

Total Pages—3

PG/IIS/MTM-206/14(U-I)

M.Sc. 2nd Semester Examination, 2014

**APPLIED MATHEMATICS WITH OCEANOLOGY
AND COMPUTER PROGRAMMING**

PAPER—MTM-206 (Unit – I)

(Stochastic Process and Regression)

[Marks : 25]

Time : 1 hour

Answer Q. No. 1 and any two 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 questions : 2 × 2

**(a) Distinguish between Markov Chain and
Markov Process.**

(Turn Over)

(2)

(b) Define 'ergodic state' in a Markov Chain.

(c) Define linear growth process with example.

2. (a) Prove that in an irreducible Markov chain all the states are of the same type i.e. they are either all transient, all persistent null, or all persistent non-null as well as all the states are aperiodic and in the later case they all have same period. 4

(b) Prove that the state j is persistent or transient according as

$$\sum_{n=0}^{\infty} p_{ij}^{(n)} = \infty \text{ or } < \infty$$

where $p_{ij}^{(n)}$ is the probability such that it reaches from state i to j , not necessarily for the 1st time, after n transitions. 4

3. Derive the differential difference equation for birth and death process describing the process. Hence find the probability generating function for birth and death process when birth rate and

(3)

death rate respectively are $n\lambda$ and $n\mu$, n being the population size at time t . Assume the initial population size is i .

8

4. What do you mean by Weiner process ? Deduce the differential equation of Weiner process. 2 + 6

[*Internal Assessment* : 5 Marks]
