2009

APPLIED MATHEMATICS WITH OCEANOLOGY AND COMPUTER PROGRAMMING

(*Stochastic Process and Regression*)

PAPER—MA - 1206

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

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

Illustrate the answers wherever necessary

1. Answer any *two* : 2x2

(*a*) Define Markov chain.

(*b*) Define Persistent state and ergodic.

(*c*) Define Brownian motion.

(*Turn Over*)

2. (*a*) State and prove Chapman-Kolmogorov equation. 5

(*b*) Write down the postulates for Poisson process. 3

3. What do you mean 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. Also state the properties of generating function of Branching process. 2 + 5 + 1

4. (*a*) For a trivariate distribution :

$$\bar{X}_1 = 40 \quad \bar{X}_2 = 70 \quad \bar{X}_3 = 90$$
$$\sigma_1 = 3 \quad \sigma_2 = 6 \quad \sigma_3 = 7$$
$$r_{12} = 0{\cdot}4 \quad r_{23} = 0{\cdot}5 \quad r_{13} = 0{\cdot}6$$

Find (*i*) $R_{1{\cdot}23}$ (*ii*) $r_{23{\cdot}1}$ (*iii*) the value of X_3 when $X_1 = 30$ and $X_2 = 45$.
[The symbols have their usual meanings]. 5

(*b*) State and prove First Entrance theorem. 3

[*Internal Assessment* : 5 Marks]
