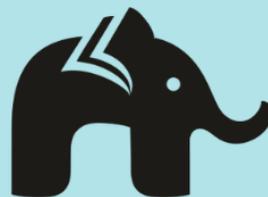


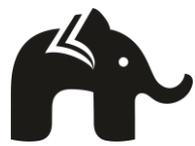


PRACTICE MCQS

CLASS 12 BIOLOGY (TERM - I)
**MOLECULAR BASIS OF
INHERITANCE**

BY
learn-o-hub
learning simplified





Question 1:

Which of the following criteria must a molecule fulfil to act as a genetic material?

- (i) It should not be able to generate its replica
 - (ii) It should chemically and structurally be stable
 - (iii) It should not allow slow mutation
 - (iv) It should be able to express itself in the form of Mendelian Characters
- (a) (i) and (ii)
 - (b) (ii) and (iii)
 - (c) (iii) and (iv)
 - (d) (ii) and (iv)

Answer: (d) (ii) and (iv)

Question 2:

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

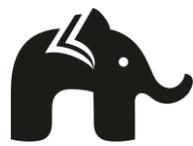
- (a) 3' (downstream) end and 5' (upstream) end, respectively of the transcription unit
- (b) 5' (upstream) end and 3' (downstream) end, respectively of the transcription unit
- (c) the 5' (upstream) end of the transcription unit
- (d) the 3' (downstream) end of the transcription unit

Answer: (b) 5' (upstream) end and 3' (downstream) end, respectively of the transcription unit

Question 3:

Which of the following is correct about mature RNA in eukaryotes?

- (a) Exons and introns do not appear in the mature RNA.
- (b) Exons appear, but introns do not appear in the mature RNA.



- (c) Introns appear, but exons do not appear in the mature RNA.
- (d) Both exons and introns appear in the mature RNA.

Answer: (b) Exons appear, but introns do not appear in the mature RNA.

Question 4:

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 polymerase.

Answer: (a) lactose is present and it binds to the repressor.

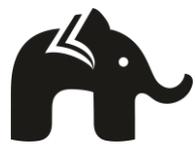
Question 5:

Oswald Avery, Colin MacLeod and Maclyn McCarty used enzymes to purify biochemicals such as proteins, DNA and RNA from the heat-killed S cells to see which ones could transform live R cells into S cells in Griffith's experiment.

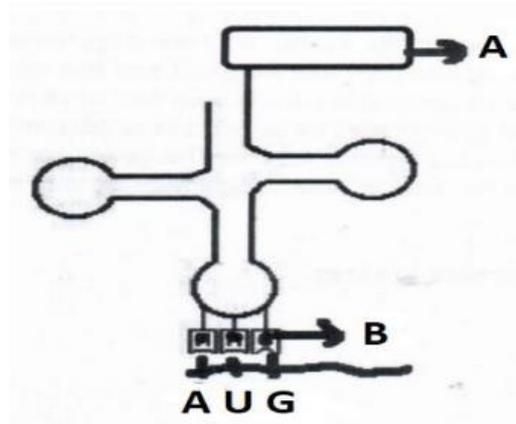
They observed that

- (a) Proteases and RNases affected transformation.
- (b) DNase inhibited transformation.
- (c) Proteases and Lipases affected transformation.
- (d) RNases inhibited transformation.

Answer: (b) DNase inhibited transformation.



Question 6:



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

	Site A	Site B
(a)	UAC	Methionine
(b)	Methionine	UAC
(c)	Methionine	AUG
(d)	AUG	Methionine

Answer: (b) Methionine, UAC

Question 7:

Short stretches of DNA used to identify complementary sequence in a sample are called

- (a) probes
- (b) markers
- (c) VNTRs
- (d) primers

Answer: (a) probes

Question 8:

Total number of nucleotide sequences of DNA that codes for a hormone is 1530. The proportion of different bases in the sequence is found to be Adenine = 34%, Guanine = 19%, Cytosine = 23%, Thymine = 19%. Applying Chargaff's rule, what conclusion can be drawn?



- (a) It is a double stranded circular DNA.
- (b) It is a single stranded DNA.
- (c) It is a double stranded linear DNA.
- (d) It is a single stranded DNA coiled on Histones.

