Chapter 02 Molecular Basis of Inheritance

NEET-FLASHBACK

Q.1 Satellite DNA is useful tool in - **[AIPMT-2010]**
(1) Forensic science
(2) Genetic engineering
(3) Organ transplantation
(4) Sex determination

Q.2 The one aspect which is not a salient feature of genetic code, is its being: **[AIPMT-2010]**
(1) Universal (2) Specific
(3) Degenerate (4) Ambiguous

Q.3 Which one of the following does not follow the central dogma of molecular biology? **[AIPMT-2010]**
(1) *Chlamydomonas* (2) HIV
(3) Pea (4) *Mucor*

Q.4 PCR and Restriction Fragment Length Polymorphism are the methods for- **[AIPMT (Pre-2012)]**
(1) DNA sequencing
(2) Genetic fingerprinting
(3) Study of enzymes
(4) Genetic transformation

Q.5 What is it that forms the basis of DNA Fingerprinting? **[AIPMT (Mains-2012)]**
(1) The relative amount of DNA in the ridges and grooves of the fingerprinting.
(2) Satellite DNA occurring as highly repeated short DNA segments.
(3) The relative proportions of purines and pyrimidines in DNA
(4) The relative difference in the DNA occurrence in blood, skin and saliva

Q.6 Which one of the following is a wrong statement regarding mutations ? **[AIPMT (Mains-2012)]**
(1) UV and Gamma rays are mutagens
(2) Change in a single base pair of DNA does not cause mutation
(3) Deletion and insertion of base pairs cause frame shift mutations.
(4) Cancer cells commonly show chromosomal aberrations.

Q.7 Which enzyme/s will be produced in a cell in which there is a nonsense mutation in the lac Y gene ? **[NEET-UG – 2013]**
(1) Lactose permease and transacetylase
(2) β-galactosidase
(3) Lactose permease
(4) Transacetylase

Q.8 DNA fragments generated by the restriction endonucleases in a chemical reaction can be separated by : **[NEET-UG – 2013]**
(1) Restriction mapping
(2) Centrifugation
(3) Polymerase chain reaction
(4) Electrophoresis

Q.9 Commonly used vectors for human genome sequencing are - **[AIPMT 2014]**
(1) T-DNA
(2) BAC and YAC
(3) Expression Vectors
(4) T/A Cloning Vectors

Q.10 In sea urchin DNA, which is double stranded, 17% of the bases were shown to be cytosine. The percentages of the other three bases expected to be present in this DNA are : **[AIPMT 2015]**
(1) G 17%, A16.5%, T32.5%
(2) G 17%, A 33%, T 33%
(3) G8.5%, A 50%, T 24.5%
(4) G 34%, A 24.5%, T 24.5%

Q.11 The movement of a gene from one linkage group to another is called : **[AIPMT 2015]**
(1) Duplication (2) Translocation
(3) Crossing over (4) Inversion

Q.12 Gene regulation governing lactose operon of *E.coli* that involves the lac I gene products is – **[AIPMT 2015]**
(1) Negative and inducible because repressor protein prevents transcription
(2) Negative and repressible because repressor protein prevents transcription
(3) Feedback inhibition because excess of β-galactosidase can switch off transcription
(4) Positive and inducible because it can be induced by lactose

Q.13 Which of the following biomolecules does have a phospho-diester bond? **[Re-AIPMT 2015]**
(1) Nucleotides of Nucleic acids
(2) Fatty acids in a diglyceride
(3) Monosaccharides in a polysaccharide
(4) Amino acids in a polypeptide

Q.14 Identify the correct order of organisation of genetic material from largest to smallest : **[Re-AIPMT 2015]**
(1) Chromosome, genome, nucleotide, gene
(2) Chromosome, gene, genome, nucleotide
(3) Genome, chromosome, nucleotide, gene
(4) Genome, chromosome, gene, nucleotide

Q.15 Which one of the following is not applicable to RNA ? **[Re-AIPMT 2015]**
(1) Chargaff's rule
(2) Complementary base pairing
(3) 5' phosphoryl and 3' hydroxyl ends
(4) Heterocyclic nitrogenous bases

Q.16 Satellite DNA is important because it : **[Re-AIPMT 2015]**
(1) Codes for enzymes needed for DNA replication
(2) Codes for proteins needed in cell cycle
(3) Shows high degree of polylmorphism in population and also the same degree of polymorphism in an individual, which is heritable from parents to children
(4) Does not code for proteins and is same in all members of the population.

