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RM-7145

B. E. - III (Sem. VI) (I. T.) Examination

May / June – 2010

Simulation & Modeling

Time : **3** Hours] [Total Marks : **100**

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ **B. E. - 3 (Sem. 6) (I. T.)**

Name of the Subject :

☛ **Simulation & Modeling**

☛ Subject Code No. : **7 1 4 5** ☛ Section No. (1, 2,.....) : **1&2**

Seat No. :

Student's Signature

(2) Answer to each section must be written in separate answer book.
(3) Figures to extreme right indicate maximum marks.
(4) Make necessary assumptions, if required.

SECTION - I

1 (a) (1) State True or False : **4**

(i) In simulation an attempt is made to copy a real system and the parameters are manipulated in an artificial environment.

(ii) "Power Residue Generator" is not Truly Random.

(iii) Simulation is an optimizing technique.

(iv) Round-off errors are indroduces because of the limited size of the computer word.

(2) Do as directed : **6**

(i) Give a brief note on simulation for business executive.

(ii) Give the difference between : Analytical solution and simulation.

(iii) Explain basic nature of simulation.

(b) Answer the following questions :

(1) Explain 'Power residue generator' in detail. **6**

(2) 'Simulation is typically the process of carrying out sampling experiments on the models of the system rather than the system itself'. Explain this statement by taking some examples.

2 (a) Discuss the inventory control system with flowchart. Also list out limitations of the simulation of this system. 8

OR

2 (a) Write note on the following : 8
(i) Chemical reactor system
(ii) Frequency and independence test.

(b)

No	Range	No. of *Observed Occurrences*	*No*	*Range*	*No. of observed Occurrences*
1	000 – 099	463	6	500 – 599	495
2	100 – 199	529	7	600 – 699	480
3	200 – 299	468	8	700 – 799	515
4	300 – 399	508	9	800 – 899	426
5	400 – 499	497	10	900 – 999	519

Above, the actual frequency counts of numbers generated are given for a sequence of 5000 three digit numbers. In this examples, $E_i = 500$ (Expected occurrence for each examples). 7

Find out how well certain observed data fit the theoretically expected data using the chi-square test. Chi-square table for degree of freedom=9 is given below :

0.995	0.99	0.95	0.90	0.75	0.50	0.25	0.10	0.05	0.01	.005
1.73	2.09	3.33	1.17	5.90	8.34	11.4	14.7	16.9	21.7	23.6

OR

(b) State the difference between continuous and discrete system. Which different models are used for the flow of time in discrete system ? Also explain any one model with flowchart. Which model is preferable to use on digital computer ? 7

3 Attempt the following questions : (any three) 15
(1) What do you mean by the term 'SIMULATION" ? State the advantages and disadvantages.
(2) Give the applications of simulation. Also discuss the servo system.
(3) Describe in brief 'Water Reservoir System'.
(4) List out most commonly used methods to generate non-uniformly distributed random numbers and explain the same in details.

SECTION - II

4 (a) Answer the following : **10**

(1) "The expected length of system is always lesser than the expected queue length of the same system." Correct this statement if incorrect.

(2) State the formula for finding utilization factor ρ.

(3) Explain 'Service Level' in brief.

(4) What is the usefulness of activity network ?

(5) Define the term : Criticality index.

(6) What is the difference between buffer stock and safety stock ?

(7) "Assume all N - customers arrive at 4^{th} minutes, arriaval time (AT) and cumulative arrival time (CAT) for k^{th} customer ($k<n$ and $k>1$) are not same." Justify this statement.

(8) What is meant by resource leveling ?

(9) State any one difference between PERT and CPM.

(10) "In the case of pre-emptive priority the servicing of a customer is imterrupted as soon as a low-priority customer arrives." State true or false.

(b) (1) Discuss backward pass with flowchart in brief. **6**

(2) List the terminologies used in single server queue system with brief explanation. **4**

5 (a) Attempt any two : **12**

(1) (a) Assume two N-server queuing systems, single (common) queue for all N-servers and N separate (individual) queues for N-servers. Compare these two queuing systems and also state which queuing system is preferred out of these two ?

(b) Discuss batch arrivals and batch service in brief.

(2) Explain the following terms with brief explanation.

(a) Dummy activity

(b) Slack

(c) Traffic intensity

(3) Explain forecasting and regression analysis.

(b) State the differences between periodic review system and continuous review system. **3**

6 (a) Consider double server queuing system with six customers. Give numbers to each customer ie. 1, 2, ...6 (like c-1, c-2, ...c-6). Using given information of customers : 8

(a) First customer (c-1) arrives at 0^{th} minutes.

(b) There is 10 minutes interval between any two successive arrivals of customers.

(c) Server-1 will take 10 minutes to provide service to each customer and server-2 will take 5 minutes to serve each customer.

Answer the following questions with proper calculations :

(i) Tabularize the results like AT, ST, CAT,CDT (for both the servers). Waiting time for customer, and idle time (for both the servers).

(iii) Which server will provide service to last customer, server-1 or server-2 and at what time this server will start providing service to last customer ?

(b) Write note on 'EOQ with shortage cost'. 7

OR

6 (a) Arrivals at a railway ticket counter are considered to be poisson, with an average time of 10 minutes between one arrival and the next. The length of service time to issue ticket to customer's is assumed to be distributed exponentially, with mean 6 minutes. Find : 8

(a) the probability that an arrival finds three persons are waiting for their turn,

(b) the average number of persons waiting and collecting railway tickets and

(c) the average length length of the queue that is formed from time to time.

(d) the average utilization factor.

(b) Discuss the simulation of activity network with flowchart. 7