Answer: (b) It is a single stranded DNA.

Question 9:

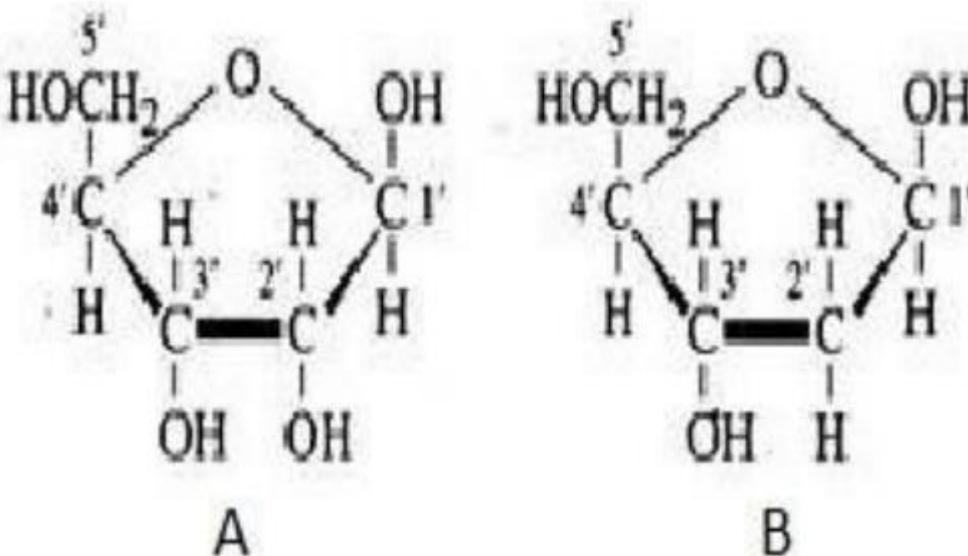
A stretch of an euchromatin has 200 nucleosomes. How many bp will there be in the stretch and what would be the length of the typical euchromatin?

- (a) 20,000 bp and $13,000 \times 10^{-9}$ m
- (b) 10,000 bp and $10,000 \times 10^{-9}$ m
- (c) 40,000 bp and $13,600 \times 10^{-9}$ m
- (d) 40,000 bp and $13,900 \times 10^{-9}$ m

Answer: (c) 40,000 bp and $13,600 \times 10^{-9}$ m

Question 10:

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 B is 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 B is 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

Answer: (b) A is having 2'-OH group which makes it more reactive and structurally unstable, whereas B is having 2'-H group which makes it less reactive and structurally stable.

Question 11:

If Meselson and Stahl's experiment is continued for sixth generations in bacteria, the ratio of Heavy strands $^{15}\text{N}/^{15}\text{N}$: Hybrid $^{15}\text{N}/^{14}\text{N}$: light $^{14}\text{N}/^{14}\text{N}$ containing DNA in the sixth generation would be

- (a) 1:1:1
- (b) 0:1:7
- (c) 0:1:15
- (d) 0:1:31

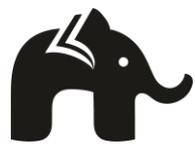
Answer: (d) 0:1:31

Question 12:

Two important RNA processing events lead to specialized end sequences in most human mRNAs:

- (i) at the 5' end, and
- (ii) at the 3' end. At the 5' end the most distinctive specialized end nucleotide,
- (iii) is added and a sequence of about 200
- (iv) is added to the 3' end.

- (a) (i) Initiator codon (ii) Promotor (iii) Terminator codon (iv) Release factors
- (b) (i). Promotor (ii) Elongation (iii) Regulation (iv) Termination.



- (c) (i) Capping (ii) Polyadenylation (iii) mG_{ppp} (iv) Poly(A).
 (d) (i) Repressor (ii) Co repressor (iii) Operon (iv) sRelease factors

Answer: (c) (i) Capping (ii) Polyadenylation (iii) mG_{ppp} (iv) Poly(A).

