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Fifth Semester MCA Degree Examination, Dec.2016/Jan.2017
System Simulation & Modeling

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions.

- 1 a. Define simulation. Draw a neat flow chart and explain the various steps in simulation study. (12 Marks)
- b. Mention the entities, attributes, activities and events for the following systems.
 - i) Hospital Emergency room
 - ii) Cafeteria
 - iii) Laundromat
 - iv) Taxicab Company. (08 Marks)
- 2 a. Prepare a simulation table for a single channel queuing system, for 10 customers. Use the inter arrival and service time as given in the below table, and determine the following :
 - i) Idle time of server
 - ii) Average waiting time
 - iii) Average time customer spends in system
 - iv) Average service time.

Inter arrival time	-	5	10	1	2	3	8	5	8	4
Service time	5	8	5	6	5	5	8	3	3	5

(12 Marks)
- b. Explain in brief the event scheduling algorithm. (08 Marks)
- 3 a. Explain any four distribution functions each from the discrete and continuous distribution function of the statistical model. (12 Marks)
- b. Hurricane hitting the eastern coast of India follows Poisson with a mean of 0.5 per year. Determine :
 - i) The probability of more than 3 hurricanes hitting the Indian eastern coast in a year.
 - ii) The probability of not hitting the Indian eastern coast in a year. (04 Marks)
- c. The daily demand for rice at a departmental store in thousands of kg is found to follow Erlang distribution with shape parameter 3 and scale parameter $\frac{1}{2}$. Determine the probability of demand exceeding 5000kg on a given day. (04 Marks)
- 4 a. Using multiplicative congruential method, generate the random values and determine the maximum period for $a = 13$ and $m = 64$, consider the seed as 6. (08 Marks)
- b. Use K - S test with $\alpha = 0.05$, to determine whether the given numbers are uniformly distributed: 0.73, 0.82, 0.16, 0.72, 0.79, 0.95, 0.57, 0.63, 0.39 [$D_{0.05,9} = 0.432$]. (12 Marks)
- 5 a. Write a step – by – step procedure to generate the random variates using inverse – transform technique for
 - i) Exponential
 - ii) Uniform
 - iii) Triangular distribution. (09 Marks)
- b. Explain in detail the acceptance – rejection technique to generate random variates using Poisson distribution. (06 Marks)
- c. Write a short note on Poisson process. (05 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.

- 6 a. Briefly explain about list processing. (04 Marks)
 b. Mention the steps involved in developing an input model. (04 Marks)
 c. Use χ^2 – test to check whether the given data follows Poisson distribution at 5% level of significance ($\chi_{0.05,2}^2 = 5.99$). The values for 100 months are recorded pertaining to the monthly number of job related injuries at an underground coal mine were analyzed and given as follows : (12 Marks)
- | | | | | | | | |
|-------------------------|----|----|----|---|---|---|---|
| Injuries/month | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Frequency of occurrence | 35 | 40 | 13 | 6 | 4 | 1 | 1 |
- 7 a. Explain the three – step process of Naylor finger approach. (12 Marks)
 b. Why do you think that optimization via simulation is difficult? Justify your answer. (08 Marks)
- 8 a. Differentiate point and interval estimation. (06 Marks)
 b. Explain briefly the output analysis for terminating simulation. (10 Marks)
 c. Write a short note on Quantile – Quantile plots. (04 Marks)

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