

**Total No. of Pages : 02**

**Total No. of Questions : 09**

**BTech.(IT) (2012 to 2017 E-III) (Sem.-7,8)**

## MODELLING AND SIMULATION

**Subject Code : BTIT-905**

**M.Code : 71989**

**Time : 3 Hrs.**

**Max. Marks : 60**

**INSTRUCTION TO CANDIDATES :**

1. **SECTION-A** is **COMPULSORY** consisting of **TEN** questions carrying **TWO** marks each.
2. **SECTION-B** contains **FIVE** questions carrying **FIVE** marks each and students have to attempt any **FOUR** questions.
3. **SECTION-C** contains **THREE** questions carrying **TEN** marks each and students have to attempt any **TWO** questions.

## SECTION-A

1. **Write briefly :**
  - a. Differentiate empirical distribution
  - b. Define non stationary poisson process.
  - c. State the queuing system represented by G/G/1/5/5.
  - d. Draw only the flowchart of next-event time advance approach for discrete-event simulation.
  - e. Define dynamic model.
  - f. Disadvantages of simulations.
  - g. Why the testing of pseudo random number is done?
  - h. Define network simulator.
  - i. Stochastic activities.
  - j. Write the pdf and cdf for uniform distribution.

**SECTION-B**

2. Explain the characteristics of queueing system.
3. How could random numbers that are uniform on the interval  $[0, 1]$  be transformed into random numbers that are uniform on the interval  $[-11, 17]$ ?
4. Show the exponential distribution is memory-less.
5. For the random variables  $X_1$  and  $X_2$  which are exponentially distributed with parameter  $\lambda = 1$ , compute  $P(X_1 + X_2 > 2)$ .
6. What is modeling and simulation? Discuss when simulation is not an appropriate tool.

**SECTION-C**

7. The lifetime, in years, of a satellite placed in orbit is given by the following pdf :

$$f(x) = \begin{cases} 0.4 e^{-0.4x}, & x \geq 0 \\ 0, & \text{otherwise} \end{cases}$$

- a. What is the probability that this satellite is still “alive” after 5 years?
- b. What is the probability that the satellite dies between 3 and 6 years from the time it is placed in orbit?
8. Explain the Mid-square random number generator with suitable example. Also discuss the importance of random number in simulation.
9. Explain the following :
  - a. Monte Carlo simulation.
  - b. Empirical distribution.

**NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.**