Question 13:

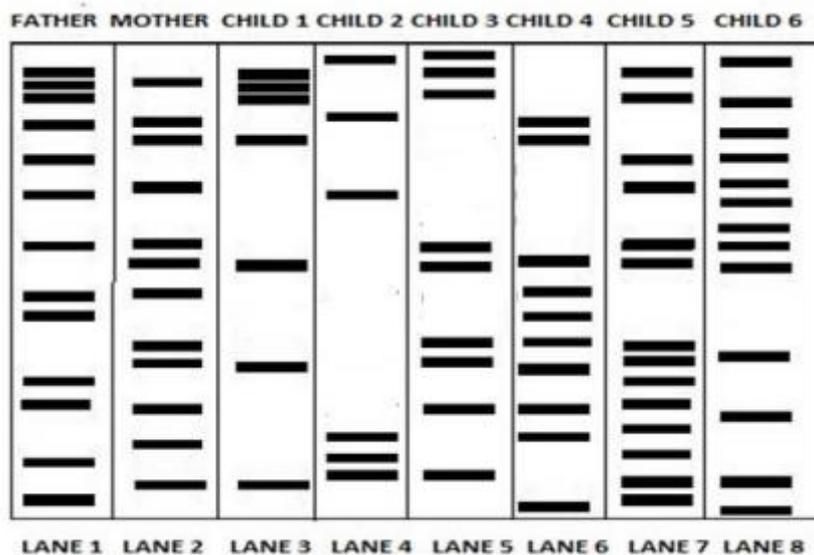
What are minisatellites?

- (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

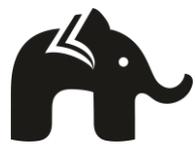
Answer: (c) Short non-coding repetitive sequence forming large portion of eukaryotic genome

Question 14:

There was a mix-up at the hospital after a fire accident in the nursery division. Which of these children belong to the parents?



- (a) All of the children

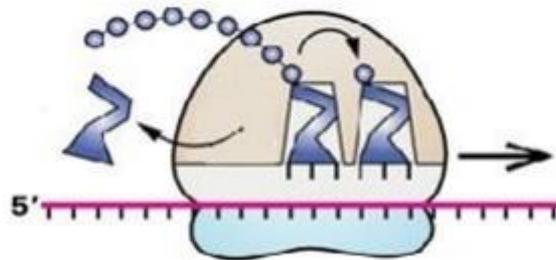


- (b) Children 2, 3 & 6
- (c) Children 1 & 3
- (d) Children 2 & 4

Answer: (c) Children 1 & 3

Question 15:

Which cellular process is shown below?

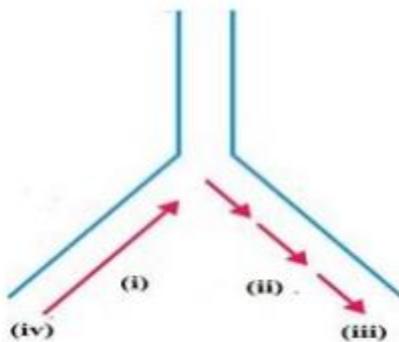


- (a) DNA Replication
- (b) Translation - Initiation
- (c) Translation - Elongation
- (d) Translation – Termination

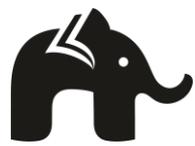
Answer: (c) Translation - Elongation

Question 16:

Origin of replication of DNA in E. coli is shown below, Identify the labelled parts (i),(ii), (iii) and (iv)



- (a) (i)- discontinuous synthesis , (ii)- continuous synthesis (iii) 3' end (iv) 5'end

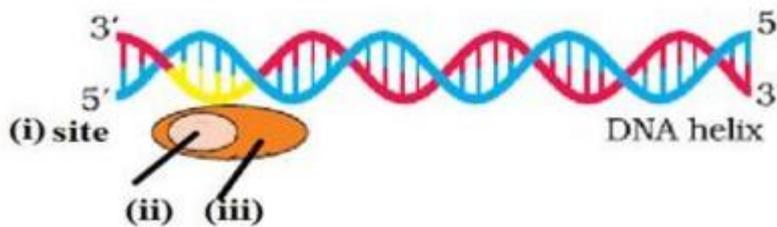


- (b) (i)- continuous synthesis , (ii)- discontinuous synthesis (iii) 5' end (iv) 3'end
- (c) (i)- discontinuous synthesis, (ii)- continuous synthesis (iii) 5' end (iv) 3'end
- (d) (i)- continuous synthesis , (ii)- discontinuous synthesis (iii) 3' end (iv) 5'end

Answer: (d) (i)- continuous synthesis , (ii)- discontinuous synthesis (iii) 3' end
(iv) 5'end

Question 17:

Transcription unit is represented in the diagram given below.



