

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION- 2016

B.Tech VI Semester

COURSE CODE: 16B22CI621

MAX. MARKS: 15

COURSE NAME: Data Analysis and Simulation Techniques

COURSE CREDITS: 04

MAX. TIME: 1 HR

Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.

Q. 1 a) (1.5 Marks) Explain the different steps of a simulation study with the help of a flow chart.

b). (1.5 Marks) Differentiate between event and activity in a simulation system. Also identify the events, activities and state variables in fax machine example given in question 2.

Q.2 a. (4 Marks) A large hotel has placed a single fax machine in an office for customer services. The arrival of customers needing to use the fax follows a Poisson process with a mean rate of eight per hour. The time each person spends using the fax is highly variable and is approximated by an exponential distribution with a mean time of five minutes.

- (a) What is the probability that the fax office will be empty?
- (b) What is the probability that nobody will be waiting to use the fax?
- (c) What is the average time that a customer must wait in line to use the fax?
- (d) Find the probability of overflow if customer waiting room has the capacity to accommodate only ten customers.

b. (3 Marks) Consider an M/M/m system

- a) Draw a rate transition diagram for the given system.
- b) Derive the formula for steady state probability of being in state n where $n > m$.

Q. 3 (2 Marks) what are the desirable properties of pseudo random number generators also write one disadvantage of linear congruential generator in this respect.

Q.4 (3 Marks) With a view to improving the quality of customer services, a Bank is interested in making an assessment of the waiting time of its customers coming to one of its branches located in a residential area. This branch has only one teller's counter. The arrival rate of the customers and the service rate of the teller are given below:

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Time between two consecutive arrivals of customers(in minutes)	Probabil ity	Service time by the teller (in minutes)	Probability
3	0.17	3	0.10
4	0.25	4	0.30
5	0.25	5	0.40
6	0.20	6	0.15
7	0.13	7	0.05

You are required to simulate 10 arrivals of customers in the system starting 11 AM and show the waiting time of the customers and idle time of the teller.

Use the following random numbers taking the first two random numbers digits each for trial e.g 11 for arrival and 56 for service.

11,56,23,72,94,83,83,02,97,99,83,10,93,34,33,53,49,94,37 and 97.