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10MT62

Sixth Semester B.E. Degree Examination, June/July 2019
Modeling and Simulation

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, selecting at least TWO questions from each part.

PART – A

- 1 a. What is system and system environment? Explain the components of a system with examples. (10 Marks)
- b. Differentiate between continuous and Discrete systems. (05 Marks)
- c. List the advantages and limitations of simulation. (05 Marks)

- 2 a. Explain the characteristics of Queuing system. (06 Marks)
- b. Briefly define any 4 concepts used in Discrete events simulation. (04 Marks)
- c. A grocery store has one checkout counter. Customers arrive at this checkout counter at random from 1 to 8 minutes apart and each interval time has the same probability of occurrence. The service times vary from 1 to 6 minutes, with probability given below.

Service (minutes)	1	2	3	4	5	6
Probability	0.10	0.20	0.30	0.25	0.10	0.05

Simulate the arrival of 6 customers and calculate the following.

- i) Average waiting time for a customer
 - ii) Probability that a customer has to wait
 - iii) Probability of a server being idle
 - iv) Average service time and
 - v) Average time between arrival (10 Marks)
- 3 a. What are Pseudo random numbers? What are the problems that occur while generating pseudo random numbers? (06 Marks)
 - b. Explain combined linear congruential method for random number generation. (06 Marks)
 - c. The sequence of numbers 0.54, 0.73, 0.98, 0.11 and 0.68 has been generated. Use the Kolmogorov – Smirnov test with $\alpha = 0.05$ to determine if the hypothesis that the numbers are uniformly distributed on the interval [0, 1] can be rejected. (08 Marks)

 - 4 a. When to use random variate generation? What is the difference between random number generation and random variate generation? Explain with example. (05 Marks)
 - b. Explain the inverse transformation technique of producing random variates for exponential distribution. Generate exponential variates 'X_i' with mean 1. Given random numbers R_i = 0.1306, 0.0422, 0.6597, 0.7965, 0.7696. (08 Marks)
 - c. Suggest a step by step procedure to generate random variates using the inverse transform technique for exponential distribution. (07 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg, 42+8 = 50, will be treated as malpractice.

PART – B

- 5 a. What is Acceptance – rejection technique? Generate three poisson variates with mean $\alpha = 0.2$. Use the following random numbers. 0.4357, 0.4146, 0.8353, 0.9952, 0.8004.

(07 Marks)

- b. The number of vertical arriving at a junction in a five minute period was observed for 100 days. The resulting data is as follows :

No. of arrivals	0	1	2	3	4	5	6	7	8	9	10	11
Frequency	12	10	19	17	10	8	7	5	5	3	3	1

It is presumed that the arrivals follow a Poisson distribution with parameter $\alpha = 3.64$. Using Chi-square test, determine whether the assumption that arrivals follow Poisson distribution can be accepted at a 0.05 level of significance.

(Note: Expected values used should be ≥ 5 for calculation and put the values and calculated values in a tabular form.

(13 Marks)

- 6 a. Explain the variance reduction techniques involved in the design and evaluation of simulation. (10 Marks)

- b. Discuss the different variable verification technique and validation of simulation models.

(10 Marks)

- 7 a. Differentiate between verification and validation of a simulation model. With a neat diagram, explain the relation between model building, verification and validation. (10 Marks)

- b. Describe the three step approach which has been used as an aid in the validation process.

(10 Marks)

- 8 a. Explain simulation in GPSS with block diagram. (10 Marks)

- b. Explain Area and Automad simulation software. (10 Marks)
