

BE INDUSTRIAL ENGINEERING (FT) – VII SEMESTER
IE 9402 SIMULATION MODELLING & ANALYSIS
END SEMESTER EXAMINATION – APRIL 2013
 (Regulation : 2008)

18/4/13
 (22)

Time: 3 Hours

Max Marks: 100

Instructions

- 1) Answer ALL the questions
- 2) Give table of Definitions, GPSS Block Diagram and Program for GPSS problems.
- 3) Use of Statistical tables allowed.

PART A (10 X 2 = 20 Marks)

1. List the types of simulation.
2. List the advantages of simulation modelling.
3. Generate three random numbers using mid square method assuming a suitable seed.
4. Generate three uniform random variates with mean 7 and half spread 3.
5. The following table gives the distribution of time between arrivals of cars in a traffic signal.

Time bet. arrival (sec)	31	34	35	37	38
Probability	0.1	0.2	0.3	0.3	0.1

Determine the total number of cars expected in the next 2 minutes.

6. State the difference between model verification and validation.
7. What is simulation clock?
8. List any four simulation languages
9. Explain the function of the following GPSS block:
 GENERATE 10,5,2,2,1
10. What is the use of START statement in GPSS ?

Part B (5 X 16 = 80 Marks)

11. Discuss in detail the steps in the design of simulation experiments.
- 12a. Explain the various types of models with suitable examples
 (OR)
- 12b. Consider the following series of 2 digit numbers. Conduct Run Test to verify the independence of the series with a confidence level of 95%

65	16	84	44	48	42	65	58	23	34	45	53	14	79	71
97	37	27	74	42	20	54	81	57	60	34	40	74	25	92
56	66	61	83	36	22	61	76	47	62	65	87	48	18	64
32	58	45	88	24										

- 13a. Components are arriving for inspection, which follow poisson with a mean of 4 per hour. There are three inspectors whose service time follows normal with a mean of 1 hour and a standard deviation of 20 minutes. The supervisor of the inspection section keeps track of the timings and allocates a new job to the inspector who is idle for a longer duration after his latest service completion. Give the logical and program flow chart to simulate the system and collect all the relevant statistics

(OR)

13b. The daily demand for widgets follow normal distribution with a mean of 20 units and a standard deviation of 6 units. Stocks are examined every 7 days (the plant is in operation all the days of the year) and if the stock level has reached 6 or less units, an order for 10 widgets is placed. The lead time is 2 ± 1 day. Give the logical and program flow chart to simulate the system for analyzing the reorder level.

14a. Write Short notes on
i) Features of GPSS
ii) Input Phase of GPSS.

(OR)

14b. Write short notes on
i) System
ii) Monte Carlo simulation
iii) Simulation Clock

15a. The inter arrival time of customers in a self service cafeteria follows uniform distribution with a mean of 35 seconds and a spread of 40 seconds. Forty percent of them go to the sandwich counter where one worker makes a sandwich in 60 ± 30 seconds. The rest go to the main counter, where one server serves the prepared food on to a plate in 54 ± 30 seconds. Afterwards all customers must pay a single cashier counter, who takes 25 ± 10 seconds. For all customers, eating take 20 ± 10 minutes. After eating, 15% of the people go back for desert, spending an additional 10 ± 2 minutes (includes all times serving, paying and eating). Simulate until 100 non-desert customers have left the cafeteria. Give GPSS block diagram and program.

(OR)

15b. Ships arrive at a harbour at the rate of one every 60 ± 30 minutes. There are six berths to accommodate them. They also need the service of a crane for unloading and only one crane is available. After unloading 10% of the ships stay for refuel before leaving while the others leave immediately. Ships do not require the use of crane for refueling. It takes 7 ± 3 hours for unloading and 60 ± 20 minutes for refueling. Assume that the cranes are subjected to routine maintenance once in every 100 hours and it takes 5 ± 2 hours to complete the maintenance. The cranes unloading operation is not interrupted for maintenance. The cranes are taken for maintenance as early as possible after completing the current unloading activity. Give the GPSS block diagram and program to simulate the system for unloading 500 ships that require refueling