Q.17 Which of the following is required as inducer(s) for the expression of lac operon ? **[NEET-I 2016]**
(1) Glucose
(2) Galactose
(3) Lactose
(4) Lactose and Galactose

Q.18 A complex of ribosomes attached to a single strand of m-RNA is known as : **[NEET-I 2016]**
(1) Polysome
(2) Polymer
(3) Polypeptide
(4) Okazaki fragment

Q.19 Which of the following is **not** required for any of the techniques of DNA fingerprinting available at present ? **[NEET-I 2016]**
(1) Polymerase chain reaction
(2) Zinc finger analysis
(3) Restriction enzymes
(4) DNA-DNA hybridization

Q.20 Which one of the following is the starter codon? **[NEET-I 2016]**
(1) AUG (2) UGA
(3) UAA (4) UAG

Q.21 A cell at telophase stage is observed by a student in a plant brought from the field. He tells his teacher that this cell is not like other cells at telophase stage. There is no formation of cell plate and thus the cell is containing more number of chromosomes as compared to other dividing cells. This would result in : **[NEET-I 2016]**
(1) Aneuploidy
(2) Polyploidy
(3) Somaclonal variation
(4) Polyteny

Q.22 The central dogma of molecular genetics states that the genetic information flows from : **[NEET-II 2016]**
(1) DNA → Carbohydrates → Protein
(2) DNA → RNA → Protein
(3) DNA → RNA → Carbohydrates
(4) Amino acids → Proteins → DNA

Q.23 Taylor conducted the experiments to prove semiconservative mode of chromosome replication on : **[NEET-II 2016]**
(1) *Vicia faba*
(2) *Drosophila melanogaster*
(3) *E.coli*
(4) *Vinca rosea*

Q.24 The mechanism that causes a gene to move from one linkage group to another is called : **[NEET-II 2016]**
(1) Duplication (2) Translocation

(3) Crossing-over (4) Inversion

Q.25 Which of the following rRNAs acts as structural RNA as well as ribozyme in bacteria ? **[NEET-II 2016]**

(1) 18 S rRNA (2) 23 S rRNA
(3) 5.8 S rRNA (4) 5 S rRNA

Q.26 A molecule that can act as a genetic material must fulfill the traits given below, except : **[NEET-II 2016]**

(1) It should be able to generate its replica.
(2) It should be unstable structurally and chemically.
(3) It should provide the scope for slow changes that are required for evolution.
(4) It should be able to express itself in the form of Mendelian characters.

Q.27 DNA depended RNA polymerase catalyses transcription on one strand of the DNA which is called the : **[NEET-II 2016]**

(1) Coding strand (2) Alpha strand
(3) Antistrand (4) Template strand

Q.28 If there are 999 bases in an RNA that codes for a protein with 333 amino acids, and the base at position 901 is deleted such that the length of the RNA becomes 998 bases, how many codons will be altered ? **[NEET 2017]**

(1) 1 (2) 11
(3) 33 (4) 333

Q.29 During DNA replication, Okazaki fragments are used to elongate : **[NEET 2017]**

(1) The leading strand towards replication fork.
(2) The lagging strand towards replication fork.
(3) The leading strand away from replication fork.
(4) The lagging strand away from the replication fork.

Q.30 Spliceosomes are not found in cells of : **[NEET 2017]**

(1) Plants (2) Fungi
(3) Animals (4) Bacteria

Q.31 The final proof for DNA as the genetic material came from the experiments of : **[NEET 2017]**

(1) Griffith
(2) Hershey and Chase
(3) Avery, Mcleod and McCarty
(4) Hargobind Khorana

Q.32 The association of histone H_1 with a nucleosome indicates : **[NEET 2017]**

(1) Transcription is occurring
(2) DNA replication is occurring
(3) The DNA is condensed into a Chromatin Fibre
(4) The DNA double helix is exposed.

