2015

ZOOLOGY

Paper : 102 (Old Course)

GENES & GENETICS

Full Marks : 80

Time : 3 hours

The figures in the margin indicate full marks for the questions

1) Answer the following multiple choice questions (any eight) 1 x 8=8

i) The DNA strains having base sequence of AGCTTCGA is acting as template for RNA, then what will be the base sequence of its mRNA

a) TCGAAGCT b) UGGAAGCU

c) UCGAAGCU d) None of these

ii) The Cross between true breeding red flowered snap-dragon with true breeding white flowered one give all F1 generation pink, what does it indicates about its parental traits?

a) Red is dominant

b) Both red and white are recessive

c) Red and white shows incomplete dominance

d) Red and white are co-dominant 1

iii) A Chromosome aberration leads to change in the order of genes in genetic map but does not alter its linkage group. This is due to

a) Translocation b) Recombination

c) Transposition d) Inversion

iv) Which of the following is INCORRECT in relation to transversion mutation

a) A mutation from a purine–pyrimidine base pair to a pyrimidine–purine base pair

b) Chances of transversion mutation is two times greater compared to transition mutation

c) Only (a) is correct

d) Both (a) and (b) are correct

v) In lac operon of E. coli when lactose is present with glucose and low cAMP then the result will be

a) Low Transcription

b) No transcription

c) Translation starts

d) High Transcription

vi) According to Mendel's trihybrid ratio

(a) Combination of characters produces 27 different genotypes in F2 generation

(b) The phenotypic ratio was 27:9:9:9:3:3:3:1.

(c) F2 generation has 7 phenotypes.

(d) A total of 64 combinations in F2 generation 1

vii) In an experiment where two populations of true-breeding pea plants with YELLOW ROUND seeds and GREEN WRINKLED seeds were crossed, all F1 plants yield yellow round seeds. When self-fertilized the F1, the F2 generation yields a mixture of yellow round, yellow wrinkled, green round and green wrinkled seeds. What does this tell you about the alleles for seed color and shape?

(a) the recessive alleles are always expressed

(b) the alleles are on different chromosomes

(c) the two alleles for each character segregate during gamete production

(d) both genes are on the same chromosome

viii) A population of 200 individuals in Hardy-Weinberg equilibrium has allele frequency of 'A' = 0.7 and 'a' = 0.3. The number of heterozygotes (Aa) in population will be

a) 18 b) 42 c) 96 d) 84

ix) In polytene chromosome some large puff like structure is observe which is known as

a) Balbiani ring

b) Primary constriction and centromere

c) Secondary constriction and satellite

d) None of the above

x) Bacteriophage T4 infects E. coli and injects its DNA inside the host cells. Despite of having all promoters on viral genome, the control takes place at

a) Promoter strength

b) Synthesis of new polymerase

c) Modification of host RNA

d) Turn over the rate of RNA synthesis

2) Answer the following short type questions (any five) 2 x 5=10

i) Why the bacterial restriction enzyme cleave foreign DNA but not its own genome? 2

ii) What is the role of Y chromosome in sex determination?? 2

iii) What are the factors that violate Hardy-Weinberg's Law? 2

iv) "Transposable elements helps is gene evolution" - Justify the statement 2

v) What do you mean by polymorphism ? 2

vi) What are lethal genes? 2

3) Answer the following (any four) 5 x 4=20

i) Explain Mendel's First Law of inheritance and how do you confirm the monohybrid ratios? 5

ii) What is human genome project? Write its importance. 5

iii) Distinguish between pseudogenes and overlapping genes. 5

iv) Describe DNA fingerprinting and its significance. 5

v) Describe the importance of telomere in human Chromosome? 5

4) Answer the following long type question (any two) 9 x 2=18

i) Illustrate Non-Mendelian Inheritance with suitable examples? Write the organization and evolution of cell organelles. (4+5)

ii) Explain chromosomal abnormalities? How it effects on the evolution of organism? (3+3+3)

iii) What do you mean by mutation? What are the different types of mutagens? Describe the different mechanism of DNA repair. (2+3+4)

5) Answer the following very long type question (any two) 12 x 2=24

i) What is extension to Mendelian Genetics? How do Mendelian extensions violate the general Mendelian genetic principles? How do you criticize Mendel's genetic principles? (3+4+6)

ii) Describe the different mechanism of genetic transfer in bacteria. Explain the transformation process trough Griffith's experiment. (7+5)

iii) What is bacteriophage? Describe the structure of T4 and Bacteriophage. Explain the lyticlife cycle of the bacteriophage (3+4+5)

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