

**DRONACHARYA COLLEGE OF ENGINEERING, GURGAON**

**Assignments**

**Subject with Code: SYSTEM SIMULATION MODELING (EC711 F)**

**Section A**

- Q1.** List down the events and activities applying for master's program in a university.
- Q2.** Search the web for "call center simulation" and prepare a report based on the finding.
- Q3.** Search the web for "Application of discrete simulation" and prepare a report based on the finding.
- Q4.** Describe the areas of application of simulation.
- Q5.** What are the different types of models?
- Q6.** Define system model and discuss different types of system models.
- Q7.** Explain dynamic Model.
- Q8.** Explain static model.
- Q9.** What is mathematical model?
- Q10.** Differentiate between continuous and static models.

**Section B**

- Q1.** Describe the various technique for simulation.
- Q2.** Define real time simulation.
- Q3.** Describe the various technique for simulation.
- Q4.** Describe Monte Carlo Method.
- Q5.** Describe Event Scheduling /Time Advance Algorithm

### Section C

**Q1.** Derive the moment generating function for a binomial distribution with parameters  $n$  and  $p$ .

**Q2.** Use the moment generating function to estimate the mean and variance of the distribution.

Use the moment generating function to show the following:

(I) Sum of two independent Poisson random variables also follows Poisson distribution.

(II) Difference of two independent and normally distributed random variables also follows Normal distribution.

**Q3.** Describe the Poisson Process.

**Q4.** Describe Empirical Distributions.

**Q5.** Describe Various Statistical Models.

### Section D

**Q1.** List the Properties of Random Numbers.

**Q2.** Describing the various techniques for Generating Random Numbers.

**Q3.** Describe the Generation of Pseudo-Random Numbers.

**Q4.** Describe Acceptance –Rejection Techniques.

**Q5.** Describe Chi – Square Test.

## Objective Questions

### Section A

Q 1. When Simulation is the appropriate tool?

Q2. When Simulation is not appropriate tool?

Q3. What are advantages And Disadvantages of Simulation?

Q4. How can we offset the disadvantages of simulation?

Q5. List the application areas/Industry domains of simulation?

Q 6. List 5 typical applications each in manufacturing and transportation systems?.

Q7. List 5 typical applications each in business process simulation & logistics, supply chain and distribution?

Q 8. What is System and System Environment?

Q9. Explain the terms: (a) entity (b) attribute (c) activity (d) event & (e) state in the system simulation context?

Q10. Explain and give an example each of continuous and discrete system?

Q11. What is Model and Component of the system?

Q12. Name several entities, attributes, activities, events & state variables of a typical automatic teller machine (ATM)?

### **Section B**

**Q1.** Differentiate between

a. Continuous and Discrete Systems

b. Deterministic and Stochastic activities

c. Static Physical Models and Dynamic Physical Models

d. Static Mathematical Models and Dynamic Mathematical Models

**Q2.** Write short notes on Monte –Carlo methods.

**Q3.** Define Discrete-event System simulation and Steps in a Simulation Study.

**Q4.** Define the concept of Discrete-Event Simulation.

**Q5** Define event scheduling/time advance algorithm

**Q6.** Describe with examples the various world views

**Q7.** Define manual simulation using event scheduling with the help of a suitable example.

**Q8** Provide the detailed flow chart of a typical arrival event and a departure event in a single channel queuing system

**Q9** What is list processing? Explain

**Q10.** What is poisson process?

### Section C

- Q1.** Write short notes on discrete distributions
- Q2.** Write short notes on continuous distributions
- Q3.** Define Discrete-event System simulation and Steps in a Simulation Study.
- Q4.** Define the concept of Discrete-Event Simulation.
- Q5** Define the following queuing system characteristics: (a) calling population (b ) system capacity (c) Arrival process (d) Queue behavior and discipline (e) service time and service mechanism .
- Q6.** Describe Kendal-Lee notation for a queuing system.
- Q7.** What is queuing model?

### Section D

- Q1.** Define the properties of random number & its consequences.
- Q2.** Define the generation of Pseudo-random Numbers.
- Q3.** Define the linear congruential method for random number generation?
- Q4.** Define the combined linear congruential random number generation method?
- Q5.** What is the role of maximum density and maximum period in random number generation?
- Q6.** Generate a sequence of 15 random numbers for which seed is 342, constant multiplier is 20, increment is 45 and modulus is 30
- Q7.** Define the Kolmogorov-Smirnov test for random numbers.
- Q8.** Write short notes on the chi-square test for random numbers.
- Q9.** Define auto correlation Test for random numbers.
- Q10.** Using the principles learnt, develop your own combined linear congruential Random number generator
- Q11.** Define Exponential Distribution.
- Q12.** Briefly describe Uniform Distribution.
- Q13.** With example Define the various types of discrete distributions.
- Q14.** What are all the different acceptance rejection techniques?
- Q15.** What is convolution method? Define.
- Q16.** State the four steps involved in the development of an input model?
- Q17.** Define data collection with example.
- Q18.** Define identifying the distribution with data with example.
- Q19.** Define parameter estimation with examples.
- Q20.** Define goodness of fit tests with examples.
- Q21.** How can you select input model with out data?