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Your Roll No. . .

5181

B.Sc. Prog. / II J

LS-204 GENETICS, GENOMICS AND MOLECULAR BIOLOGY

(Admissions of 2008 and onwards)

Time : 3 Hours **Maximum Marks : 75**

(Write your Roll No on the top immediately on receipt of this question paper)

Question No. 1 is compulsory

Attempt five questions in all.

All questions carry equal marks.

1. (a) Write down the genomic formulae of individuals showing Down's, Turner's and Klinefelter's syndromes

   (b) What are the antigen and antibody components of blood groups A, B and O ?

   (c) Draw the chemical structure of an acidic and basic amino acid.

   (d) Where is transcription initiated ? What role do transcription factors play in this process ?

(e) What do you understand by Teminism ?

(f) Why does adenine normally pair with thymine and guanine with cytosine in a DNA molecule ?

(g) Write down the consensus sequence and localization of Pribnon's box in prokaryotes

(h) What is the difference between a proto oncogene and an oncogene ?

(i) There are 64 codons that code for 20 amino acids Explain

(j) What is the difference in the inheritance pattern of a cytoplasmic and a nuclear gene ? $1\frac{1}{2} \times 10 = 15$

2 (a) What are the deviations from Mendel's laws ? What could Mendel not discover these deviations ? 5

(b) Explain the following terms

Back cross, Test cross, Pure line, Allele, Forked line method 5

(c) In pea, tall vine (Le) is dominant over dwarf (le), Green pods (Gp) over yellow (gp) and round seeds (R) over wrinkled (r). A homozygous dwarf, green, wrinkled pea plant is crossed to a homozygous tall, yellow, round plant Using forked line method, give the genotypes and phenotypes of parents, F_1 & F_2 progenies 5

3 Answer the following with **diagrams** only :

(a) Experimental proof of crossing over

(b) Outcome of crossing over in a pericentric inversion **7 ½ × 2 = 15**

4 Briefly explain the following

(a) Hemophilia

(b) Nucleosome

(c) Recessive epistasis **5 × 3 = 15**

5. (a) Describe the mechanism of Lactose synthesis in E coli by a Lac-operon system Explain the positive and negative control system. **10**

(b) In guinea pigs, white coat (w) is recessive to black coat (W) and wavy hair (V) is recessive to straight hair (V) A pig homozygous for white coat and wavy hair is crossed to a pig with black and straight hair The F_1 progeny is then crossed with pigs having white coats and wavy hair in a series of test crosses The following progeny are produced from these test crosses

Black, straight	=	300
White, straight	=	120
Black, wavy	=	100
White, wavy	=	310
Total	=	831

Using the above data, calculate the recombination frequencies between the involved markers **5**

6 Differentiate between any **three :**

(a) Euploidy and Aneuploidy

(b) Maternal effects and maternal inheritance.

(c) DNA polymerase and RNA polymerase.

(d) Alkylating agents and Deaminating agents as mutagens. **5 × 3 = 15**

7 (a) Describe the molecular basis of mutations Which in your opinion is going to be more lethal-a mis-sense or a non-sense mutation?

(b) Describe the Clover leaf model to explain tRNA structure

(c) Describe the elongation cycle of protein synthesis in prokaryotes diagramatically only. **5 × 3 = 15**

8 (a) Describe the mechanism of splicing of a eukaryotic mRNA.

(b) Describe the role of apoptosis in human diseases

OR

Briefly write about the types of cancers

7½ × 2 = 15
