

27/6/22

C14 R

(Evening)

Exam.Code:0918

Sub. Code: 6794

2072

B.E. (Computer Science and Engineering)

Sixth Semester

CS-603: Modeling and Simulation

Time allowed: 3 Hours

Max. Marks: 50

**NOTE:** Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Part.

x-x-x

1.

- i) Briefly justify the statement that in Chi-Square test, uniformity test of random numbers is only a necessary test for randomness but not sufficient one. (1)
- ii) Give difference between help and lookfor functions in MATLAB with example. (1)
- iii) Briefly explain the difference between Clear and Reset Statement of GPSS. (1)
- iv) Briefly explain two limitations of MATLAB JIT (Just in Time) Compiler. (1)
- v) Generate one random variate from an exponential distribution having mean value 8. Take 0.513 as random number. (1)
- vi) What is fixed increment time advance approach in simulation? (1)
- vii) What is significance of strongly connected component in event graph for event initialization rule? (1)
- viii) List the names of three basic components of Queuing Systems. (1)
- ix) List different equipment oriented blocks of GPSS. (1)
- x) What is difference between Deterministic and Stochastic simulation models? (1)

**Part-A**

2. A fleet of trucks is used to haul coal from a mine to a railway station. Each truck is loaded by one of three loaders. After loading, the truck moves, in negligible time, to a weighing machine for getting the weight recorded. The queues at loaders and weighing machine follow FCFS (First come first serve) discipline. After weighing, the truck travels toward the station and joins a queue for unloading at station. After unloading, it travels back to join the loading queue at the coal mine. Simulate the above problem using event diagram. Identify system state variables, entities and events by giving proper reasons. Draw and explain an event graph for the problem, Also Draw flow chart diagrams for events identified. (10)

3. a) Explain components and organization of discrete event simulation model in detail with diagram. (5)
- b) Explain how area of any irregular figure can be calculated using Monte Carlo Simulation. (5)

4. A one-pump gas station is always open and has two types of customers. A-police car arrives every 30 minutes (exactly), with the first police car arriving at time 15 minutes. Regular, (non-police) cars have exponential inter arrival times with mean 5.6 minutes, with the first regular car arriving at time 0. Service times at the pump for all cars are exponential with mean 4.8 minutes. A car arriving to find the pump idle goes right into service, and regular cars arriving 10 find the pump busy join the end of a single queue. A police car arriving to find the pump busy, however, goes to the front of the line, ahead of any regular cars in line: [If there are already other police cars at the front of the line, assume that an arriving police car gets in line ahead of them as well] Initially the system is empty and idle, and the simulation is to run until exactly 500 cars (of any type) have completed their delays in queue.

Identify system state variables, entities and events by giving proper reasons. Draw and explain an event graph for the problem, Also draw flow chart diagrams for events identified. Also estimate the expected average delay in queue for each type of car separately, the expected time-average number of cars (of either type) in queue, and the expected utilization of the pump. (10)

P.T.O.

(2)

**Part-B**

5. a) Explain features and usage of any Network Simulator (5)  
b) Write a function in MALAB for generation of random variates following Poisson distribution. (5)
6. a) Explain different Control statements of GPSS with examples. (5)  
b) Explain different Transaction-flow modification oriented blocks of GPSS with examples. (5)
7. a)  
The number of automobile accidents per week in a certain community were as: 12, 8, 20, 2, 14, 10, 15, 6, 9, 4  
Test whether these frequencies are in agreement with the belief that accident conditions were the same during this 10 week period using Chi Square test. (The table value of Chi-Square for 9 degree of freedom at 5% level of significance is 16.92) (5)
- b) What is Vectorization in MATLAB? Explain its benefits with example. (5)

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