailing or polyadenylation?

(a) Poly-A polymerase **(b) Exonucleases** **(c) RNA polymerase I** **(d) RNA polymerase II**

(iv) **Assertion:** A single RNA polymerase in prokaryotes synthesis all types of RNAs.

Reason: Prokaryotic RNA polymerase has sigma (σ) factor .

(a) Both assertion and reason are true and reason is the correct explanation of assertion.

(b) Both assertion and reason are true but reason is not the correct explanation of as

(c) Assertion is true but reason is false

(d) Both assertion and reason are false.

(v) Read the given list of materials.

1. RNA polymerase enzyme
2. DNA template
3. RNA primers
4. Okazaki segments
5. Four types of ribonucleotides triphosphates
6. Divalent metal ions Mg^{2+} as a cofactor.

Which of the above given materials are required for transcription?

(a) (1), (2), (3) and (4) **(b) (1), (2), (3), (5) and (6)** **(c) (1), (2), (5) and (6)** **(d) All of these**

859) **Read the following and answer any four questions from (i) to (v) given below :**

Translation is the process of polymerisation of amino acids to form a polypeptide. The order and sequence of amino acids are defined by the sequence bases in the mRNA. The amino acids are joined by a bond called peptide bond. Ribosome is the site of protein synthesis.

(i) Which ion is essential for association of both units of ribosome at the time of protein formation ?

(a) Mg^{2+} **(b) Mn^{2+}** **(c) Cl^{-}** **(d) Ca^{2+}**

(ii) During translation, how many initiation factors are required in eukaryotes for initiation reactions?

(a) 3 **(b) 6** **(c) 7** **(d) 9**

(iii) Which part of mRNA contains untranslated regions (UTR)?

(a) 3' end **(b) 5' end** **(c) Either 3' or 5' end** **(d) Both 5' end and 3' end**

(iv) Name the enzyme that helps in combining amino acid to its particular tRNA.

(a) Activating enzyme **(b) Amino-acyl tRNA-synthetase** **(c) Peptidyl transferase** **(d) Both (a) and (b)**

(v) From the given list, select the translation machinery.

1. mRNA
2. Ribosomes
3. Amino acids
4. tRNAs
5. Peptidyl transferase
6. Amino acyl tRNA synthetase
7. Pyrophosphatase

(a) (1), (2), (3), (4) and (6) **(b) (1), (2), (3), (4) and (5)** **(c) (1), (2), (3), (4), (5) and (6)** **(d) (1), (2), (3), (4), (5), (6) and (7)**

860) Read the following and answer any four questions from (i) to (v) given below:
The process of translation requires transfer of genetic information from a polymer of nucleotides to synthesise a polymer of amino acids. The relationship between the sequence of amino acids in a polypeptide and nucleotide sequence of DNA or mRNA is called genetic code. George Gamow suggested that in order to code for all the 20 amino acids, code should be made up of three nucleotides.
(i) What is a codon?

(a) A length of DNA which codes for a particular protein

(b) A part of the tRNA molecule to whi specific amino acid is attached.

(c) A part of the tRNA molecule which recognises the triplet code on the messenger RNA.

(d) A part of the messenger RNA molec a sequence of bases coding for an amir

(ii) Three consecutive bases in the DNA molecule provide the code for each amino acid in a protein molecule. What is the maximum number of different triplets that could occurs ?

(a) 16 (b) 20 (c) 24 (d) 64

(iii) Listed below are some amino acids and their corresponding mRNA triplets.

Amino acid	**mRNA triplet**
Phenylalanine	UUU
Lysine	AAG
Arginine	CGA
Alanine	GCA

Which DNA sequence would be needed to produce the following polypeptide sequence? Alanine-Arginine- Lysine- Phenylalanine

(a) CGT GCT TTC AAA(b) CGT GCT TTC TTT(c) CGU GCU UUC AAA(d) CGU GCU UUC TTT

(iv) Identify the non-sense codons among the following.

(a) AUG (b) GUG (c) UAA (d) UGG

(v) A polypeptide is made using synthetic mRNA molecules as shown.

Synthetic mRNA used	Polypeptide produced
UUUAAAUUUAAA	Phenylalanine-lysine-phenylalanine-lysine

What are the DNA codes for the amino acids phenylalanine and lysine?

Phenylalanine	**Lysine**
(a) AAA	**TTT**
(b) AAA	**UUU**
(c) GGG	**CCC**
(d) TTT	**GGG**

861) **Read the following and answer any four questions from (i) to (v) given below:**

Mutation explains the relationship between gene and DNA. The effects oflarge deletions and rearrangement in a segment of DNA results in loss or gain of gene and its function. Insertion or deletion of one or two bases changes the reading frame from the point of insertion or deletion. A classical example of point mutation is a change of single base pair in the gene for beta.globin chain that results in change of amino acid residue glutamate to valine and results into a diseased condition called sickle cell anaemia.

(i) A mutation is a change produced by an alteration in the genetic mechanism and

(a) may arise spontaneously **(b) is always induced by the environment** **(c) is never advantageous** **(d) is not inherited.**

(ii) The DNA code for glutamic acid is CTC or CTT. The code for valine is CAA or CAT. In sickle cell haemoglobin, valine is present instead of glutamic acid.

