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Programme: MSc. (Statistics) **Part-1** **Semester-2**

Practical based on Stochastic Process
Markov Chain -2

Q.1. Which of the following are the transition probability matrix?

(i)

0	1
0	1

(ii)

0.3	0.2	0.5
0.2	0.3	0.5
0.5	0.5	0

(iii)

0.5	0.1	0.5
0.6	0,5	0.1
0	1	1

Q.2. Consider markov chain with state space {0,1,2} and its t.p.m is given below

0.5	0	0.5
0	1	0
0.5	0	0.5

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Draw transition probability diagram and answer the following
(i) Is chain reducible? (ii) find transient and recurrent states.

Q.3. Consider a markov chain with state space {0,1,2,3} and t.p.m is given below

0.5	0.5	0	0
0.5	0.5	0	0
0	0	0	1
0	0	1	0

(i) Is the chain irreducible? (ii) Are all states transient ? (iii) are all states recurrent?

Q.4. Consider a M.C. with state space {0,1,2,3,4} and t.p.m. given below

1	0	0	0	0
0.25	0.75	0	0	0
0	0.5	0.5	0	0
0.25	0.25	0	0.25	0.25
0	0	0	0.5	0.5

Classify all the states as recurrent or transient. Is this M.C. irreducible?

Q.5.Consider the following T.P.M

0.5	0.5	0	0	0
0	0.5	0.5	0	0
0.5	0	0.5	0	0
0	0	0	1	0
0.2	0.2	0.2	0.2	0.2

Classify all the states. Is this M.C reducible?

Q.6. Consider M.C. given below

0.5	0.5
0.25	0.75

Find P($X_3 = 1 / X_0 = 0$) and P($X_4 = 1 / X_0 = 1$).

Q.7. Consider following markov chain with t.p.m.given below

1	2	3	4
0	1/2	1/2	0
1/3	0	0	2/3
1	0	0	0
0	0	0	1

Show the state transition diagram for above Markov Chain and Classify the states into
(i) Communicating Classes
(ii) Reducible or irreducible states
(iii) absorbing state and closed states

Also find the mean recurrent time for recurrent states

Q.8. Consider following markov chain with t.p.m.given below

0	1	2	3
1/8	1/4	1/8	1/2
3/4	0	0	1/4
0	3/4	0	1/4
1/8	0	7/8	0

Find Stationary distribution of M.C.

Q.9. Consider a Markov chain with tpm given

0	1	2
0.5	0	0.5
0	1	0
0.5	0	0.5

Check periodicity of Chain. Also find stationary distribution of the MC.