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10CS82

Eighth Semester B.E. Degree Examination, Dec.2018/Jan.2019
System Modeling and Simulation

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting atleast TWO questions from each part.***

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 – A

1 a. With a neat flow diagram, explain the steps in simulation study. **(10 Marks)**

b. A small grocery store has one checkout counter. Customer arrives at this checkout counter at random from 1 to 8 minutes apart. Each possible value of interarrival time has the same probabilities of occurrences. The service times vary from 1 to 6 minutes with the probabilities shown below :

Service time	1	2	3	4	5	6
Probability	0.10	0.20	0.30	0.25	0.10	0.05

Simulate the arrival and service of 6 customers and estimate :

i) Average waiting time
ii) Average service time
iii) Probability of idle server.

Note : Random digits for interarrival time : 913, 727, 015, 948 and 309
Random digits for service time : 84, 10, 74, 53, 17 and 76. **(10 Marks)**

2 a. Write and explain event scheduling /time advance algorithm with an example. **(10 Marks)**

b. What is world view? Briefly explain different world views. **(10 Marks)**

3 a. Explain the following continuous distributions :
i) Exponential distribution ii) Normal distribution. **(10 Marks)**

b. Given the following distribution : Normal (10, 4), uniform(4, 16) triangular(4, 10, 16). Find the probability that $6 < x < 8$ for each of the distribution note :
$\phi(-1) = 01587$; $\phi = (2) = 0.0228$. **(06 Marks)**

c. Forty percent of the assembled ink-jet printers are rejected at the inspection station.
i) Find the probability that the first accepted ink-jet printer is the third one inspected.
ii) Determine the probability that the third printer inspected if the second acceptable printer. **(04 Marks)**

4 a. Explain in detail the characteristics of queuing system. **(10 Marks)**

b. State and explain the Kendal's notation of queuing system. **(05 Marks)**

c. List the steady state parameters of M|G|1 queue. **(05 Marks)**

PART – B

5 a. Discuss the properties that an ideal random number generation rouline should satisfy. **(05 Marks)**

b. Generate five numbers of a random sequence using multiplicative congrential method with $x_0 = 2$, $a = 13$ and $m = 64$. **(05 Marks)**

c. Give the steps to derive an expression for generating random variates that if uniformly distributed on the interval [a, b] using inverse transformation technique. Generate exponential random variates with mean 1 for the following random numbers 0.1306, 0.0422, 0.6597, 0.7965, 0.7696. **(10 Marks)**

6 a. Explain the steps in the development of a useful model of input data. **(12 Marks)**

b. Recorder pertaining to the monthly number of job related injuries at an underground coalmine were being studied by federal agency. The values for the past 100 months were as following :

Injuries per month	0	1	2	3	4	5	6
Frequency of occurrence	35	40	13	6	4	1	1

Apply the chi-square test to these data to left the hypothesis that the underlying distribution is Poisson. Use the level of significance $\chi^2_{\alpha,k-s-1} = 5.99$ **(08 Marks)**

7 a. Why is optimization via simulation difficult? What compromises are normally made during that process? **(10 Marks)**

b. Explain the following :

i) Point estimation

ii) Confidence interval estimation. **(10 Marks)**

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8 a. With a neat diagram, explain model building, verification and validation. **(08 Marks)**

b. Explain the three step approach for validation process as formulated by Nayler and finger? **(12 Marks)**

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