COURSE CODE (CREDITS): 18B11BT311(4)   MAX. MARKS: 35

COURSE NAME: Genetics

COURSE INSTRUCTOR: Dr. Sudhir Kumar   MAX. TIME: 2 Hours

Note: All questions are compulsory. Marks are indicated against each question in square brackets.

Q1 a) A woman has a rare abnormality of the eyelids called ptosis, which makes it impossible for her to open her eyes completely. The condition has been found to depend on a single dominant gene P. the woman's father had ptosis, but her mother had normal eyelids. Her father's mother had normal eyelids. i) What are the probable genotypes of the woman, her father and mother? ii) What proportion of her children will be expected to have ptosis if she marries a man with normal eyelids?

b) In human families it is often observed that certain characteristics may "skip" a generation, then reappear. How would you explain this in the light of the facts given by Mendel?

COI   [2.5+2.5]

Q2: a) In a population of 1500 magical mice, green fur is dominant over orange. If there are 300 orange mice in a population of 1500, find the following (assume population is in Hardy-Weinberg equilibrium): i) Frequency of dominant (green) allele   ii) Frequency of recessive (orange) allele iii) Frequency of homozygous dominant, heterozygous and homozygous recessive genotypes.

b) All members of an isolated village were genotyped for a particular RFLP. Of the 1000 individuals, 200 were homozygous for the presence of the restriction site, 700 were heterozygous, and 100 were homozygous for its absence. What is the frequency of the "restriction site present" allele, p?

COV   [2.5+2.5]

Q3: a) Does Hardy- Weinberg principle apply to human population? Support your answer with logical reasoning.

b) What principle did the fluctuation test of Luria and Delbruck establish?

COIV   [2.5=2.5]

Q 4 a) A wild-type chromosome can be represented as ABC*DEFGH, and from this a chromosomal aberration arises that can be represented as ABC*FEDGH (* = centromere). How will chromosome pair together during meiosis and explain the type of aberration and its implications to human beings.

b) What is the difference between an allopolyploid and an autopolyploid? Support your answer with the help of an example.   COIV   [2.5+2.5]

Q 5 a) How did the discovery of three categories of petite mutations in yeast lead researchers to postulate extranuclear inheritance of colony size?   **PTO**

1

b) 02 Ovules were selected from green branch of *Mirabilis* plant and 02 pollens were selected from; one each from white branch and other from variegated branch. What will be the colour of progeny in F1 and why?   COIII   [2.5+2.5]

Q6: a) If two parents are heterozygous for a genetically inherited autosomal dominant trait, what is the probability that they will have a child who has this trait in his or her phenotype?

b) The diploid number of an organism is 20. How many chromosomes would be expected in an individual having triploidy and why?

c) If observed DCOs in a cross are seen as 0.077 in place of expected (.096). Calculate the value of interference.   CO II   [2+2+1]

Q7: a) There is a case of accidental babies swapping in a hospital. As an expert in Genetics. How do will solve the case? Justify your answer with logical reasoning.

b) A family is having a history of genetic disorder. Does it ethical to go for predetermination of sex of the foetus? What are the implications linked with it.

CO VI   [2.5+2.5]

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