Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – I • EXAMINATION – SUMMER • 2014

Subject code: 711901N **Date: 13-06-2014**

Subject Name: Modelling, Analysis and Simulation

Time: 02:30 pm - 05:00 pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** ñModeling is an idealized representation of realityò Explain. . **07**

(b) It is observed that at crossing number of accident per month on an Average is 3. Find the probability that **07**
(a) A month will accident free (b) What is the probability that during a month their will be exactly one accident(c)) What is the probability that during a month their will be exactly two accident(c)) What is the probability that during a month their will be not more than two accident(d)) What is the probability that during a month their will be more than two accident.

Q.2 **(a)** What are the advantages and disadvantages of simulation? Explain various steps used in a simulation study. **07**

(b) Vehicles arrive at a toll booth at an average rate of 300 per hours. Average waiting time at the toll booth is 10sec per vehicle, If both arrival and departure rate are exponentially distributed, What is the average number of vehicles in the system, average queue length, the average delay per vehicle and the average time a vehicle in the system. **07**

OR

(b) What is multiplicative congruential technique of random number generation? Dose it generate true random numbers? Explain the out put. **07**

Q.3 **(a)** Explain Monte-Carlo Method and use it to find the area under a curve. **07**

(b) A ramp has an arrival rate of 200 cars an hour and the ramp meter only permits 250 cars per hour, While the ramp can store 40 cars before spilling over (i) What is the probability that it is half-full, empty, full ? **07**
(ii) How many cars do we expect on the ramp.

OR

Q.3 **(a)** Develop a model for state ï independent queuing system at a harbour of Calcutta, where a ship arrives randomly and the service is provided in berths in FCFS service discipline. There are no restrictions in the Queue and initially only a single servicing channel is available. **07**

(b) Rank in order of accuracy, the probabilistic, the deterministic and the stochastic model Why? Explain with suitable example **07**

Q.4 **(a)** 5% of the tools produced by a certain process are defective. Find the probability that in a sample of 40 tools chosen at random, exactly three will be defective. Calculate a) Using the binomial distribution, and b) using the Poisson distribution as an approximation. **07**

(b) A mail order company receives a steady supply of orders by telephone. The manager wants to investigate the pattern of calls received , so he records the number of calls received per day over a period of 40 days as follows: **07**

Number of calls per day.	0	1	2	3	4	5	>5
Frequency of calls	8	13	10	6	2	1	0

(i) Calculate the mean and variance of the data. Comment on your answers.
(ii) State whether the conditions for using the Poisson distribution as a model apply.

OR

Q.4 (a) . What is M.G.F of Erlang distribution? Show that it consists of óaô channels of negative exponential distribution. Plot the distribution for a=1,2,3 and infinity **07**

Q.4 (b) (i) A typist type 3 letters erroneously for every 100 letters. What is the probability that tenth letter typed is the erroneous letter? **07**
(ii) A normal distribution has a mean 20 and slandered deviation of 4 .Find the probability of X lies between 20and 24.

Q.5 (a) Define óentitiesô attributes and activities of a system. Explain in detail with suitable example **07**

(b) What is Digital simulation? Explain in detail with suitable examples. **07**

OR

Q.5 (a) The car-hire firm has two cars, which it hires out day by day. The number of demand for a car on each day is distributed as a Poisson distribution with mean 1.5. Calculate the proration of days on which neither car is used and proportion of days on which some demand is refused. **07**

(b) In railway marshaling yard ,goods trains arrive at a rate of 30 trains per day .Assuming that the inter-arrival time follows an exponential distribution and the service time is also exponential with an average 36 minutes., calculate the following: **07**
(i)The mean queue size.
(ii) If the input of train increase to an average 33 per day, What will be the change in (i)and(ii).

****