

2016

ZOOLOGY

(Major)

Paper : 4-2

(Genetics)

Full Marks : 60

Time : 3 hours

The figures in the margin indicate full marks for the questions

1. Answer the following as directed : 1×7=7

(a) What term is used to denote the dominant gene that stops the expression of another dominant gene of a different locus?

(b) Trinucleotide nub occurs in mRNA/tRNA/rRNA/hnRNA.

(Find out the correct answer)

(c) What is a pro-virus?

(d) Name the type of ionizing radiation which is produced by decay of some radioactive isotopes.

- (e) _____ is the amino acid that initiates the translation process during protein synthesis. (Fill in the blank)
- (f) Express the chromosome number in nullisomy.
- (g) Down's syndrome arises due to non-disjunction of 21st chromosome during meiosis. (State True or False)
2. Give brief answer to the following : $2 \times 4 = 8$
- (a) Mention the type of cross which is done between F_1 hybrid and its homozygous recessive parent. Show the result of this cross in percent taking the cross between a tall and a dwarf pea plant as an example.
- (b) Distinguish between autopolyploids and allopolyploids.
- (c) Give at least two positive consequences of mutation.
- (d) Write the differences between transformation and transduction in bacteria.
3. Answer any *three* questions from the following :
- (a) Define inversion. Explain different types of inversion and mention one genetic consequence of inversion. $1+3+1=5$

(b) Explain coupling phase and repulsion phase of linkage with appropriate examples. 5

(c) How can the mitochondrial DNA be distinguished from nuclear DNA? Give brief account of the inheritance of mitochondrial DNA. 2+3=5

(d) Who first suggested the triplet nature of genetic codes? Write the important features of genetic code. 1+4=5

(e) Explain how the non-ionizing radiations affect the cytogenetic setup of a living cell. 5

4. Define multiple allele. Write the characteristics of multiple alleles. Explain this phenomenon taking human ABO blood groups and their inheritance. 1+3+6=10

Or

What is an operon? Describe the mechanism of gene regulation with the help of *lac* operon concept. 2+8=10

5. In which cellular process the synaptonemal complex is formed? Illustrate the structure of a synaptonemal complex and write its significance. 1+6+3=10

Or

Mention various enzymes and proteins required for DNA replication. Describe the major stages of the replication process. Write how the leading strand differs from a lagging strand. $2+6+2=10$

6. Explain how the sex of an individual is determined by a balance between the genes for maleness and that for femaleness. Add a note on the involvement of SRY gene in testis differentiation. $6+4=10$

Or

What is an idiogram? Write about the nomenclature of different chromosomes of human karyotype. Mention briefly the salient features of Human Genome Project. $1+5+4=10$