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

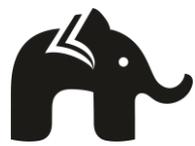
- (a) (i) Promoter Site, (ii) Rho factor (iii) RNA polymerase
- (b) (i) Terminator Site, (ii) Sigma factor (iii) RNA polymerase
- (c) (i) Promoter Site, (ii) Sigma factor (iii) RNA polymerase
- (d) (i) Promoter Site, (ii) Sigma factor (iii) DNA polymerase

Answer: (c) (i) Promoter Site, (ii) Sigma factor (iii) RNA polymerase

Question 18:

The main reason for the presence of both a leading and a lagging strand during DNA replication is

- (a) DNA polymerase can read and synthesize only in the direction of 3'-to-5'
- (b) DNA polymerase can only synthesize one strand at a time
- (c) Only one strand is available to be read at any given time
- (d) There are not enough RNA primers to have both strands be synthesized simultaneously



Answer: (a) DNA polymerase can read and synthesize only in the direction of 3'-to-5'

Question 19:

On the ribosome, mRNA binds _____ and two sites in the _____ for subsequent amino acids to bind to be close enough to each other for the formation of a peptide bond.

- (a) between the subunits; on the large subunit.
- (b) to the large subunit; on the small subunit.
- (c) to the small subunit; on the large subunit.
- (d) to the small subunit; between the subunits

Answer:(c) to the small subunit; on the large subunit.

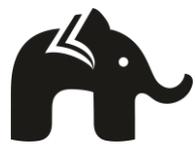
Question 20:

Which of the following is removed from initially transcribed RNA before it is transported to the cytoplasm for translation in eukaryotes?

- (a) Introns
- (b) Exons
- (c) 5' cap
- (d) Ribosome binding site

Answer:(a) Introns

Introns are the non coding sequences in newly formed mRNA which must be removed for making mRNA functional for translation.



Assertion Reason based questions:

Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:

- (a) Both A and R are true and R is the correct explanation of A
- (b) Both A and R are true and R is not the correct explanation of A
- (c) A is true but R is false
- (d) A is False but R is true

Question 21:

A: Synthesis of daughter or new strand occurs continuously along the parent 3' → 5' strand.

R: DNA polymerase can polymerise nucleotides in 3' → 5' direction on 5' → 3' strand.

Answer: (c) A is true but R is false

DNA polymerase can polymerise nucleotides only in 5' → 3' direction on 3' → 5' strand because it adds nucleotides at the 3' end.

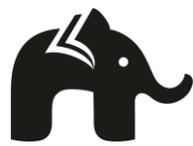
Question 22:

A: Repetitive sequences make up very large portion of human genome.

R: Repetitive sequences do not have direct coding function in the genome.

Answer: (b) Both A and R are true and R is not the correct explanation of A

Repetitive sequences make up a large portion of human genome. These sequences are nucleotide sequences that are repeated many times. They have no direct coding function but provide information about chromosome structure, dynamics and evolution.



Question 23:

A: If the sequence of bases of one DNA strand is known the sequence of other strand can be predicted.

R: Both the strands of DNA are complementary to each other.

Answer: (b) Both A and R are true and R is not the correct explanation of A

If polynucleotide chains like DNA base pairings are said to be complementary to each other. If the base sequence of one strand is known then the sequence of other strand can be predicted.