Assuming a single base pair substitution has occurred, what is the mRNA code in the affected mutant?

(a) CUU **(b) GAA** **(c) GAG** **(d) GUA**

(iii) A mutation involving the substitution of one nitrogenous base for another has altered the base sequence of a DNA molecule, coding for four amino acids, as shown below.

Normal A-G-C-A- T-G-G-A- T-C-C- T

Mutant A-G-C-A-T-G-C-A-T-C-C-T

The table shows six codons and the corresponding amino acids into which each is translated.

mRNA codon	**Amino acid**
AAG	Lysine
CUA	Leucine
GGA	Glycine
GUA	Valine
UAC	Tyrosine
UCG	Serine

The mutation has changed the amino acid

(a) leucine to valine **(b) lysine to glycine** **(c) serine to leucine** **(d) tyrosine to lysine.**

(iv) **Assertion:** Insertion or deletion of three or its multiple bases, insert or delete one or multiple codons and so one or multiple amino acids.

Reason: Reading frame remains unaltered with insertion or deletion of three or its multiple bases.

(a) Both assertion and reason are true and reason is the correct explanation of assertion.

(b) Both assertion and reason are true but reason is not the correct explanation of assert

(c) Assertion is true but reason is false

(d) Both assertion and reason are false

(v) Part of the amino acid sequences in normal and sickle cell haemoglobin are shown.

Normal haemoglobin	**Sickle cell haemoglobin**
Thr- Pro-Glu-Glu	Thr- Pro- Val-Glu

mRNA codons for these amino acids are

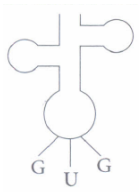
Glutamine (Glu) GAA GAG

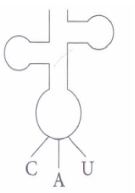
Prpline (Pro) CCU CCC

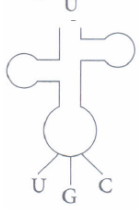
Threonine (Thr) ACU ACC

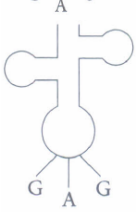
Valine (Val) GUA GUG

Which transfer RNA molecule is involved in the formation of this part of the sickle cell haemoglobin?

(a) 

(b) 

(c) 

(d) 

862) **Read the following and answer any four questions from (i) to (v) given below :**

Gene regulation is the mechanism of switching off and switching on of the genes depending upon the requirement of cells and the state of development. Gene regulation is of two types : negative and positive. In negative gene regulation the genes continue expressing their effect till their activity is suppressed. Positive gene regulation is the one in which the genes remain non -expressed unless and until they are induced to do it. Operon model is a co-ordinated group of genes such as structural gene, operator gene, promoter gene, regulator gene which function together and regulate a metabolic pathway as a unit, e.g., lac operon, trp operon, ara operon, etc.

(i) Regulation of gene' expression occurs at the level of

(a) transcription **(b) processing/splicing** **(c) translation** **(d) all of these**

(ii) Inducible operon system usually occurs in A pathways. Nutrient molecules serve as B to stimulate production of the enzymes necessary for their breakdown. Genes for inducible operon are usually switched C and the repressor is synthesised in an D form.

	A	B	C	D
(a)	**anabolic**	**corepressor**	**on**	**inactive**
(b)	**anabolic**	**inducer**	**off**	**active**
(c)	**catabolic**	**inducer**	**off**	**active**
(d)	**catabolic**	**corepressor**	**on**	**inactive**

(iii) An mRNA molecule transcribed from the lac operon contains nucleotide sequences complementary to

a) structural genes coding for the enzymes **(b) the operator region** **(c) the promotor region** **(d) the repressor gene.**

(iv) Which statement correctly describes the control of transcription of the genes involved in the breakdown of lactose in Escherichia coli?

(a) A repressor protein binds to the operator and the genes are switched on

(b) A repressor protein binds to the operator and the genes are switched off

(c) A transcription factor binds to the promoter and the genes are switched on.

(d) A transcription factor binds to the promoter and the genes are switched off.

(v) Function of catabolic activator protein in lac operon is

a) to form mRNA **(b) help to bind RNA polymerase** **(c) code for repressor** **(d) to activates lac gene when glucose is absent.**

863) **Read the following and answer any four questions from (i) to (v) given below:**

DNA fingerprinting is a technique of determining nucleotide sequences of certain areas of DNA which are unique to each individual. Each person has a unique DNA fingerprint. Each fingerprint is the same for every cell, tissue and organ of a person. DNA fingerprinting is the basis of paternity testing in case of disputes.

(i) The technique developed to identify a person with the help of DNA restriction analysis is known as

(a) DNA profiling **(b) DNA fingerprinting** **(c) RFLP** **(d) both (a) and (b).**

(ii) For DNA fingerprinting, DNA is obtained from

(a) blood **(b) hair root cells** **(c) semen** **(d) all of these.**

(iii) During DNA fingerprinting, the radioactive probes

(a) hybridise with DNA sample to form double stranded structure

(b) degrade the DNA

(c) create positive charge on DNA

(d) cut the DNA sample at various sites.

