Total number of printed pages = 5

63/2(SEM-3) ZOO-303

2022

(Held in 2023)

ZOOLOGY

(Theory Paper)

Paper Code : ZOO-303

(Genetics, Cytogenetics and Genetic Engineering)

Full Marks – 80

Pass Marks – 32

Time – Three hours

The figures in the margin indicate full marks for the questions.

1. Answer the following Multiple-choice Questions (*all* compulsory) : 1×6=6

(a) In heterozygote genotype, if both alleles are expressed, then it is a

(i) Codominant

(ii) Completely dominant

(iii) Epistatic

(iv) Incompletely dominant

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(b) In G-Banding technique, the evident bandings are

(i) GC rich euchromatin

(ii) GC rich facultative heterochromatin

(iii) AT rich facultative heterochromatin

(iv) AT rich constitutive heterochromatin

(c) Prader-Willi syndrome, characterized by obesity and poor sexual development, occurs due to

(i) Segments of chromosome 5 undergo deletion

(ii) Segments of chromosome 5 undergo duplication

(iii) Segments of chromosome 15 undergo deletion

(iv) Segments of chromosome 15 undergo duplication

(d) A drastic reduction effect in a species' population because of landslide affecting the gene pool of the population is known as

(i) Bottleneck effect (ii) Founder effect

(iii) Genetic drift (iv) Sampling error

(e) The mtDNA does not code for

(i) Cytochrome b (ii) Histone protein

(iii) rRNA (iv) tRNA

(f) The common vector used for sequencing human genome is

(i) YAC (ii) Plasmid

(iii) Cosmid (iv) M13

2. Answer the following Short answer type Questions (*all* compulsory) : 2×5=10

(a) Why are Plasmids considered suitable vectors for cloning ?

(b) What do you mean by Genotype frequency and Allele frequency ?

(c) Define threshold traits in population genetics.

(d) How does genetic drift affect the genetic makeup of a population ?

(e) What is the function of satellite region in a chromosome ?

3. Answer any *six* of the following questions : 5×6=30

(a) Which modifying enzymes are used in Genetic engineering ?

(b) Illustrate genomic imprinting with an example.

(c) Illustrate the role of methylation and acetylation in chromatin structure.

(d) Distinguish between Linkage and Physical mapping.

(e) Describe the Hardy-Weinberg law.

(f) Describe the similarities between mitochondrial structure and prokaryotic cells according to Endosymbiotic theory.

(g) Distinguish between essential genes and lethal alleles.

(h) Distinguish between penetrance and expressivity of a genotype in a population.

(i) Write a short note on Telomerase.

4. Answer any *two* of the following Long answer type Questions : 10×2=20

(a) What is the difference between genotypic and genic sex determination ? Describe the sex determination in Drosophila. 4+6=10

(b) What do you mean by transformed cells ? Describe the characteristic symptoms, types, mechanism of cause, diagnosis and treatments of Burkitt's Lymphoma. 3+7=10

(c) How are genome libraries constructed ? Write about the different methods to identify the desired clone from the library. 5+5=10

5. Answer any *one* of the following Very long answer type Questions : 14×1=14

(a) Why are chromosome banding techniques considered an important tool in genetics ? Illustrate the different types of chromosomal aberration with suitable examples. 5+9=14

(b) What do you mean by genotype frequency and allele frequency ? In a population of 450 numbers of individual with the genotypes RR=63, RS=42, SS=98, ST=88, TT=67, RT=92. Calculate the genotype frequency and allele frequency of R, S and T. 5+9=14