USN ☐☐☐☐☐☐☐☐☐☐ **13MCA52**

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 ½. 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 α = 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)

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 ($\chi^2_{0.05,2} = 5.99$). 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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