Indian Association for the Cultivation of Science

(Deemed to be University under *de novo* Category)

Integrated Bachelor's and Master's Program
End-Semester Examination (Semester II-2020)

Subject: Biology II ***Subject Code(s): BIS 1201***

Full Marks: 50 ***Time Allotted: 3 h***

GENETICS

Total No: 4X5=20

ANSWER ANY 4

1. A. what is inbreeding depression?
   B. What is assortative mating**?**
   C. Which assumption in the Hardy–Weinberg equilibrium affects the genotype frequency?

2+1+2=5

2. **A)** The students of a small college are tested for the tasting of phenylthiocarbamide (PTC). The ability to taste this chemical is dominant *(T)* over the inability to taste it *(t)*. Among 1242 students, 67.8% were found to be tasters. What are the expected frequencies of the two alleles?

   B) Consider a sex-influenced trait that is dominant in males ***(R)*** and recessive in females *(r)*. In a population of 6,000 males, 4,850 were found to be r. How many females would be expected to be ***r*** in this population?

2+3=5

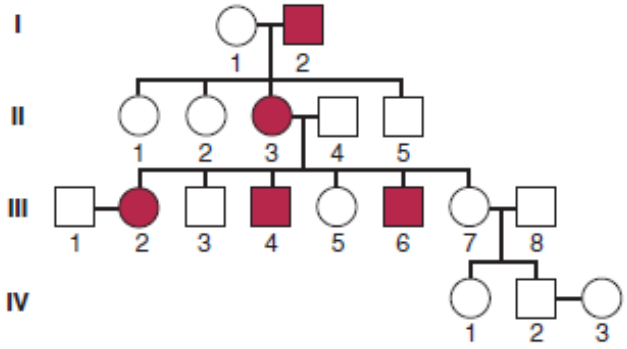
3. **A)** In a certain African population, 4 % of the population is born with sickle cell anemia (aa). Calculate the percentage of individuals who enjoy the selective advantage of the sickle-cell gene (increased resistance to malaria)?

   B) Calculate the effective population size for breeding populations having 50 adult males and 50 adult females.

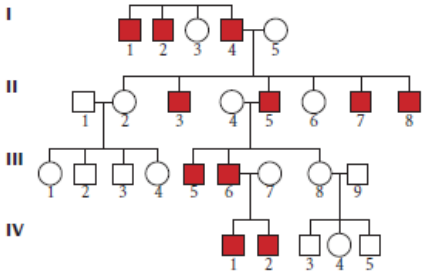
C) One assumption of the Hardy–Weinberg law is that a population interbreeds randomly. Explain whether it is likely that a population interbreeds randomly for all traits, and if it is not, how the Hardy–Weinberg law can be valid

2+1+2=5

4. **A)** What is the likely mode of inheritance? What is the chance that the couple III-1 and III-2 will have an affected child? What is the chance that the couple IV-2 and IV-3 will have an affected child?



B) What is the likely mode of inheritance?



C) What is Disruptive selection? Give an example

3+1+1=5

5. A) Write **very briefly** the effect of genetic drift on population.

B) Calculate the relative fitnesses of females having these genotypes

Genotype	Mean number of offspring
Adh^F/Adh^F	120
Adh^F/Adh^S	60
Adh^S/Adh^S	30

C) What is population bottle neck and founder effect?

2+2+1=5

BIOCHEMISTRY

Total NO: 6x5=30

5.

A) Calculate the approximate yield in ATP molecules of the complete oxidation of stearic acid (C_{18})

B) What is familial hypercholesterolemia and what are its causes?

3+2=5

6. A) How fatty acids are transported to mitochondria from cytosol?

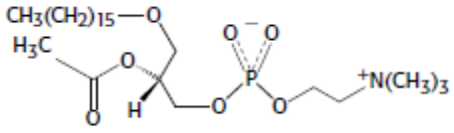
B) Fatty acid with cis-configuration is more prevalent than trans in human--- Explain

3+2=5

7. A) What is the requirement of bile salt in human body?

B) What are the final products when odd chain fatty acid undergoes beta oxidation?

C) Platelet-activating factor (PAF) is a phospholipid that plays a role in allergic and inflammatory responses, as well as in toxic shock syndrome. The structure of PAF is shown here. How does it differ from the structures of the phospholipids discussed in this chapter?



Platelet-activating factor (PAF)

2+2+1=5

8. A) Write the important differences between phospholipid and sphingolipids.

B) Why STATIN drugs are used for hyperlipidemia?

C) Where is the labeled carbon of $H^{14}CO3$ found when the following molecules are added to a liver homogenate carrying out palmitate synthesis?

2+2+1=5

9. A) What is the role of peroxisome in fatty acid oxidation?

B) How Nonsteroidal anti-inflammatory drug functions?

C) How acetyl CoA are transported from mitochondria to cytosol?

2+1+2=5

10. A) Why Hyperlipidemia is considered as one of the major cause of cardiovascular morbidity?

B) Lauric acid is a 12-carbon fatty acid with no double bonds. How many molecules of ATP are required to synthesize lauric acid? **2+3=5**