

Ex/Math/H/32/6.6/C/87/2018

BACHELOR OF SCIENCE EXAMINATION, 2018

(3rd Year, 2nd Semester)

MATHEMATICS (Honours)

Paper - 6.6 (C)

[Mathematical Modelling - II]

Full Marks : 50

Time : Two Hours

The figures in the margin indicate full marks.

(Notations and Symbols have their usual meanings)

Use a separate Answer-Script for each group.

Group A

(30 marks)

Answer any *three* questions. $10 \times 3 = 30$

1. (a) What do you mean by open access fishery ?

(b) Discuss the Gordon's model of open access fishery based on parabolic yield-effort curve and state the principal results. $2+8=10$
2. (a) Explain the basic model for inheritance in population genetics.

[*Turn over*]

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(b) Define the fundamental genetic matrices of crossing by two genotypes.

(c) If a population is mated at random with only dominants, then show that the proportion of dominants tend to unity.

$$4+2+4=10$$

3. (a) Define and discuss Newton's laws of cooling.

(b) The body of a victim was discovered at 11.00 pm. The doctor took the temperature of the body at 11.30 pm, which was 94.6°F. He again took the temperature after one hour when it showed 93.4°F, and noticed that the temperature of the room was 70°F. Estimate the time of death. (Normal temperature of human body=98.6°F.

$$2+8=10$$

4. (a) Define and discuss the Richardson's model of two notions arms race.

(b) What do you mean by interest and discount rates in resource management ?

$$5+5$$

Group B

(20 marks)

Answer any *two* questions.

5. (a) Write down the hypothesis for population regulation.

[*Turn over*]

[3]

(b) Explain the basic Logistic model for population biology and define carrying capacity.

(c) Find the explicit solution of P. Verhulst model. 3+3+4

6. (a) Define Simple Epidemic model.

(b) Formulate and solve the mathematical model based on the biology of simple epidemic. 2+8

7. (a) Formulate the deterministic mathematical model with the help of schematic diagram for expected time to extinction of Pathogenic Bacteria through antibiotic.

(b) Give its stochastic approach to describe the transition states and formulate Kolmogorov forward equation.

5+5
