

KATHMANDU UNIVERSITY
End Semester Examination [C]
December, 2024

Marks Scored:

Level : B.Tech.

Year : II

Exam Roll No. :

Time: 30 mins.

Course : BIOT 202

Semester : I

F. M. : 20

Registration No.:

Date : 13 DEC 2024

SECTION "A"

[10Q. × 1 = 10 marks]

Choose and mark [X] encircle the most appropriate option from each set of choices

- At the hospital, a case was filed against the progeny being switched. To solve the case, the doctors used blood types. Parents' blood group genotypes were $I^A I^o$ and $I^A I^B$. What was the blood group of the child who had been mistakenly identified as theirs?
 A B AB O
- A colorblind man has a brother who is not colorblind and a sister who is colorblind. What should the parents' phenotypes be?
 Normal father, colorblind mother they're both colorblind
 Father is colorblind, mother is a carrier they're both normal
- Percentage of crossing over is more when _____.
 genes are located in a different cell genes are not linked
 linked genes are located close to each other linked genes are located far apart
- _____ is a sex-linked disorder
 Hemophilia Huntington
 Bombay phenotype Down syndrome
- _____ represents Protenor mode of sex determination
 XX/XY XX/XO ZZ/ZW XX/YO
- A genetic disease is transferred from a phenotypically normal but a carrier female to only some of the male progeny. The disease shows _____ pattern of inheritance.
 autosomal dominant autosomal recessive
 X-linked dominant X-linked recessive
- After cross-fertilization of true-breeding tall and dwarf plants, the F1 generation was self-fertilized. The resultant plants have genotype in the ratio
 1:2:1 (homozygous tall: heterozygous tall: dwarf)
 1:2:1 (heterozygous tall: homozygous tall: dwarf)
 3:1 (tall: dwarf)
 3:1 (dwarf: tall)
- Which of the following statements on inversion of chromosomes is FALSE?
 Inverted chromosomes are generally viable
 Inversion can cause chromosome breakage
 Two DNA strands with an inverted segment will not pair
 Inversion including centromere is known as paracentric.

9. Farmers often practice polyploidy as _____
 It makes the plants more durable
 They take longer time to undergo meiosis
 It increases complexity and there is a hope of new species
 It produces larger plant parts and products
10. Two chromosomes 1- A—B—C—D—E and 2- F—G—H— I undergo reciprocal translocation. Which of the following will NOT BE TRUE?
 New sequence at 1 will be C—D—E—F—G
 The 1 will then pair with both 1' and 2'
 Pairing will be between same gene loci only
 2nd chromosome will become longer

Fill in the blanks

[5Q. × 1 = 5 marks]

11. The probability of getting CcWw from the cross CcWw X Ccww is _____.
12. Huntington disease is due to _____ lethal allele.
13. The number of X chromosomes in a Klinefelter male is _____.
14. The unit factors defined by Mendel are today known as _____.
15. Red-Green color blindness is an X-linked _____ trait.

Define the following

[5Q. × 1 = 5 marks]

16. Recessive lethal allele:
17. Metacentric chromosome:
18. Holandric genes:
19. Eugenics:
20. Turner syndrome:

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SECTION "B"

[7Q. × 5 = 35 marks]

Attempt ALL questions.

1. Discuss with example(s) how gene duplication favors evolution.
2. Explain different patterns of inheritance of petite mutation in *Saccharomyces*.
3. Discuss temperature dependent sex determination in reptiles.
4. Write short note on "Application of Genetics in Medicine".
5. Explain how dosage compensation balances the expression of X-linked genes in humans.
6. In chickens, a condition referred to as "creeper" exists whereby the bird has very short legs and wings, and appears to be creeping when it walks. If creepers are bred to normal chickens, one-half of the offspring are normal and one-half are creepers. Creepers never breed true. If bred together, they yield two-thirds creepers and one-third normal. Propose an explanation for the inheritance of this condition.
7. An organism of the genotype AaBbCc was testcrossed to a triply recessive organism (aabbcc). The genotypes of the progeny were as follows:

20 AaBbCc	20 AaBbcc
20 aabbCc	20 aabbcc
5 AabbCc	5 Aabbcc
5 aaBbCc	5 aaBbcc

- a. If these three genes were all assorting independently, how many genotypic and phenotypic classes would result in the offspring, and in what proportion, assuming simple dominance and recessiveness in each gene pair?
- b. Answer part (a) again, assuming the three genes are so tightly linked on a single chromosome that no crossover gametes were recovered in the sample of offspring.
- c. What can you conclude from the actual data about the location of the three genes in relation to one another?

P.T.O.

SECTION "C"

[20 marks]

8. Give **TWO** differences between **ANY FIVE** [5 Q. × 2 = 10 marks]
- a. Infectious heredity and Maternal effect.
 - b. Monosomy and Partial monosomy
 - c. Sex influenced and Sex linked inheritance
 - d. Dominant and Recessive genes.
 - e. Test cross and Back cross.
 - f. Single cross over gametes and Double cross over gametes.
9. Explain **WHY/HOW** for **ANY FIVE** [5 Q. × 2 = 10 marks]
- a. Nutrition can influence the expression of a gene.
 - b. The number of parental gametes is higher than recombinant gametes.
 - c. Transmission genetics is also known as Mendelian genetics.
 - d. Partial dominance and co-dominance are similar in certain aspects.
 - e. Mitochondrial DNA can be used to trace maternal lineage.
 - f. Down Syndrome is a trisomy condition.