Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – III • EXAMINATION – WINTER • 2013

Subject code: 735001 **Date: 26-11-2013**

Subject Name: Simulation Modeling of Manufacturing System

Time: 10.30 am – 01.00 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)**	Give advantages and disadvantages of Simulation.	**07**
	(b)	Enlist the various application areas of Simulation. Explain any one with suitable example.	**07**
Q.2	**(a)**	Define the following components of the System and give example of each for a Banking and Production system. (i) Entity (ii) Attribute (iii) Activities	**07**
	(b)	Explain the steps involved in a simulation study.	**07**
		OR	
	(b)	Give classification of simulation models.	**07**
Q.3	**(a)**	Two independent variables $y_1$and y_2 are normally distributed with mean 10 and 35 and variances 4 and 25 respectively. Find the mean and variance of $4y_1$-y_2.	**07**
	(b)	Define "Random Variable". Also explain Discrete random variable, Continuous random variable, Uniform random variable and Exponential random variable.	**07**
		OR	
Q.3	**(a)**	Estimate "expected average delay in the queue", expected average number of customer in the queue" and "expected utilization of server" for a single server queue where inter arrival and service times are IID and queue discipline follows FIFO rule. Consider following data. (i) Inter arrival times (mins.): 0.4, 0.9, 1.0, 0.3, 1.4, 0.8, 1.1, 1.2….. (ii) Service times (mins.): 1.0, 0.5, 0.8, 0.6, 1.2, 1.3, 0.5….. (iii) n= 4 delys in the queue desired	**07**
	(b)	If X and Y are jointly continuous random variables with joint probability density function $f(x,y)$ and X and Y are independent, show that Cov(X,Y) = 0. Therefore, X and Y being independent implies that $E(X,Y) = E(X)\,E(Y)$	**07**
Q.4	**(a)**	Explain the model-building process with need for verification and validation.	**07**
	(b)	Enlist the techniques for increasing the validity and credibility of a simulation model. Explain any one with suitable example.	**07**
		OR	
Q.4	**(a)**	Develop a generation scheme for the triangular distribution with pdf	**07**

$$f(x) = \begin{cases} \frac{1}{2}(x-2), & 2 \le x \le 3 \\ \frac{1}{2}\left(2 - \frac{x}{3}\right), & 3 \prec x \le 6 \\ 0, & \text{otherwise} \end{cases}$$

(b) Enlist the advantages and disadvantages of using a simulation packages over general purpose programming languages. **07**

Q.5 **(a)** Describe the need for output data analysis. Explain "terminating simulation" with suitable example. **07**

(b) Explain Convolution Method for random variate generation with suitable example. **07**

OR

Q.5 **(a)** What is "Simulation Clock"? Explain two principle approaches for advancement of simulation clock. **07**

(b) Enlist the possible validation techniques in order of increasing cost-to-value ratios. **07**

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