(iv) In India, DNA fingerprinting technique was developed by

(a) Dr. Lalji Singh **(b) Alec Jeffreys** **(c) Dr. Khorana** **(d) none of these**

(v) Which of the following is true about DNA fingerprinting?

(a) VNTR is used as probe.

(b) DNA samples are loaded on agarose gel electrophoresis

(c) It is based on identification of nucleotide sequence present on the DNA molecule.

(d) All of these

864) **Read the following and answer any four questions from (i) to (v) given below:**

RNA or ribonucleic acid is a single chain polyribonucleotide which functions as carrier of coded genetic or hereditary information from DNA to cytoplasm for taking part in protein and enzyme synthesis. Six types of RNAs are ribosomal, transfer, messenger, genomic, small nuclear and small cytoplasmic RNA. Out of these, rRNA, mRNA and tRNA are major classes of RNAs that are involved in gene expression.

(i) Which one is referred to a soluble RNA?

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

(ii) The RNA that picks up specific amino acid from amino acid pool in the cytoplasm to ribosome during protein synthesis is

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

(iii) Which of the following is found in both DNA and messenger RNA ?

(a) Double helix structure (b) Ribose (c) Sugar-phosphate chain (d) Thymine

(iv) Which of the following statements regarding RNA is correct ?

(a) Messenger RNAs carries coded information for synthesis of polypeptide

(b) Ribosomal RNAs bind with tRNA to catalyse the formation of phosphodiester bonds

(c) Genomic RNA is always single stranded.

(d) Synthesis of rRNA occurs in cytoplasm by RNA pol

(v) In studying a virus, you find the following proportions of nitrogenous bases present: adenine 23%, guanine 37%, cytosine 23% uracil 17%. Which of the following statement(s) regarding this virus is/are correct?

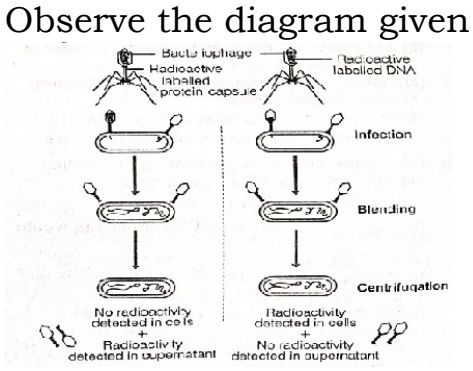
I. It probably uses RNA as its genetic material.

II. The genetic material of this virus is probably single stranded.

III. Base pairing rules in virus in this virus include adenine: cytosine

(a) I only (b) I and II only (c) II and III only (d) All of these

865) Observe the diagram given below of Hershey and Chase experiment and answer the following questions.



(i) ln Hershey and Chase experiment, bacteriophage nucleic acids were labelled as

(a) ^{32}P labelled phosphate

(b) ^{3}H labelled H_2O

(c) ^{35}S labelled sulphate

(d) ^{14}C labelled CO_2

(ii) Bacteriophage protcin coat was labelled by _____ in Hershey and Chase experiment.

(a) ^{35}S labelled sulphur

(b) ^{32}S labelled sulphate

(c) ^{30}S labelled sulphur

(a) ^{32}P labelled sulphate

(iii) In Hershey and Chase experiment, radioactive ^{32}P was used to culture bacteriophage which resulted in radioactive

(a) viral DNA

(b) bacterial capsule

(c) viral protein

(d) plasma membrane of bacteria

(iv) DNA with labelled thymidine is added to a medium where Escherichia coli is growing. After 5 minutes of growth

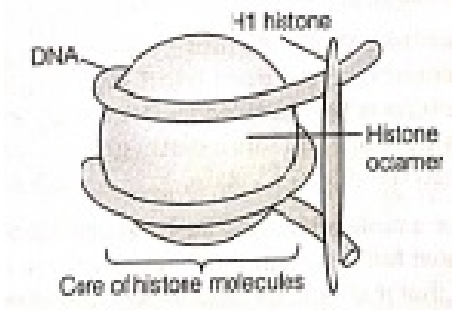
(a) All the DNA strands of parents and daughters will show DNA with labelled thymidine

(b) Only parental strands will show thymidine labelled DNA

(c) All the strands of daughters will be thymidine labelled

(d) Half the daughter strands will have labelled and half strands without labelled thymidine

866) Observe the diagram given below of a nucleosome model and answer the following questions.



(i) The number of nucleosomes present in human cell is

(a) 3.3 x10^7 nucleosome

(b) 1.1 x10^7 nucleosome

(c) 6.6 x10^7 nucleosome

(d) indefinite

(ii) Which amino acids are present in histones?

