

GUJARAT TECHNOLOGICAL UNIVERSITY
ME - SEMESTER-III • EXAMINATION – WINTER • 2014

Subject Code: 735001**Date: 25-11-2014****Subject Name: Simulation Modeling of Manufacturing System****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) Describe the rules for determining when simulation is not appropriate. **07**
 (b) What are the different ways to study a system? Differentiate between analytical solution and simulation. **07**
- Q.2** (a) Define the following components of the System and give example of each for an Inventory and a Production system. **07**
 (i) Entity (ii) Events (iii) State variables
 (b) Differentiate between discrete and continuous system with suitable example. **07**
- OR**
- (b) What is "Queueing System"? Give at least three examples of real world queueing system with their servers and Customers. **07**
- Q.3** (a) 3.4, 5.3, 4.7, 4.8, 3.2, 5.9, 6.0, 4.1, 5.1, 3.9 are 10 observations from a distribution with unknown mean. Compute an approximate 95 percent confidence interval for $\bar{x}$. Also test the null hypothesis $H_0: \bar{x} = 5$ at level $\alpha = 0.05$. **07**
 (b) Explain the following: **07**
 (i) Covariance stationary process (ii) Strong-law of large numbers (iii) Type I and Type II error
- 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.): 0.5, 1.2, 0.8, 0.9, 2.0, 0.8, 1.4, 0.5 ..
 (ii) Service times (mins.): 0.6, 1.2, 2.2, 1.2, 0.7, 1.0, 1.2 .. (iii) $n = 4$ delays in the queue desired
 (b) If X and Y are jointly continuous random variables with **07**

$$f(x, y) = \begin{cases} 24xy & \text{for } x \geq 0, y \geq 0, \text{ and } x + y \leq 1 \\ 0 & \text{otherwise} \end{cases}$$
 Then, compute $\text{Cov}(X, Y)$.
- Q.4** (a) Differentiate between model verification and validation. Enlist the possible validation techniques in order of increasing cost-to-value ratios. **07**
 (b) Explain "terminating simulation" and "Non-terminating simulation" with suitable example. **07**

OR

Q.4 (a) Develop a generation scheme for random variable with pdf **07**

$$f(x) = \begin{cases} \frac{1}{3}, & 0 \leq x \leq 2 \\ \frac{1}{24}, & 2 < x \leq 10 \\ 0, & \text{otherwise} \end{cases}$$

(b) Describe the criteria for evaluation and selection of simulation software. **07**

Q.5 (a) Enlist the techniques for increasing the validity and credibility of a simulation model. Explain any one with suitable example. **07**

(b) Explain Acceptance-rejection Method for random variate generation with suitable example. **07**

OR

Q.5 (a) Define the following components found in discrete event simulation models. **07**

(i) Simulation clock (ii) Event routine (iii) Report generator

(b) What are the desirable software features? Explain any two of them. **07**