Q.33 DNA replication in bacteria occurs: **[NEET 2017]**

(1) During S phase
(2) With in nucleolus
(3) Prior to fission
(4) Just before transcription

Q.34 Which of the following RNAs should be most abundant in animal cell ? **[NEET 2017]**

(1) r-RNA (2) t-RNA
(3) m-RNA (4) Sn-RNA

Q.35 The experimental proof for semiconservative replication of DNA was first shown in a : **[NEET-UG – 2018]**

(1) Fungus (2) Bacterium
(3) Plant (4) Virus

Q.36 Select the **correct** statement: **[NEET-UG – 2018]**

(1) Franklin Stahl coined the term "Linkage"
(2) Punnett square was developed by a British scientist
(3) Spliceosomes take part in translation
(4) Transduction was discovered by S. Altman

Q.37 Select the **correct** match : **[NEET-UG – 2018]**

(1) Alec Jeffreys : *Streptococcus pneumoniae*
(2) Alfred Hershey and Martha Chase : TMV
(3) Matthew Meselson and F. Stahl : *Pisum sativum*
(4) Francois Jacob and Jacques Monod : Lac operon

Q.38 Many ribosomes may associate with a single mRNA to form multiple copies of a polypeptide simultaneously. Such strings of ribosomes are termed as : **[NEET-UG – 2018]**

(1) Polysome (2) Polyhedral bodies
(3) Plastidome (4) Nucleosome

Q.39 AGGTATCGCAT is a sequence from the coding strand of a gene. What will be the corresponding sequence of the transcribed mRNA ?

[NEET-UG – 2018]

(1) AGGUAUCGCAU
(2) UGGTUTCGCAT
(3) ACCUAUGCGAU
(4) UCCAUAGCGUA

Q.40 All of the following are part of an operon except: **[NEET-UG – 2018]**

(1) An operator (2) Structural genes
(3) An enhancer (4) A promoter

Q.41 Expressed Sequence Tags (ESTs) refers to: **[NEET-UG – 2019]**

(1) DNA polymorphism
(2) Novel DNA sequences
(3) Genes expressed as RNA
(4) Polypeptide expression

Q.42 Under which of the following conditions will there be no change in the reading frame of following mRNA ? **[NEET-UG – 2019]**

5' AACAGCGGUGCUAUU 3'

(1) Insertion of A and G at 4^{th} and 5^{th} positions respectively.
(2) Deletion of GGU from 7^{th}, 8^{th} and 9^{th} positions
(3) Insertion of G at 5^{th} position
(4) Deletion of G from 5^{th} position

Q.43 Match the following genes of the Lac operon with their respective products: **[NEET-UG – 2019]**

(a) i gene	(i) β-galactosidase
(b) z gene	(ii) Permease
(c) a gene	(iii) Repressor
(d) y gene	(iv) Transacetylase

Select the **correct** option:

(1) a-(iii), b-(i), c-(iv), d-(ii)
(2) a-(iii), b-(iv), c-(i), d-(ii)
(3) a-(i), b-(iii), c-(ii), d-(iv)
(4) a-(iii), b-(i), c-(ii), d-(iv)

Q.44 Purines found both in DNA and RNA are : **[NEET-UG – 2019]**

(1) Guanine and cytosine
(2) Cytosine and thymine
(3) Adenine and thymine
(4) Adenine and guanine

Q.45 If the distance between two consecutive base pairs is 0.34 nm and the total number of base pairs of a DNA double helix in a typical mammalian cell is 6.6 × 109 bp, then the length of the DNA is approximately : **[NEET-UG – 2020]**

(1) 2.7 meters
(2) 2.0 meters
(3) 2.5 meters
(4) 2.2 meters

Q.46 The sequence that controls the copy number of the linked DNA in the vector, is termed : **[NEET-UG – 2020]**

