

Code :R5321502

**R5**

**III B.Tech II Semester(R05) Supplementary Examinations, April/May 2011**  
**MATHEMATICAL MODELING & SIMULATION**  
 (Computer Science & Systems Engineering)

Time: 3 hours

Max Marks: 80

**Answer any FIVE questions**  
**All questions carry equal marks**  
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- What is meant by a feasible solution of a Linear Programming problem?
  - Write an algorithm for two-phase method. Explain.
  - What are the steps involved to find new solution in Simplex method?
- Give a mathematical formulation of the transportation problem and the simplex methods
  - What are the differences in the nature of the problems that can be solved by above two methods?
  - Describe the transportation problem with its general mathematical formulation.
- Discuss the deterministic periodic review model and explain with example.
- What is selective inventory control? From the following details, draw a plan of ABC selective control.
 

Item :	1	2	3	4	5	6	7	8	9	10	11	12
Unit C('000) :	7	24	1.5	0.6	38	40	60	3	0.3	29	11.5	4.1
Unit cost :	5	3	10	22	1.5	0.5	0.2	3.5	8	8.4	7.1	6.2

- Explain perpetual inventory system.
  - Define a queue. State the characteristics of waiting lines.
    - Telephone users arrive at a booth following Poisson distribution with an average time of 4 minutes between one arrival and the next. The time taken for a telephone call is on an average 3 minutes and it follows an exponential distribution negatively. What is the probability that the booth is busy? How many more booths should be established to reduce the waiting time to less than or equal to one third of the present waiting time.
6. A project has the following activities and other characteristics:

Activity	Preceding	Time Estimates (weeks)		
		Optimistic	Most Likely	Pessimistic
A	-	4	7	6
B	-	1	5	15
C	A	6	12	30
D	A	2	5	8
E	C	5	11	17
F	D	3	6	15
G	B	3	9	27
H	E, F	1	4	7
I	G	4	19	29

- Draw the PERT network diagram.
  - Identify the critical path.
  - Prepare the activity schedule for the project.
  - Determine the mean project completion time.
7. A gas transport company controls pipe-lines between several natural gas fields and out of state distributors. The company has a 1,00,000 unit storage capacity. Because of certain government regulations, the company receives either 40,000 or 60,000 units per day but the probability of receiving such quantity is not equal. The actual demand for natural gas is given by the following table: Assume any suitable random numbers
- | Daily Demand | Probability |
|--------------|-------------|
| 25001- 45000 | 0.3         |
| 45000- 55000 | 0.3         |
| 55000- 65000 | 0.4         |
- What is the expected daily demand?
  - Construct a model that can be used to simulate the company's daily receiving, storage and shipping activities.
8. "Simulation typically is nothing more or less than the technique of performing sampling experiments on the model of the system". Discuss.

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