## CITADAT TECHNOLOCICAL UNIVEDSITY

		GUJARAT TECHNOLOGICAL UNIVERSITT ME – SEMESTER II– EXAMINATION – WINTER - 2016		
Subject Code: 2725010 Date: 17/11			6	
Su	bject	Name: SIMULATION MODELING OF MANUFACTURING SYSTEM		
Time: 2:30 pm to 5:00 pm Total Marks			: 70	
IIIS	1. 2. 3.	<ul> <li>Attempt all questions.</li> <li>Make suitable assumptions wherever necessary.</li> <li>Figures to the right indicate full marks</li> </ul>		
Q.1	<b>(a)</b>	Enlist and briefly explain the steps in simulation study.	07	
	(b)	Define system and system environment. Give examples of various system components for production system and inventory system.	07	
Q.2	<b>(a)</b>	Give complete classification of simulation software.	07	
	(b)	Explain the following terms: (a) Discrete random variable (b) Continuous random variable (c) Joint probability density function (d) covariance OR	07	
	(b)	Suppose that 7.3, 6.1, 3.8, 8.4, 6.9, 7.1, 5.3, 8.2, 4.9, and 5.8 are 10 observations from a distribution with unknown mean. Compute an approximate 95 percent confidence interval for $\mu$ . Also test the Null hypothesis H <sub>0</sub> : $\mu = 6$ at level $\alpha = 0.05$	07	
Q.3	(a)	Develop a generator for a random variable whose pdf is	07	
		$f(x) = \begin{cases} \frac{1}{3}, 0 \le x \le 2\\ \frac{1}{24}, 2 < x \le 10\\ 0, otherwise \end{cases}$		
	<b>(b)</b>	Explain Acceptance-Rejection technique for random-variate generation with	07	
		suitable example.		
		OR		
Q.3	(a)	Develop a random-variate generator for a random variable X with the pdf	07	

$$f(x) = \begin{cases} e^{2x}, -\infty < x \le 0\\ e^{-2x}, 0 < x < \infty \end{cases}$$

(b) Two independent variable  $y_1$  and  $y_2$  are normally distributed with mean 20 and 07 15 and variances 16 and 9 respectively. Find the mean and variance of  $2y_1-y_2$ .

## Briefly explain the three step approach for simulation model validation. **Q.4 (a)**

A simulation model of a job shop was developed to investigate different **(b)** scheduling rules. To validate the model, the scheduling rule currently used was incorporated into the model and the resulting output was compared against observed system behavior. Based on previous data base, the estimated average number of jobs was 22.5 on a given day. Seven independent replications of the model were run, each of 30 days' duration, with the following results for average number of jobs in the shop: 18.9, 22.0, 19.4, 22.1, 19.8, 21.9, 20.2

Develop and conduct a statistical test to evaluate whether model output is

07

07

consistent with system behavior? Use  $\alpha = 0.05$ 

## OR

- Q.4 (a) Differentiate between model verification and validation. Explain the process of model building, verification and validation.
  - (b) System data for the job shop of example (b) above revealed that the average time spent by a job in the shop was approximately 4 working days. The model made the following predications, on seven independent replications, for average time spent in the shop:
    3.70, 4.21, 4.35, 4.13, 3.83, 4.32, 4.05 Is the model output consistent with system behavior? Conduct a statistical test, using α = 0.01
- Q.5 (a) What is output analysis? What is the need for it? Define the following terms 07 w.r.t. simulation output data.
   (a) Transient simulation (b) Steady state simulation
   (b) Define following components of Discrete event simulation models. 07
  - (a) System state (b) State variable (c) Event list (d) Statistical counter OR
- Q.5 (a) What are the desirable software features? Explain any two of them. 07
  - (b) Explain the queuing system simulation with suitable example. Assume the 07 necessary data.

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