Case-Study Based Questions

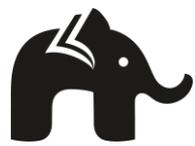
Question 24:

Transfer RNA serves as the nucleic acid decoding device that reads the triplet genetic code of messenger RNA 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 an mRNA is read by a tRNA through one of its loops, which has a triplet of anti-codon 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 adaptor 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) tRNA binds to mRNA through



- (a) anticodon loop
- (b) mRNA
- (c) D-loop
- (d) amino acids

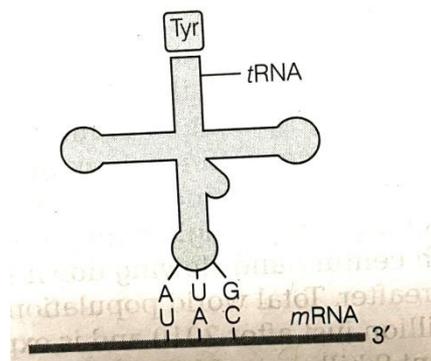
(iii) Choose the incorrect option.

- (a) tRNA has amino acid acceptor end to which it binds to amino acids.
- (b) There are no tRNAs for stop codons.
- (c) mRNAs are specific for each amino acid.
- (d) None of these

(iv) The difference between mRNA and tRNA is that

- (a) mRNA has more elaborated 3-D structure due to extensive base pairing.
- (b) mRNA bears anticodon but tRNA has codons.
- (c) tRNA has more elaborated 3D structure due to extensive base pairing.
- (d) mRNA is usually smaller than tRNA.

(v)

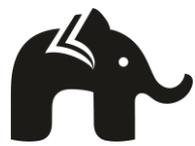


Following statements are related to the above figure of tRNA.

- 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 o amino acids.
- III. It looks like a clover leaf.
- IV. It is not specific for each amino acid.

Choose the correct option.

- (a) I and IV
- (b) II and IV



(c) I, II and III

(d) III and IV

Answer:

(i) (a) Francis Crick

Francis Crick discovered the adaptor molecule or tRNA. But its 3D structure was given by Klug in 1974.

(ii) (a) anticodon loop

tRNA binds to mRNA through anticodon loop as it bears bases complementary to those on mRNA being translated.

(iii) (c) mRNAs are specific for each amino acid.

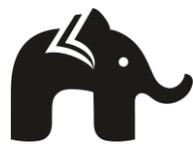
tRNAs are specific for each amino acid.

(iv) (c) tRNA has more elaborated 3D structure due to extensive base pairing. tRNA has more elaborated 3D structure than mRNA due to extensive base pairing.

(v) (c) I, II and III

Question 25:

Erwin Chargaff was one of those men, making two discoveries that led James Watson and Francis Crick to the double helix structure of DNA. At first Chargaff noticed that DNA whether taken from a plant or animal-contained equal amount of adenine and thymine and equal amounts of cytosine and guanine. These equalities provide clues into the chemical pairing that make up the double helix. In addition Chargaff also found that amounts of G, C, A and T vary



by species are indication that DNA, not protein might be the genetic material for life.

(i) Thymine is also called

- (a) 2 methyl uracil
- (b) 3 methyl uracil
- (c) 4 methyl uracil
- (d) 5 methyl uracil

(ii) In DNA 20% bases are adenine. What %age of bases are pyrimidines?

- (a) 30%
- (b) 60%
- (c) 50%
- (d) 20%

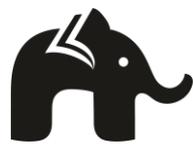
(iii) The length of DNA in a human cell is about

- (a) 2.3 m
- (b) 2.4 m
- (c) 2.2 m
- (d) 2 m

(iv) A DNA molecule in which both strands have radioactive thymidine is permitted to replicate in an environment that contains non-radioactive thymidine. What is the right number of DNA molecules which possess some radioactive thymidine post three duplications?

- (a) one such molecule
- (b) two such molecules
- (c) four such molecules
- (d) eight such molecules

(v) If the DNA strand has nitrogenous base sequence ATTGCC, the mRNA will have?



- (a) ATTGCA
- (b) UGGACC
- (c) UAACGG
- (d) ATCGCC

Answer:

(i) (d) 5 methyl uracil

Thymine and uracil have both similar structure. Thymine is also called as 5-methyl uracil.

(ii) (b) 60%

A – 20%, T – 20%

$A + T = 20 + 20 = 40\%$

$100 - 40 = 60\%$

(iii) (c) 2.2 m

The length of DNA in a human cell is 2.2 m.

(iv) (b) two such molecules

(v) (c) UAACGG
