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B. Sc. Bio Technology (NCF-NEP) (Sem.-III) Examination March - 2026

Fundamentals of Genetics - Major II

Time: 1 Hour] **[Total Marks: 25**

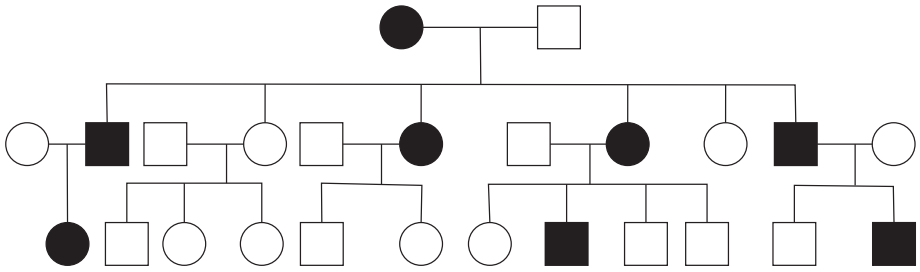
સૂચના : / Instructions
(1) ઉપરોક્ત દર્શાવેલ વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fill up strictly the above details on your answer book

Seat No.:

Student's Signature

Q.1. Short question (Any 5 out of 6) **05**

a. What is the phenotypic ratio in the F2 generation of a dihybrid cross ?
b. What is the difference between linked genes and unlinked genes ?
c. Given below is a pedigree chart showing the inheritance of a certain sex-linked trait in humans, the trait traced in the below pedigree chart is



d. Define complete dominance
e. In a dihybrid cross (AaBb x AaBb), what is the probability of obtaining an offspring that is homozygous recessive for both traits (aabb).
f. Mention types of translocation.

Q.2. Short Note (Any 2 out of 3) **10**

a. Explain incomplete dominance and codominance with suitable examples. How do the phenotypic and genotypic ratios differ in these inheritance patterns as compared to Mendehan inheritance?

b. In a population of 2,000 individuals, agene has two alleles: A(dominant) and a (recessive) It is known that 160 individuals in the population exhibit the recessive phenotype (aa). Assuming the population is in Hardy-Weinberg equilibrium-
   I. Calculate the frequency of the recessive allele (a) and the dominant allele (A)
   II. Determine the number of heterozygous individuals in the population
   III. If the population size doubles, and the allele frequencies remain constant how many individuals are expected to show the dominant phenotype?

c. Using Mendel's principle of segregation, illustrate a monohybrid cross between a homozygous tall pea plant (TT) and a homozygous dwarf pea plant (tt) Construct the Punnett square for the FI and F2 generations, and analyse the phenotypic and genotypic ratios obtained.

Q.3. Short note (Any 2 out of 3) **10**

a. Write note on Numerical chromosomal aberration
b. Describe how Fluorescent In Situ Hybridization (FISH) is used to detect chromosomal abnormalities with an example.
c. Explain Thomas Hunt Morgan's experiment on gene linkage in *Drosophila melanogaster*, Describe the experimental design, observations, and conclusions.