## Fifth Semester MCA Degree Examination, June/July 2017
System Simulation and Modeling

Time: 3 hrs.   Max. Marks:100

Note: *Answer any FIVE full questions.*

1 a. What is simulation? State when simulation is appropriate and when simulation is not appropriate tool. **(10 Marks)**

   b. What are the advantages and disadvantages of simulation? **(10 Marks)**

2 a. With neat diagram, explain steps involved in simulation study. **(12 Marks)**

   b. What is a system and system environment? Explain the components of the system with examples. **(08 Marks)**

3 a. What are the major concepts in discrete event simulation? **(10 Marks)**

   b. Discuss the simulation in Java. **(10 Marks)**

4 a. Give the properties of Random numbers. Use the linear congruential method to generate 6 random numbers, given that $X_0 = 27$, a = 17, C = 43 and m = 100. **(10 Marks)**

   b. Explain Kolmogrov-Smirnov test for uniformity of random numbers. Hence test for uniformity of 0.36, 0.23, 0.64, 0.18, 0.02, 0.71, 0.47, 0.86, 0.43, 0.91. Given the critical value $D_X = 0.410$. **(10 Marks)**

5 a. Explain Event-scheduling /time advance algorithm. **(08 Marks)**

   b. Six dump trucks are used to haul coal from the entrance of a small mine to the railroad.
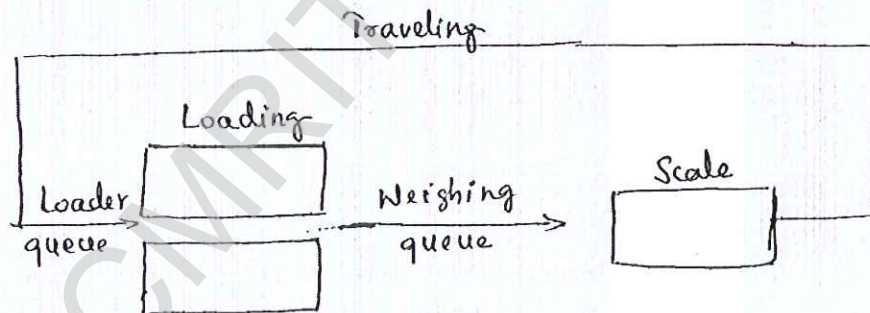
Dump truck problem
Fig. Q5 (b)

Fig. Q5 (b) provides a schematic of the dump truck operation. Each truck is loaded by one of two loaders. After a loading, the truck immediately moves to the scale, to be weighted as soon as possible. Both the loaders and scale have first-come first served waiting line (or queue) for trucks. Travel time from loaders to scale is considered negligible. After being weighted, a truck begins travel time (during which time the truck unloads) and then afterword returns to the loader queue. Assume that, at time 0, five trucks are at the loaders and one is at the scale. Take the activity times from the following as needed:

Loading time	10	5	5	10	15	10	10
Weighing time	12	12	12	16	12	16	
Travel time	60	100	40	40	80		

Simulate for one cycle to estimate loader and scale utilization (percentage of busy time). **(12 Marks)**

6   a.   What are the steps on developing an input model? Explain them briefly.   (10 Marks)
    b.   Suggest step by step procedure to generate random variates using inverse transform techniques for,
         (i)   Exponential distribution.
         (ii)   Uniform distribution.   (10 Marks)

7   a.   Briefly explain the commonly used methods in the verification process.   (10 Marks)
    b.   Discuss the calibration and validation methods.   (10 Marks)

8   Write short notes on:
    a.   World views.
    b.   Goodness of fit tests.
    c.   Model building.
    d.   Stochastic nature of output data.   (20 Marks)

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