(a) Lysine and histidine

(b) Valine and histidine

(c) Arginine and lysine

(d) Arginine and histidine

(iii) Linker DNA is

(a) a part of nucleosomc

(b) a part that joins two Octamer cores

(c) ssDNA

(d) Both (a) and (b)

(iv) The association of histone H1 with a nucleosome indicates

(a) transcription is occurring

(b) DNA replication is occurring

(c) the DNA is condensed into a chromatin fibre

(d) the DNA double helix is exposed

867) Read the following passage and answer the questions given below.
Transfer RNA (tRNA) serves as the nucleic acid decoding device that reads the triplet genetic code of messenger RNA (mRNA) and causes the insertion of codon-specific amino acids in a growing protein chain during the process of translation in the ribosome. A particular triplet codon in a mRNA is read by a tRNA through one of its loop, which has triplet of anticodon residues that base pair with the codon. Each tRNA is charged with a particular amino acid at its 3' end.

i) The presence of an adapter molecule that would on one hand read the code and on the other hand would bind to specific amino acids was postulated by

(a) Francis Crick **(b) James Watson**

(c) Rosalind Franklin **(d) Griffith**

(ii) The difference between mRNA and tRNA is that

(a) mRNA has more elaborated 3-dimensional structure due to extensive base pairing

(b) mRNA bears anticodon, but tRNA has codons

(c) tRNA has more elaborated 3-dimensional structure due to extensive base pairing

(d) mRNA is usually smaller than tRNA

(iii) Before the genetic code was postulated, the tRNA was called

(a) rRNA (ribosomal RNA)

(b) mRNA (messenger RNA)

(c) sRNA (soluble RNA)

(d) sedimentary RNA

(iv) tRNA binds to mRNA through

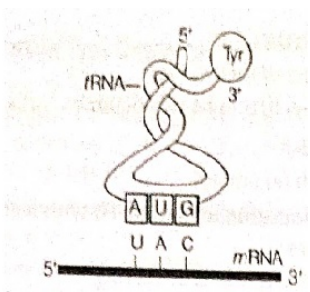
(a) anticodon loop

(b) TyCloop

(c) amino acid binding loop

(d) D-loop

(v)



Following statements are related to the above figure of tRNA,

I. It has an anticodon loop that has bases complementary to the code.

II. It has an amino acid acceptor end to which it binds to amino acids.

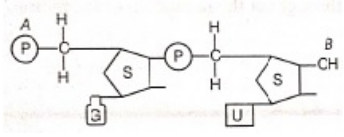
III. It is not specific for each amino acid.

Choose the correct option.

(a) I and III **(b) II and III**

(c) I, II and III **(d) I and II**

868) Answer the questions based on the dinucleotide structure shown below.



(i) Name the type of sugar guanine base is attached to.

(ii) Name the linkage connecting the two nucleotides.

(iii) Identify the 3' end of the dinucleotide. Give a reason for your answer.

869) While teaching the structure of DNA, teacher told students that the law of magnetic attraction works behind the DNA packaging. Upon query by a student, teacher told about the histone proteins and nucleosomes.

(i) What is a nucleosome? Name the positive and negatively charged structures in nucleosome.

(ii) How many and what type of histone molecules are found in a nucleosome?

(ii) What do you understand by the beads on string structure of nucleosome?

(iv) What are euchromatin and heterochromatin?

(v) How many hydrogen bonds are present between

(a) adenine and thymine

(b) cytosine and guanine

870) During an argument between two biology students, Raman said that during the course of evolution, DNA was chosen over RNA because the former has stable structure and is less reactive as compared to the latter. Ajay was not convinced and said that RNA was the first genetic material in organisms.

(i) Why RNA is considered unstable over DNA?

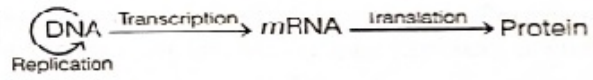
(ii) Give an evidence that RNA was the first genetic material.

(iii) Do humans contain RNA? If yes, mention its function.

(iv) Name two organisms in which RNA is the genetic material.

(v) Mention any two properties that must be fulfilled by a molecule acting as genetic material.

871) Refer to the below mentioned flow diagram and answer the questions that follows



(i) What information is derived from the above mentioned flow diagram?

(ii) Who proposed this concept?

(iii) Is there any exception to this concept? If yes, describe it.

872) An organism is able to survive on a culture medium, containing nutrient A, by the enzyme catalysed reaction.

$$A \xrightarrow{p} B \xrightarrow{q} C \xrightarrow{r} D$$

A mutant organism failed to survive on this medium, but grew well when nutrient B was added to it.

(i) Which gene of this mutant organism is defective ?

(ii) What does such a condition indicate of ?

(iii) Mention the major components in an operon.

873) Refer to the checker board for the genetic code and answer the following questions

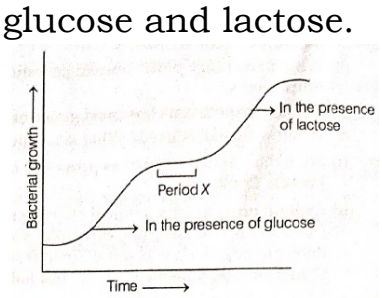
	U	C	A	G	
U	UUU Phe	UCU Ser	UAU Tyr	UGU Cys	U
	UUC Phe	UCC Ser	UAC Tyr	UGC Cys	C
	UUA Leu	UCA Ser	UAA Stop	UGA Stop	A
	UUG Leu	UCG Ser	UAG Stop	UGG Trp	G
C	CUU Leu	CCU Pro	CAU His	CGU Arg	U
	CUC Leu	CCC Pro	CAC His	CGC Arg	C
	CUA Leu	CCA Pro	CAA Gln	CGA Arg	A
	CUG Leu	CCG Pro	CAG Gln	CGG Arg	G
A	AUU Ile	ACU Thr	AAU Asn	AGU Ser	U
	AUC Ile	ACC Thr	AAC Asn	AGC Ser	C
	AUA Ile	ACA Thr	AAA Lys	AGA Arg	A
	AUG Met	ACG Thr	AAG Lys	AGG Arg	G
G	GUU Val	GCU Ala	GAU Asp	GGU Gly	U
	GUC Val	GCC Ala	GAC Asp	GGC Gly	C
	GUA Val	GCA Ala	GAA Glu	GGA Gly	A
	GUG Val	GCG Ala	GAG Glu	GGG Gly	G

