63/2 (SEM-1) BIT 104

2021

(held in 2022)

BIOTECHNOLOGY)

(Theory Paper)

Paper Code : BIT-104

(Genetics)

Full Marks – 80

Time – Three hours

The figure in the margin indicate full marks for the questions.   i)

1. Answer any *eight* of the following questions :

    1×8=8

    (a) Split genes are characteristic of

    (i) Eukaryotic Cells Genome

    (ii) Prokaryotic Cell Genome

    (iii) PPLO Genome

    (iv) Random Occurrence

[Turn over

(b) The proteins which are attached with eukaryotic DNA are

   (i) Transferrin and Elastin

   (ii) Protamine and Histone

   (iii) Transferring and Histone

   (iv) Histone and Transferrin

(c) Nucleosome comprise of ——— base pair of DNA on it in absence of H1.

   (i) 166 bp

   (ii) 146-147 bp

   (iii) 200 ± 40

   (iv) All of these (in different conditions)

(d) Criss-cross inheritance is generally observed in

   (i) X-Linked Inheritance

   (ii) Y-Linked Inheritance

   (iii) Sex-Linked Inheritance

   (iv) Pseudoautosomal Inheritance

(e) Heteroplasmy refers to presence of

   (i) More than one mtDNA in the same mitochondria or different mitochondria within the same cell

   (ii) Only one mtDNA in the same mitochondria or different mitochondria within the same cell

   (iii) Same type of mtDNA in the same mitochondria

   (iv) More than one chloroplast DNA in the same chloroplast or different chloroplast within the same cell

(f) What is transition ?

(g) The relation between linkage and appearance of new trait is

   (i) Linkage is directly proportional to appearance of new trait

   (ii) Linkage is inversely proportional to appearance of new trait

   (iii) Linkage and appearance of trait is a concidence

   (iv) None of these

(h) F pili are tubes for conjugation in bacteria and are present in

   (i) F+   (b) F+ and Hfr

   (iii) F−   (iv) Hfr

(i) The phenotypic ratio of a dihybrid cross is 9:7 in F_2 generation which is

   (i) Complementary Gene Interaction

   (ii) Supplementary Gene Interaction

   (iii) Epistasic Gene Interaction

   (iv) Pleiotropic Gene Interaction

(j) What are tumour suppressor gene ?

(k) Fingerprinting experiment with 16SrRNA and 23sRNA is also known as

   (i) Chlorotyping   (ii) Mitotyping

   (iii) Ribotyping   (iv) None of these

2. Write short note on :   2×1=2

   (a) Genetic Drift Or (b) Migration   Or

   (c) Bottleneck effect.

3. Distinguish between any *five* :   2×5=10

   (a) Polygenic Trait and Monogenic Trait

   (b) Sterility and Infertility

   (c) rRNA and rDNA

   (d) Population and Community

   (e) F+ and F− Bacterial strain

   (f) Nucleotide Excision Repair and Base Excision Repair

   (g) Organelle Genome and Nuclear Genome.

4. Write short notes on any *four* :   5×4=20

   (a) Endosymbiont theory

   (b) 16S rRNA typing

   (c) Molecular Taxonomy

   (d) DNA Repair

   (e) Metastasis

   (f) Sex Linked Disorders

   (g) DNA Packaging

   (h) DNA Barcoding

   (i) Comparative Genomics.

5. Answer any *two* of the following questions :

$8 \times 2 = 16$

(a) Describe the role of : $2 \times 4 = 8$

   (i) Homeotic Gene

   (ii) Hox Gene

   (iii) Gap Gene

   (iv) Pair rule Gene.

(b) Define p and q arm of chromosome. Differentiate chromosome on the basis of centromere. Give a brief nomenclature of human chromosome.

8

(c) 'Gene flow and Migration are the wheels of population genetic'. – Justify.

8

(d) Describe the different pathways of apoptosis.

8

6. Answer any *two* of the following questions :

$12 \times 2 = 24$

(a) Describe different types of DNA repair.

12

(b) Describe Haldane's Rule with suitable examples. $2 + 10 = 12$

(c) What are markers ? Describe different types of molecular marker. $2 + 10 = 12$

(d) What is Hardy-Weinberg law ? Mention the attributes of the law. Mention the importance of Hardy-Weinberg law with special reference to the allelic distribution in a population. $2 + 2 + 8 = 12$

(e) Describe different types of non-mendelian inheritance with suitable examples. 12

(f) What is molecular taxonomy ? Mention its role in the study of phylogenetic relationships. $5 + 7 = 12$

(g) What is mutation ? What are the different types of mutation ? What is the significance of mutation in evolution of characters. $1 + 8 + 3 = 12$