INTERNATIONAL INDIAN SCHOOL BURAIDAH
WORKSHEET revision Ch ; Molecular basis of inheritance.

1-The enzyme DNA dependent RNA polymerase catalyses the polymerisation reaction in _____direction.

(a) only 5' → 3'

(b) only 3' → 5'

(c) both (a) and (b)

(d) none of these

2-The three codons which result in the termination of polypeptide chain synthesis are

(a) UAA, UAG, GUA

(b) UAA, UAG, UGA

(c) UAA, UGA, UUA

(d) UGU,UAG,UGA

3-DNA replication is said to be semiconservative because:

a) One strand of DNA is newly synthesized, while the other strand is conserved.

b) Both strands of DNA are newly synthesised.

c) Both strands of DNA are conserved.

d) One strand of DNA is degraded, while the other strand is newly synthesised.

4-The genetic code is said to be degenerate because:

a) Each amino acid has multiple codons

b) Each codon codes for multiple amino acids

c) The start codon codes for multiple amino acids

d) The stop codon codes for multiple amino acids

5-Which of the following statements is the most appropriate for sickle cell anaemia ?

(a) It cannot be treated with iron supplements.

(b) It is a molecular disease.

(c) It conferes resistance to acquiring malaria.

(d) All of the above.

6-The human chromosome 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.

7-Which of the following steps in transcription is catalysed by RNA polymerase ?

(a) Initiation

(b) Elongation

(c) Termination

(d) All of the above

8-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.

9-Find out the wrong statement about heterochromatin,

(a) It is densely packed

(b) It stains dark.

(c) It is transcriptionally active.

(d) It is late replicating.

10-The three codons which result in the termination of polypeptide chain synthesis are

(a) UAA, UAG, GUA

(b) UAA, UAG, UGA

(c) UAA, UGA, UUA

(d) UGU,UAG,UGA

11-Sickle cell anaemia results from a single base substitution in a gene, thus it is an example of

(a) point mutation

(b) frame-shift mutation

(c) silent mutation

(d) both (a) and (b).

12-Select the correct match of enzyme with its related function.

(a) DNA polymerase – Synthesis of DNA strands

(b) Helicase – Unwinding of DNA helix

(c) Ligase – Joins together short DNA segments

(d) All of these

13-If the sequence of bases in coding strand of DNA is ATTCGATG, then the sequence of bases in mRNA will be

(a) TAAGCTAC

(b) UAAGCUAC

(c) ATTCGATG

(d) AUUCGAUG.

14-If the sequence of bases in DNA is GCTTAGGCAA then the sequence of bases in its transcript will be

(a) GCTTAGGCAA

(b) CGAATCCGTT

(c) CGAAUCCGUU

(d) AACGGAUUCG.

Answer:

(c) CGAAUCCGUU

15-Polycistronic messenger RNA (mRNA) usually occurs in

(a) bacteria

(b) prokaryotes

(c) eukaryotes

(d) both (a) and (b)

Part-B

16-Name the enzyme that transcribes hnRNA in eukaryotes. (Delhi 2015C)

Or

Write the function of RNA polymerase-II. (Foreign 2015)

17-Write the dual purpose served by deoxyribonucleoside triphosphates in polymerisation. (2018)

18-Why does hnRNA undergo splicing? Where does splicing occur in the cell? (Delhi 2015C)

19-Name the enzyme that transcribes hnRNA in eukaryotes. (Delhi 2015C)

Or

Write the function of RNA polymerase-II. (Foreign 2015)

20-Describe the structure of a nucleosome. (Delhi 2017)

Or

Draw a labelled diagram^of a nucleosome. Where is it found in a cell? (Foreign 2014; All India 2012)

21-Show DNA replication with the help of a diagram only. (All India 2014C; Delhi 2012)

22-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. (Delhi 2015)

Or

(i) A DNA segment has a total of 1500 nucleotides, out of which 410 are guanine containing nucleotides. How many pyrimidine bases this segment possesses?

(ii) Draw a diagrammatic sketch of a portion of DNA segment to support your answer. (All India 2015)

Or

(i) A DNA segment has a total of 2000 nucleotides, out of which 520 are adenine containing nucleotides. How many purine bases this DNA segment possesses?

(ii) Draw a diagrammatic sketch of a portion of DNA segment to support your answer. (Delhi 2014)

Ans:22

(i) According to Chargaff's rule, ratio of purines to pyrimidines is equal,

i.e. A + G = C + T

The number of adenine (A) is equal to the number of thymine (T).

A = 240(given)

Therefore, T = 240

Also, the number of guanine (G) is equal to cytosine (C).

Thus, G + C = 1000 – [A + T]
G + C = 1000 – 480= 520
Hence, G = 260, C = 260
The number of pyrimidine bases,
i.e. C + T= 240 + 260 = 500

(ii) Diagrammatic sketch of portion of DNA segment

Or

(i) Given, G = 410 therefore, C = 410
A + T = 1500 – (G + C)
= 1500 – 820 = 680
Hence, A = 340; T = 340
The number of pyrimidine bases, i.e.
C + T = 410 + 340 = 750

(ii) Refer to above figure.
Or
(i) Given, A = 520
therefore, T = 520
A + T = 520 + 520 = 1040
Total number of nucleotides = 2000
G + C = 2000 – 1040 = 960
G = 960/2 = 450
Hence, total number of purine bases are
⇒A + G = 520 + 480 = 1000
(ii) Refer to above figure.