(i) Why the genetic code is said to be non-ambiguous and specific ?

(ii) What does UAA, UGA and UAG code for ?

(iii) A given amino acid can be specified by more than one codon. Which feature of genetic code is shown here?

874) The graph given below shows the growth of bacteria over time in the presence of two sugars namely, glucose and lactose.



(i) What is the preferred substrate of bacterial growth?

(ii) What does period Xrepresents in graph?

(iii) Why does the growth curve is less steep in case of lactose as compared to glucose?

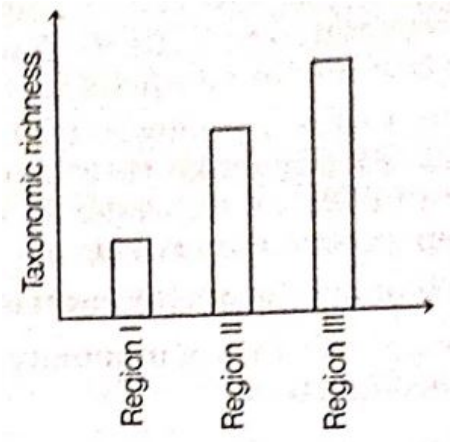
or

(iii) What would be the consequence of high glucose concentration in the system throughout the regulation of lac operon?

875) Read the following passage and answer the questions that follow

It incredible that India's land area is only 2.4 per cent of the world's total land area whereas its share of the global species diversity is an impressive 8.1 per cent. However, in these estimates of species, prokaryotes do not figure anywhere.

Biologists are always keen on collecting data with respect to species diversity observed in different regions of the world. The data collected based on the survey conducted for species richness of groups of mammals in three different regions of the world is shown in the bar graph given below



(a) Why is the species richness maximum in region III in the bar graph?

Or

(a) Why is the species richness mínimum in region I in the bar graph?

(b) Plants and animals do not have uniform diversity in the world but show rather uneven distribution. Mention what this kind of diversity is referred to as.

(c) Why is it that prokaryotes do not have an estimated number of their species diversity as seen in plants and animals ? Explain.

5 Marks 120 x 5 = 600

876) Differentiate between the following

(a) Repetitive DNA and Satellite DNA

(b) mRNA and tRNA

(c) Template strand and Coding strand

877) Briefly describe the following:

(a) Transcription

(b) Polymorphism

(c) Translation

(d) Bioinformatics

878) Enlist the salient features o the double helix strucutre of DNA.

879) Describe the process of DNA replication.

880) (i)What are the three types of RNA?

(ii)Which one of these has the shape of a clover leaf in two-dimentional structure?

(iii)How is each RNA related in the information during protein synthesis?Explain.

881) What is genetic code?Name the scientists and their contribution in deciphering the genetic code

882) Describe the steps involved in the sequencing of genome of an organism.

883) (a)Name two types of satellite DNA.Mention the basis for such a classification.

(ii)Show only diagrammatically the process of transcription in bacteria

884) Enumarate the salient features of human genome.

885) How did Meselson and Stahl experimentally prove that DNA replication is semiconservative? Explain.

886) State the aim and describe Meselson and Stahl's experiment.

887) Who proposed that DNA replication is semiconservative? How was it experimentally proved by Meselson and Stahl?

888) Who proposed that DNA replication is semicoservative? How did Meselson and Stahl prove it experimentally?

889) What is 'semiconservative DNA replication'? How was it experimentally proved and by whome?

890) What is semiconservative replication of DNA? Explain how it was experimentally proved.

891) Name the scientists who proved experimentally that DNA is the genetic material. Describe their experiment.

892) Describe the Hershey-Chase experiment.Write the conclusion they arrived at after the experiment.

893) (a)Describe Hershey and chase experiment.
(b)Write the aim of the experiment.

894) How did Hershey and Chase prove that DNA is the heredity material? Explain their experiment with suitable diagrams.

895) How did Alfred Hershey and Chase unequivocally prove that DNA ia the genetic material?

896) (a) Describe the process of synthesis of fully functional mRNA in a eukaryotic cell.
(b) How is this process of mRNA synthesis different from that in prokaryotes?

