

M.Sc. 2nd Semester Examination, 2015

**APPLIED MATHEMATICS WITH OCEANOLOGY
AND COMPUTER PROGRAMMING**

(Stochastic Process and Regression)

PAPER — MTM - 206

Unit – I

Full Marks : 25

Time : 1 hour

Answer Q.No.1 and any two from the rest

The figures in the right-hand margin indicate marks

1. Answer any two questions : 2 × 2

(a) Define Irreducible Markov chain.

(b) What do you meant by order of a Markov chain ?

(c) Write the properties of multiple correlation coefficient.

(Turn Over)

2. (a) State and prove the Chapman-Kolmogorav equation. 5
- (b) Establish the relation between multiple correlation and partial correlation. 3
3. (a) Write the postulates for Poisson process. 2
- (b) Find the stationary probability distribution of a Markov chain with two states $S = \{ 0, 1 \}$ and transition matrix

$$P = \begin{pmatrix} q & p \\ p & q \end{pmatrix}, p + q = 1. \quad 6$$

4. (a) Let a sample $(2, 5, 3)$, $(8, 3, 9)$, $(5, 3, 6)$, $(5, 0, 1)$ and $(3, -1, 2)$ of size five of the variables x_1, x_2 and x_3 drawn from the random population. Find the regression line of x_1 on x_2 and x_3 . 6
- (b) How do you distinguish Markov process and Markov chain? 2

5. Derive the differential equations of pure birth process. Hence solve it for Yule-Furry process.

4 + 4

[*Internal Assessment* : 5 Marks]