Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – I • EXAMINATION – WINTER 2012

Subject code: 711901N Date: 08-01-2013

Subject Name: Modeling, Analysis & 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)**	Define mathematical model. Why it is said that a model is an idealized representation of reality? How mathematical models are classified & how do they differ in their predicting capability.	**07**
	(b)	How would you define a process of vehicles on highway using discrete and continuous distributions?	**07**
Q.2	**(a)**	It is found that the percentage of left vehicles from eastbound approach is 20% and average hourly volume of eastbound is 2000vph.The cycle length for this intersection is 90 seconds. Estimate the probability that no more than 4 left turn vehicles will come in a cycle.	**07**
	(b)	Why do we need random numbers? Can we generate truly random numbers or random fractions?	**07**
		OR	
	(b)	What is Gamma Family distribution? List them along with their mean and variance .Plot the Erlang distribution.	**07**
Q.3	**(a)**	Find the variance of Poisson distribution from the basic property of moment of discrete distributions. What is its M.G.F.?	**07**
	(b)	What is Monte-Carlo Simulation? Use Monte-Carlo method to find the value of pie.	**07**
		OR	
Q.3	**(a)**	What are the advantages of Simulation? Explain in detail “various steps used in a simulation study”.	**07**
	(b)	Describe the importance of random numbers in simulation.	**07**
Q.4	**(a)**	Vehicles arrivals at the main gate of park are assumed Poisson distribution with an average arrival rate of 1 vehicle every 5 minutes. What is the probability of the following: (i) Exactly 2 vehicles arrive in a 15 minute interval? (ii) Less than 2 vehicles arrive in a 15 minute interval? (iii) More than 2 vehicles arrive in a 15 minute interval?	**07**
	(b)	Based on survey, 25%commuters choose transit for their daily trip. There are 5 commuters being randomly selected from an organization .Estimate the probability that 1 person among 5 will choose transit for travel.	**07**
		OR	
Q.4	**(a)**	What are stochastic processes and/ or stochastic events? Give some examples & show whether these can be converted into probabilistic processes?	**07**
Q.4	**(b)**	“Traffic flow is one of the most difficult processes to be modeled in space-and-time”. Why?	**07**

Q.5	**(a)**	Explain the application areas of queuing and explain different terminologies used in queuing system.	**07**
	(b)	What are auxiliary functions in study of probability density functions?	**07**
		OR	
Q.5	**(a)**	List and explain the conditions when simulations become essential and desirable.	**07**
	(b)	What do you understated by Pseudo-random numbers generated by Multiplicative Congruent Techniques (MCT)? Explain: A-B=k*m A=B (mod m)	**07**

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