



Name :

Roll No. :

Invigilator's Signature :

CS/B.SC(H)/GENETICS/SEM-3/PEG-304/2011-12

2011

POPULATION AND EVOLUTIONARY GENETICS

Time Allotted : 3 Hours

Full Marks : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following : 10 × 1 = 10
- i) Who wrote on the origin of species by means of natural selection' ?
 - a) J. B. de Lamarck b) C. Darwin
 - c) Weisman d) E. Darwin.
 - ii) Genetic drift tends to reduce genetic variability
 - a) between the populations
 - b) within a small population
 - c) within a large population
 - d) in another population.
 - iii) The study of the fossil plant is known as
 - a) Palaeontology b) Palaeobotany
 - c) Palynology d) none of these.
 - iv) Out-crossing is the avoidance of mating between
 - a) related individuals b) unrelated individuals
 - c) different species d) none of these.



- v) Inbreeding is actually
- a) negative assortative mating
 - b) positive assortative mating
 - c) random mating
 - d) none of these.
- vi) 'SNP' is
- a) sort nucleotide polymorphism
 - b) sort nuclear programme
 - c) single nucleotide polymorphism
 - d) none of these.
- vii) Mutation cause the genetic variation
- a) increased
 - b) decreased
 - c) unchanged
 - d) huge changed.
- viii) The evolutionary effects of genetic drift are greatest when
- a) the population size is large
 - b) intraspecific competition is intense
 - c) the population size is small
 - d) intraspecific competition is weak.
- ix) Which one of the following conditions is necessary for speciation to occur ?
- a) Reproductive isolation
 - b) Sympatric speciation
 - c) Adaptive radiation
 - d) interbreeding among neighbouring population.



- x) The shape of the beak of the Darwin's finches, industrial melanism and the changes in horse teeth are all examples of
- a) artificial selection b) natural selection
c) convergent evolution d) homologous structures
- xi) Mutation is
- a) the ultimate source of variations
b) the only form that produces adaptive evolutionary changes
c) the source of genetic drift
d) none of these.
- xii) Multigene families are important as potential sources of
- a) Selection b) Evolution
c) Genetic variation d) Migration.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. Albinism, an autosomal recessive trait, are easily recognized by lack of pigment in skin, hair and iris. One source estimates the frequency of Albinos as 1 in 10,000. What percentage of the population is heterozygous for this gene ?
3. What is 'genetic equilibrium' ? Explain it.
4. What is modern synthetic theory ? Explain it. $2 + 3$
5. Distinguish between Paraphyly and Monophyly.
6. What is punctuated equilibrium ? What do you mean by Anagenesis ? $3 + 2$



GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

7. What is 'gene pool' ? What are the implications of Hardy-Weinberg law ? What assumptions must be met for a population to be in Hardy-Weinberg equilibrium ? What factors do affect the rate of change in allele frequency ?

1 + 5 + 4 + 5

8. What is 'genetic drift' ? Describe the parameters of 'genetic drift'. Define causes and effects of 'genetic drift'. Compare 'natural selection' and 'genetic drift'.

2 + 3 + 4 + 4 + 2

9. What do you mean by 'genetic polymorphism' ? Give examples. Write briefly about 'Transient' and 'Balanced' polymorphisms. State about chromosome polymorphisms in *Drosophila*.

3 + 2 + 6 + 4

10. State Kimura's Neutral theory of Molecular Evolution with suitable example. What do you mean by 'Catastrophism' ? What are micro, macro and mega evolutions ? Write the major stages of human evolution.

5 + 2 + 3 + 5

11. What is Biological Species concept ? Describe some criticism of this concept. Explain Population bottlenecks and Founder effect with suitable examples.

4 + 3 + 8.