897) Answer the following questions based on Meselson and Stahl's experiment.
(a)Why did the scientists use $^{15}NH_4Cl$ and $^{14}NH_4Cl$ as source of nitrogen in the culture medium for growing E.Coli?
(b)Name the molecule(s) that ^{15}N got incorporated into.
(c)How did they distinguish between ^{15}N labelled molecules from ^{14}N ones?
(d)Mention the significance of taking the E.coli samples at definite time intervals for observations.
(e)Write the observations made by them from the samples taken at the end of 20 minutes and 40 minutes respectively.
(f)Write the conclusion drawn by them at the end of their experiment.

898) (a)State the arrangement of different genes that in bacteria is reffered to as 'operon'
(b)Draw a schematic labelled illustration o lac operon in a 'switched on' state.
(c)Describe the role of lactose in lac operon.

899) (a)Mention the contributions of the following scientists.
(i)Maurice Wilkins and Rosalind Franklin.
(ii)Erwin Chargaff.
(b)Draw a double-stranded dinucleotide chain with all the four nitrogen bases.Label the polarity and the components of the dinucleotide.

900) (i) DNA polymorphism is the basis of DNA fingerprinting technique. Explain
(ii)Mention the causes of DNA polymorphism.

901) Name and describe the technique that will help in solving a case of paternity dispute over the custody of a child by two different families.

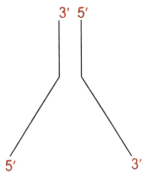
902) Two blood samples A and B picked up from the crime scene were handed over to the forensic department for genetic fingerprinting. Describe how the technique of genetic fingerprinting is carried out. How will it be confirmed whether the samples belonged to the same individual or to two diferent individuals?

903) Explain the steps to DNA-fingerprinting that will help in processing of the two blood samples A and B picked up from the crime scene.

904) Draw a labelled schematic strucure of a transcription unit. Explain the function of each component of the unit in the process of transcription.

905) (a)Who proposed the concept of lac operon?
(b)Draw a labelled schematic representation of a lac operon.
(c)Explain how this operon gets switched 'on' and 'off'

906) (a) State the central Dogma of molecular biology. Who proposed it? Is it universally applicable? Explain
(b) List any four properties of a molecule to be able to act as a genetic material.

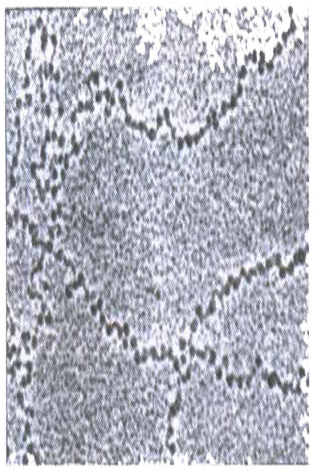
907) 

(a) Identify the structure shown above.

(b) Redraw the structure as a replicating fork and label the parts.

(c) Write the source of energy for this replication and list the enzymes involved in this process.

(d) Mention the difference in the synthesis based on the polarity of the two template strands.

908) 

Shown above is the electron micrograph (EM) picture of 'beads-on- string'.

(a) Identify and explain the detailed structure of a bead with the help of a labelled diagram.

(b) Describe the packaging of 'beads-on- string' in a eukaryotic cell.

909) (a) State the arrangement of different genes that in bacteria is referred to as 'operon'.

(b) Draw a schematic labelled illustration of lac operon in a 'switched on' state.

(c) Describe the role of lactose in lac operan.

910) During the course of evolution why DNA was chosen over RNA as genetic material. Give reasons by first discussing the desired criteria in a molecule that can act as genetic material and in the light of biochemical difference between DNA and RNA.

911) Give an account of post-transcriptional modification of a eukaryotic mRNA.

912) 'There is a paternity dispute for a child', which technique can solve the problem? Discuss the principle involved.

913) Give an account of method used in sequencing the human genome

914) Answer the following question based on Hershey and chase experiment

(a) Name the kind of virus they worked with and why?

(b) Why did they use two types of culture media to grow viruses in it? Explain

(c) What was the need for using a blender and later a centrifuge during their experiment?

(d) State the conclusion drawn by them after the experiment.

915) How are the following formed and involved in DNA packaging in a nucleus of a cell?

(i) Histone octamer

(ii) Nucleosome

(iii) Chromatin

916) What is human project genome (HGP)? Write salient features of human genome project

917) State the role of VNTR in DNA fingerprinting.

918) What is nucleosome?How many base pairs are present in a typical nucleosome?

919) In a maternity ward, two new born babies got exchanged and two women claiming to be the mother of one child and the matter went to the court.The judge asked to conduct DNA test of the child and two women, and on the basis of report settled the issue of paternity

Read the above passage and answer the following questions:

(i)What is the meaning of DNA test?

(ii)How is it helpful in deciding paternity issues?

920) In a recent case of crime, there were no witness and Ramesh was the first person to reach the site.He did not allow any onlookers to distrub the scene of crime and called the police.Careful examination by forensic experts revealed the presence of some hairs from the site of crime which helped the police to nail the culprit.
|Read the above passage and answer the following questions:
(i) In your opinion, by which method this was possible?
(ii) What is DNA fingerprinting?
(ii) What value is displayed by Ramesh?

