HG(3) — Math (8) Bio.
Math. (Sc. & Arts)

2020

Time : 3 hours

Full Marks : 70

Pass Marks : 32

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

The questions are of equal value.

*Answer any **five** questions.*

1. What do you mean by biological population growth ? What are the objectives and basic parameters for scientific studies of population growth.

2. If $\frac{dN}{dt} = (B - D)\, f(N)$ be the differential equation of growth of biological population where B and D are birth and death rates respectively and f(N) is

a continuous function, discuss the following conditions :

(a) $B < D$, $f(N) = N$

(b) $B = D$

(c) $B > D$, $f(N) = \frac{1}{2}N$

3. Write short notes on any **two** of the following :

(a) Blood Circulation

(b) Respiration

(c) Biodiffusion

(d) Membrane Transport

4. Show that $P = \frac{1}{1+ce^{-t}}$ where C is a constant is the solution of the population differential equation for single species $\frac{dP}{dt} = P(1 - P)$, where P is a function of time.

5. If birth rate = $\left(\frac{1}{2} - \frac{1}{800}P\right)P$ and death rate = $\left(\frac{1}{4} + \frac{1}{200}P\right)P$ and then

find the population N of any species as a function of time.

6. What is infectious disease ? Why is infection prevention and control among healthcare workers important during outbreak of any infectious disease ?

7. What is air pollution ? Write down the equations used in calculating pollution at different places.

8. Find the equation of continuity of blood flow in human arteries.

9. Show that the flow of blood in elastic tubes obeys Poiseuille's law.

10. What do you mean by diffusion in biological medium ? Write down the Ficks law of diffusion.