

M.Sc 2nd Semester Examination, 2011

**APPLIED MATHEMATICS WITH OCEANOLOGY
AND COMPUTER PROGRAMMING**

(Stochastic Process & Regression)

PAPER—MTM-206

Full Marks : 25

Time : 1 hour

Q. No. 1 is compulsory and any **two** questions from the rest

The figures in the right-hand margin indicate marks

1. Answer any *two* from the following: 2 × 2
- (a) Define : Persistent state and transient state.
 - (b) Write two important properties of multiple correlation coefficient.
 - (c) Define stochastic process with an example.

(Turn Over)

2. What do you mean by Galton-Watson Branching process? Prove that

$$P_n(s) = P_{n-1}(P(s)) \text{ and}$$

$$P_n(s) = P(P_{n-1}(s)),$$

the symbols have their usual meanings. Hence show that

$$P_n(s) = P(P(\dots(P(P(s))\dots))). \quad 2 + 5 + 1$$

3. (a) Find the differential equation for Wiener process.
 (b) What do you mean by extinction probability? 6 + 2
4. (a) Find the regression equation of X_1 on X_2 and X_3 given the following results :

Variable	Mean	Standard deviation	r_{12}	r_{23}	r_{31}
X_1	28.02	4.42	+0.80	—	—
X_2	4.91	1.10	—	-0.56	—
X_3	594	85	—	—	-0.40

where r_{ij} is the correlation coefficient between X_i and X_j .

- (b) In an irreducible chain all the states are of the same type. They are either all transient, all persistent null, or all persistent non null. All the states are aperiodic and in the latter case, they all have the same period. Prove it. 3 + 5

[*Internal Assessment, : 5 Marks*]
