

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 **07**
 for a Banking and Production system.
 (i) Entity (ii) Attribute (iii) Activities
 (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. **07**
 (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) $n = 4$ delays in the queue desired
 (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 $\text{Cov}(X,Y) = 0$. 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**

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

- (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**
