R09

Code No: D7508

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M.Tech II - Semester Examinations, March/April 2011
OPERATIONS RESEARCH
(CONTROL SYSTEMS)

Time: 3hours **Max. Marks: 60**

Answer any five questions
All questions carry equal marks
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1. A manufacturer produces three models (I, II and III) of a certain product. He uses two types of raw material (A and B) of which 4000 and 600 units respectively are available. The raw material requirements per unit of three models are given below:

Raw material	Requirement per unit of given model		
	I	II	III
A	2	3	5
B	4	2	7

The labour time for each unit of model 1 is twice that of model II and three times that of model III. The entire labour force of the factory can produce the equivalent of 2500 units of model I. A market survey indicates that the minimum demand of the three models are 500,500 and 375 nits respectively. However, the ratios of the number of units produced must be equal to 3:2:5. Assume that the profit per unit of models I, II and III are rupees 60, 40 and 100 respectively. Formulate the problem as LPP model in order to determine the number of units of each product which will maximize profit and solve it by Simplex method.

2. $Max\ f = 5x_1 + 12x_2 + 4x_3$ st

$x_1 + 2x_2 + x_3 \le 5$

$2x_1 - x_2 + 3x_3 = 2$ and $x_i \ge 0,$

a) Solve LPP by using Big M method.
b) Find the effect of change C to (4, 10, 4 from (5, 12, 4).

3. Use Vogel's' approximate method to obtain an initial basic feasible solution of the following transportation problem & find the optimal solution.

Warehouse / Factory	W	X	Y	Z	Supply
A	11	13	17	14	250
B	16	18	14	10	300
C	21	24	13	10	400
Demand	200	225	275	250	

Contd…2

4. Using graphical method calculate the minimum time needed to process job (1) and job(2) on five machines A,B,C,D and E i.e., for each machine find the job which should be done first. Also find the total time needed to complete both jobs.

Job1	Sequence	A	B	C	D	E
	Time	1	2	3	5	1
Job 2	Sequence	C	A	D	E	B
	Time	3	4	2	1	5 hours

5. a) Explain the terms:
i) Pay off
ii) Saddle point
iii)Mixed strategy.
b) Solve the following game by using the principle of dominance.

4	2	0	2	1	1
4	3	1	3	2	2
4	3	7	-5	1	2
4	3	4	-1	2	2
4	3	3	-2	2	2

6. Find the shortest path from A to E in the following network using Dynamic Program

	B1	B2	B3
A	2	2	2

	C1	C2
B1	3	4
B2	4	-
B3	5	2

	D1	D2
C1	-	2
C2	5	3

	E1
D1	3
D2	4

Contd…3

7.a) Min f = x^2-10$e^{0.1x}$ in the interval (-10, 5) to the accuracy of 10%. Use Fibonacci Method.

b) Mention the drawbacks of Fibonacci method.

8.a) Use geometric-inequality theorem and derive dual problem for a unconstrained GP problem.

b) Consider inventory problem in which ordering quantity q>0 is to be found such that

Minimize $f(q) = 1/2\, C_1 q + C_3 R/q$

Where C_1, C_2 and R are parameters. Using geometric programming model approach, solve for optimal ordering quantity.

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