(1) Recognition site (2) Selectable marker
(3) Ori site (4) Palindromic sequence

Q.47 Name the enzyme that facilitates opening of DNA helix during transcription. **[NEET-UG – 2020]**

(1) RNA polymerase (2) DNA ligase
(3) DNA helicase (4) DNA polymerase

Q.48 The first phase of translation is : **[NEET-UG – 2020]**

(1) Recognition of an anti-codon
(2) Binding of mRNA to ribosome
(3) Recognition of DNA molecule
(4) Aminoacylation of tRNA

Q.49 Complete the flow chart on central dogma. **[NEET-2021]**

(a) DNA —(b)→ RNA —(c)→ (d)

(1) (a)-Replication; (b)-Transcription; (c)-Transduction; (d)-Protein
(2) (a)-Translation; (b)-Replication; (c)-Transcription; (d)-Transduction
(3) (a)-Replication; (b)-Transcription; (c)-Translation; (d)-Protein
(4) (a)-Transduction; (b)- Translation; (c)-Replication; (d)-Protein

Q.50 Identify the correct statement. **[NEET-2021]**

(1) In capping, methyl guanosine triphosphate is added to the 3 ' end of hnRNA.
(2) RNA polymerase binds with Rho factor to terminate the process of transcription in bacteria.

(3) The coding strand in a transcription unit is copied to an mRNA.
(4) Split gene arrangement is characteristic of prokaryotes.

Q.51 **Statement I :** The codon 'AUG' codes for methionine and phenylalanine.
Statement II : 'AAA' and 'AAG' both codons code for the amino acid lysine.
In the light of the above statements, choose the correct answer from the options given below. **[NEET-2021]**
(1) Both Statement I and Statement II are true
(2) Both Statement I and Statement II are false
(3) Statement I is correct but Statement II is false
(4) Statement I is incorrect but Statement II is true

Q.52 If Adenine makes 30% of the DNA molecule, what will be the percentage of Thymine, Guanine and Cytosine in it? **[NEET-2021]**
(1) T:20;G:30;C:20 (2) T:20;G:20;C:30
(3) T:30;G:20;C:20 (4) T:20;G:25;C:25

Q.53 What is the role of RNA polymerase III in the process of transcription in eukaryotes ? **[NEET-2021]**
(1) Transcribes r-RNAs (28S, 18S and 5.8S)
(2) Transcribes t-RNA, 5S r-RNA and sn-RNA
(3) Transcribes precursor of m-RNA
(4) Transcribes only sn-RNAs

Q.54 Read the following statements and choose correct statements. **[NEET-2022]**
(A) Euchromatin is loosely packed chromatin.
(B) Heterochromatin is transcriptionally active.
(C) Histone octamer is wrapped by negatively charged DNA in nucleosome.
(D) Histones are rich in lysine and arginine
(E) A typical nucleosome contains 400 bp of DNA helix.
Choose the correct answer from the option given below.
(1) (B), (D), (E) only (2) (A), (C), (D) only
(3) (B), (E) only (4) (A), (C), (E) only

Q.55 If the length of a DNA molecule is 1.11 metres, what will be the approximate number of base pairs **[NEET-2022]**
(1) 3.3×10^9 bp (2) 6.6×10^9 bp
(3) 3.3×10^6 dp (4) 6.6×10^6 dp

Q.56 Ten *E.coli* cells with ^{15}N-dsDNA are incubated in medium containing ^{14}N nucleotide. After 60 minutes, how many *E.coli* cells will have DNA totally free from ^{15}N? **[NEET-2022]**
(1) 20 cells (2) 40 cells
(3) 60 cells (4) 80 cells

Q.57 The process of translation of *m*RNA to proteins begins as soon as **[NEET-2022]**
(1) The small subunit of ribosome encounter mRNA
(2) The larger subunit of ribosome encounters *m*RNA
(3) Both the subunits join together to bind with *m*RNA
(4) The *t*RNA is activated and the larger subunit of ribosome encounters *m*RNA,