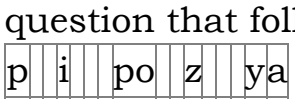
921) Ramesh somewhere heard about human genome project.He discuss it with his biology teacher who explained that is a comprehensive project(approx.cost9 billion dollars)undertaken by molecular biologists to completely map the entire human genome by determining the complete nucleotide sequences of DNA of each chromosome (22 autosoms and X, Y sex chromosomes.)
Read the above passage and answer the following questions:
(i) What is genomics?
(ii) What is importance of Human Genome Project?

922) Ranjit,while coming back home,saw a person on motorbike who was using mobile phone while driving and he met with an accident.Motorcyclist was badly hurt and was profusely bleeding.As a good citizen, Ranjit took him to hospital immediately where doctors after examining advised immediate blood transfusion to save his lifr.Ranjit offered doctors his blood but they refused as his blood group was not compatible with that of the victim.
Read the above passage and answer the following questions:
(i)What are blood, groups?
(ii)Why have different people different blood groups?
(iii)What value is displayed by Ranjit?

923) (i) State the arrangement of different genes that in bacteria is referred to as 'operon'.
(ii) Draw a schematic labelled illustration of lac operon in a switched on state.
(iii) Describe the role of lactose in the lac operon.

924) (i) Describe the various steps of Griffith's experiment that led to the conclusion of the 'transforming principle'.
(ii) How did the chemical nature of the 'transforming principle'get established?

925) Study the schematic representation of the genes involved in the lac operon given below and answer the question that follows.



i) Identify and name the regulatory gene in this operon .Explain its role in 'switching off' the operon.
(ii) Why is lac operon's regulation referred to as negative regulation?
(iii) Names the inducer molecule and the products of the genes 'z' and 'y' of the operon.Write the function of these gene products
(iii) Names the inducer molecule and the products of the genes 'z' and 'y' of the operon.Write the function of these gene products.

926) (a) Draw a labelled diagram of a 'replicating fork' showing the polarity.Why does DNA replication occur within such 'forks'?
(b) Name two enzymes involved in the process of DNA replication, along with their properties.

927) (i) Explain the process of DNA replication with the help of a schematic diagram.
(ii) In which phase of the cell cycle does replication occur in eukaryotes? What would happen if cell division is not followed after DNA replication?

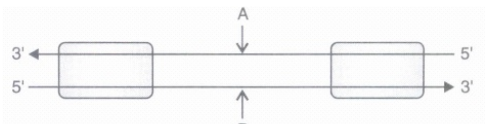
928) The biology teacher asked her students to verify the experiment on transformation principle in bacteria to establish DNA as genetic material.The class was divided into groups.The teacher asked them to submit the reports.Group 2 did not use mouse and did not repeat GRiffith's experiment.The teacher praised them.
(i) Which experiment did they perform?
(ii) Explain the experiment in brief.
(iii) Who and when performed the transformation principle experiment?
(iv) What values did students of group 2 exhibit?

929) Raj was a known sportsman in his school.While returning home he found unknown miscreants beating a young fellow.He tried to drive them off but by that time the fellow died of injury.The police arrested Raj and he was put on trial.The judge being convinced by Raj's plea, ordered for DNA fingerprinting reports.
(i) What is the basis of DNA fingerprinting?
(ii) Explain the steps in DNA fingerprinting.
(iii) Write the applications of DNA fingerprinting.
(iv) Raj's fingerprints on the dead body were sufficient to convict him but the judge asked for authentic proof.What values can observed by the judge?

930) An organism is able to survive on a culture medium, containing nutrient A, by the enzyme-catalysed reactions.

$$A \xrightarrow{p} B \xrightarrow{q} C \xrightarrow{r} D$$

A mutant organism failed to survive on this medium, but grew well when nutrient B was added to it.
(i) Which gene of this mutant organism is defective?
(ii) What does such a condition indicate of?
(iii) Mention the major components and their functions in an operon.
(iv) Indicate the value expressed in this sequence of reactions.

931) 

(a) Identify strands 'A' and 'B' in the diagram of transcription unit given above and write the basis on which you identified them.
(b) State the functions of Sigma factor and Rho factor in the transcription process in a bacterium.
(c) Write the functions of RNA polymerase-I and RNA polymerase-Ill in eukaryotes
(OR)
Describe the packaging of DNA helix in a prokaryotic cell and an eukaryotic nucleus.

932) Explain the process of protein synthesis from processed m-RNA.

933) (a) Name the stage in the cell cycle where DNA replication occurs
(b) Explain the mechanism of DNA replication. Highlight the role of enzymes in the process.
(c)Why is DNA replication said to be semiconservative?

934) (a) How are the following formed and involved in DNA packaging in a nucleus of a cell?
(i) Histone octamer,
(ii) Nucleosome,
(iii) Chromatin.
(b) Differentiate between Euchromatin and Heterochromatin.

935) (a) What is Central dogma? Who proposed it ?
(b) Describe Meselson and Stahl's experiment to prove that the DNA replication is semi-conservative.

936) Explain the process of DNA replication with the help of a replicating fork.

937) Describe Frederick Griffith's experiment on Streptococcus pneumoniae. Discuss the conclusion he arrived at.

938) Describe Meselson and Stahl's experiment and write the conclusion they arrived at.

939) Name the major types of RNAs and explain their role in the process of protein synthesis in prokaryote.

