VCD/ 9/12/23 **FYBT SEMESTER I GENETICS 2 ½ Hours 75 Marks**

NOTE:

1. Attempt **all** questions.
2. **All questions** carry **equal** marks.
3. Draw **neat labeled diagrams** wherever necessary.
4. For **Q 2, Q 3 and Q 4** attempt A and B **OR** C and D.

Q 1 Do as directed: (Any fifteen) **15**

1. Define phenotype.
2. Who is considered the father of genetics?
3. Phenotypic ratio of dominant epistasis.
4. What is the product rule of probability?
5. Define molecular genetics.
6. If one gene has five alleles, calculate the number of possible genotypes using formula.
7. State true or false. Flower color in snapdragons is an example of codominance.
8. Give me an example of gene interaction that leads to new phenotype.
9. Which of the following bacteria has been extensively used for genetic analysis?
   A. Bacillus subtilis
   B. E.coli
   C. S.aureus
   D. Pseudomonas species.
10. What are auxotrophs?
11. State true or false " E.coli strain with the genotype trp-ade-thi will not grow on minimal medium."
12. Which of the following bacterial recombination process is followed by direct physical contact between two bacterial cells?
    A. Transformation
    B. Conjugation
    C. Transduction
    D. None of the above.
13. What are competent cells?
14. State true or false "Virulent phages can follow either lytic or lysogenic pathway"
15. 25 individuals in a population are homozygous dominant, then the individuals that are expected to be homozygous recessive are
    (a) 100 (b) 75 (c) 50 (d) 25
16. _____ is the branch of genetics which deals with the study of genotype and allelic frequencies in a population.
17. State true or false:- Pitcairn islands are a group of four volcanic islands in the southern pacific ocean,is an example of the founder's effect.
18. Industrial melanism of moths in England is an example of _____ phenomenon acting as an evolutionary factor.

19. State true or False:- Gene pool is the set of all genes in a population
20. Consider the following statements:
I. A pollen grain from one population is blown to the area of another population where it lands on the pistil of a flower, fertilizing it.
II. A bacterium's gene sequence changes due to a DNA replication error, giving the bacterium resistance to a certain antibiotic.
Which of the statements describes at least one new allele entering a population?

Q 2 A How to calculate the probability of genotypes and phenotypes of dihybrid cross with the help of a branch diagram? **08**

Q 2 B Explain the principle of segregation with the help of monohybrid cross. **07**

OR

Q 2 C Give a detailed note on multiple alleles with the help of an example. **08**

Q 2 D What is epistasis? Explain recessive epistasis with the help of cross. **07**

Q 3 A With a neat labeled diagram give a brief account of an interrupted mating experiment. **08**

Q 3 B Define transduction. Add a note on specialized transduction. **07**

OR

Q 3 C Define conjugation and transconjugants. Discuss in detail F factor. **08**

Q 3 D Discuss in detail how a transformation can be used to determine the gene order. **07**

Q 4 A Cooke and Ryder (1971) studied the nestlings of Ross's goose, a small Arctic nesting goose. Goslings (baby geese) exist in two color morphs, White or yellow. Cooke and Ryder reported that a population of geese at Karrack Lake, Canada included 250 white goslings and 750 yellow goslings (1000 total). They assumed that color is controlled by two alleles at a single locus. Calculate the frequencies of all three possible genotypes, assuming that yellow is dominant and that the population is in Hardy-Weinberg equilibrium. **08**

Q 4 B State Hardy- Weinberg Law and explain its assumptions. **07**

OR

Q 4 C The geneticist P. M. Sheppard (1959) carried out a selection experiment on a laboratory population of the fruit fly *Drosophila melanogaster*. The stubble allele, (S) which affects the bristle shape of the fly, is dominant to the normal wild-type allele (s) Flies that are homozygous for stubble always die during embryonic development. Sheppard started out with 86% normal flies and 14% stubble flies. Calculate the allele frequencies. Calculate the genotype frequencies for the alleles. **08**

Q 4 D Read the following passage and answer the following questions: - **07**
Did you know that elephant seals in the Northern Pacific have a signature asymmetrical face that is extremely rare among other populations of elephant seals? This is because an evolutionary force called a bottleneck event acted upon their gene