Q.58 In an *E.coli* strain *i* gene gets mutated and its product cannot bind the inducer molecule. If growth medium is provided with lactose, what will be the outcome? **[NEET-2022]**
(1) Only *z* gene will get transcribed
(2) *z*, *y*, *a* genes will be transcribed
(3) *z*, *y*, *a* genes will not be translated
(4) RNA polymerase will bind the promoter region

Q.59 If a geneticist uses the blind approach for sequencing the whole genome of an organism, followed by assignment of function to different segments, the methodology adopted by him is called as **[NEET-2022]**
(1) Sequence annotation
(2) Gene mapping
(3) Expressed sequence tags
(4) bioinformatics

Q.60 DNA polymorphism forms the basis of

[NEET-2022]

(1) Genetic mapping
(2) DNA fingerprinting
(3) Both genetic mapping and DNA fingerprinting
(4) Translation.

Q.61 Which one of the following is the sequence on corresponding coding strand, if the sequence on mRNA formed is as follows
5′AUCGAUCGAUCGAUCGAUCGAUCG AUCG 3′? **[NEET-2023]**
(1) 3 ′UAGCUAGCUAGCUAGCUAGCUAGCUAGC 5′
(2) 5′ ATCGATCGATCGATCGATCGATCG 3′
(3) 3′ ATCGATCGATCGATCGATCGATCG 5′
(4) 5′ UAGCUAGCUAGCUAGCUAGCUAGCUAGC 3′

Q.62 Unequivocal proof that DNA is the genetic material was first proposed by **[NEET-2023]**
(1) Alfred Hershey and Martha Chase
(2) Avery, Macleoid and McCarthy
(3) Wilkins and Franklin
(4) Frederick Griffith

Q.63 Given below are two statements: **[NEET-2023]**
Statement I: In prokaryotes, the positively charged DNA is held with some negatively charged proteins in a region called nucleoid.
Statement II: In eukaryotes, the negatively charged DNA is wrapped around the positively charged histone octamer to form nucleosome. In the light of the above statements, choose the correct answer from the options given below:
(1) Both Statement I and Statement II are false.
(2) Statement I is correct but Statement II is false.
(3) Statement I is incorrect but Statement II is true.
(4) Both Statement I and Statement II are true.

Q.64 Match List I with List II. List I List II

A.	Gene ‘a’	I.	β-galactosidase
B.	Gene ‘y’	II.	Transacetylase
C.	Gene ‘i’	III.	Permease
D.	Gene ‘z’	IV.	Repressor protein

Choose the correct answer from the options given below: **[NEET-2023]**
(1) A-II, B-III, C-IV, D-I
(2) A-III, B-IV, C-I, D-II
(3) A-III, B-I, C-IV, D-II
(4) A-II, B-I, C-IV, D-III

Q.65 Frequency of recombination between gene pairs on same chromosome as a measure of the distance between genes to map their position on chromosome, was used for the first time by **[NEET-2023]**
(1) Sutton and Boveri
(2) Alfred Sturtevant
(3) Henking
(4) Thomas Hunt Morgan

Q.66 What is the role of RNA polymerase Ill in the process of transcription in Eukaryotes? **[NEET-2023]**
(1) Transcription of tRNA, 5S rRNA and snRNA
(2) Transcription of precursor of mRNA
(3) Transcription of only snRNAs
(4) Transcription of rRNAs (28S, 18S and 5.8S)

Q.67 Expressed sequence tags (ESTs) refers to **[NEET-2023]**
(1) All genes that are expressed as proteins.
(2) All genes whether expressed or unexpressed.
(3) Certain important expressed genes.
(4) All genes that are expressed as RNA.

Q.68 Given below are two statements: **[NEET-2023]**
Statement I: RNA mutates at a faster rate
Statement II: Viruses having RNA genome and shorter life span mutate and evolve faster in the light of the above statements.
Choose the correct answer from the option given below:
(1) Both Statement I and Statement II are false.
(2) Statement I is correct but Statement II is false.
(3) Statement I is incorrect but Statement II is true.
(4) Both Statement I and Statement II are true.

ANSWER KEY

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