940) Abiology teacher told his students is a class that the genetic material is all the organisms is DNA but it may be RNAin some of the viruses. He further told in the class that besides DNA the organisms also have another nucleic acid called RNA.
Answer the following questions:
(1) What is the difference between the nucleotides of DNA and RNA.
(2) What is the role of RNA in the cell ?
(3) What makes DNA the most suitable genetic material?
(4)What values are exhibited by the biology teacher?

941) The biology teacher asked his students to varify the results of experiments on the principle of transformation in bacteria. The teacher made two groups (A + B) of the class students and asked them to submit the report of their findings. One of the
groups (the group B) of the students did not repeat the Griffith's experiment, however the teacher liked it.
Answer the following on the basis of above information-
(1) Which experiment did they perform?
(2) Who performed the transforming principle experiment and when it was it performed.
(3) Give a brief account of the experiment.
(4) What values were exhibited by the students of group B.

942) (a) How does a Human Immunodeficiency Virus (HIV) replicate in a host?
(b) How does an HlV infected patient lose immunity?
(c) List any two symptoms of this disease

943) (a) Explain the role of regulatory gene, operator, promoter and structural genes in lac operon when E. Coli is growing in a culture medium with the source of energy as lactose.
(b) Mention what would happen iflactose is withdrawn from the culture medium.

944) (a) Write any two different levels at which regulation of Gene Expression could be exerted in Eukaryotes
(b) Give a labelled schematic representation of "lac operon" in its "Switched Off' position.

945) Explain sequentially the process of "Iranslation' in a prokaryote. Name the cellular factory where this process occurs

946) (a)How is DNA finger printing done? Name any two types of human samples which can be used for DNA fingerprinting. Explain the process sequentially.
(b) Mention any two situations when the technique is useful.

947) (a) Describe the process of transcription in bacteria.
(b) Explain the processing the hnRNA needs to undergo before becoming functional mRNA in eukaryotes.

948) Explain the role of lactose as an inducer in a lac operon.

949) Explain the structure of t-RNA with the help of a diagram. Describe its role in the process of translation.

950) (a) Name the scientist who postulated the presence of an adapter molecule that can assist in protein synthesis.
(b) Describe its structure with the help of a diagram. Mention its role in protein synthesis.

951) Describe how the lac operon operates, both in the presence and absence of an inducer in E.coli.

952) (a) Describe the different steps in one complete cycle of PCR.
b) State the purpose of such an amplified DNA sequence.

953) Garima is a bright fair girl but orphan by birth. One she got much disturbed after learning that a couple had claimed her to be their daughter. Although it is good but she felt that she did not belong to them. One of her close friends Nisha who was very much caring for her contacted the orphanaqe executives to find out the validity of the claim of the couple through DNA profiling.
Answer the following questions on the basis of above information:
(i) How DNA profiling can be made use of for testing the validity of parenthood claim of the couple.
(ii) Which branch of biology was this programme associated with?
(iii) What values were shown by Nisha.

954) According to Human Genome Project, about 99.9% nucleotide bases are exactly the same in all human. On the basis of this information answer the following questions.
(i) People may be discriminated on the basis of caste creed, colour and religion. What do you think and Why?
(ii) What percentage of human genome codes for protein?
(iii) Which chromosome has the maximum number of genes & which has their least number.

955) One of the students of biology class has some confusion on some points of the 'Human Genome Project'. Can you explain?
(i) Why was the Human Genome Project called a mega project?
(ii) What are its main goals?

956) How did Hershey and Chase established that DNA is transferred from virus to bacteria?

957) Describe Meselson and Stahl's experiment that was carried in 1958 on E.coli. Write the conclusion they arrrived at after the experiment.

958) Explain the process of transcription in prokaryotes. How is the process different in eukaryotes?

959) (i) Explain the role of DNA dependent RNA polymerase in initiation, elongation and termination during transcription in bacterial cell.
(ii) How is transcription a more complex process in eukaryotic cells? Explain.

960) How does splicing represent the dominance of RNA world?

961) (i) Describe the structure and function of a tRNA molecule. Why is it referred to as an adapter molecule?
(ii) Explain the process of splicing of hnRNA in a eukaryotic cell.

962) How do mRNA, tRNA and ribosomes help in the process of translation?

963) Observe the representation of genes involved in the lac operon given below.

p	i	p	Ⓞ	z	y	a

(i) Identify the region where the repressor protein will attach normally.
(ii) Under certain conditions repressor is unable to attach at this site. Explain.
(iii) If repressor fails to attach to the said site what products will be formed by z, y and a?
(iv) Analyse why this kind of regulation is called negative regulation.

964) (a) Describe the series of experiments of F. Griffith. Comment on the significance of the results obtained.
(b) State the contribution of Mac Leod, Mc Carty and Avery.

965) (a) Describe the experiment which demonstrated the existence of 'transforming principle'.
(b) How was the biochemical nature of this 'transforming principle' determined by Avery, Mac Leod and McCarty?

966) (a) Write the conclusion drawn by Griffith at the end of his experiment with 'Staphylococcus pneumoniae.
(b) How did Avery, C. Mac Leod and Mc Carty prove that DNA was the genetic material? Explain.