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Mangalore

06ME74

Seventh Semester B.E. Degree Examination, December 2010
Operations Research

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting at least TWO questions from each part.***

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining bl- '' pages.
2. Any revealing of identificatio ppeal to evaluator and /or equations written eg, 42+8 = 5-, will be treated as malpractice.

PART – A

1 a. Explain the limitations of OR models. **(05 Marks)**

b. A plant manufactures washers and dryers. The major manufacturing departments are stamping department, motor and transmission department and final assembly department. Stamping department fabricates a large number of metal parts for both washers and dryers. Monthly dept. capacities ate as follows:

Stamping dept. : 10000 washers or 10000 dryers
Motor and transmission dept. : 16000 washers or 7000 dryers.
Dryer assembly dept. : Only 5000 dryers.
Washer assembly dept. : Only 9000 washers.

Stamping dept. can produce parts for 10000 washers or 10000 dryers per month as well as for some suitable combinations. It is assumed that there is no changeover cost from washers to dryers. A similar situation exists in motor and transmission dept. but assembly lines are separate. The contribution to monthly profit is Rs.900/- per washer and Rs.1200/- per dryer. Determine the number of washers and dryers to be produced. **(15 Marks)**

2 Write the dual for the following LPP. Solve the primal and read the solution of both primal and dual problems.

Maximize $Z = 2x_1 + x_2$

Subjected to constraints $x_1 + 2x_2 \le 10$; $x_1 + x_2 \le 6$; $x_1 - x_2 \le 2$; $x_1 - 2x_2 \le 1$ and $x_1, x_2 \ge 0$ **(20 Marks)**

3 a. The following information is available concerning the operation of a manufacturing company:

Period	Units in order	Production capacity		Excess over cost per unit OT (Rs.)	Storage cost per unit (Rs.)
		Regular time	Over time		
Month 1	800	920	920	1.25	0.5
Month 2	1400	250	250	1.25	0.5

Formulate the problem as a transportation problem and determine the optimal solution. **(15 Marks)**

b. "Solution to the assignment problem is inherently degenerate". Explain. **(05 Marks)**

4 a. State the assumptions of Johnson's algorithm. **(05 Marks)**

b. Find the sequence of the following eight jobs. Each job has to be processed in the order CAB. Following entries give the time in hours on the machine:

Jobs	1	2	3	4	5	6	7	8
M/c A	4	6	7	4	5	3	6	2
M/c B	8	10	7	8	11	8	9	13
M/c C	5	6	2	3	4	9	15	11

Calculate the elapsed time and idle time. **(15 Marks)**

PART – B

5 a. Define: i) Balking ii) Collision iii) Reneging **(06 Marks)**

b. Write a note on Kendall's notations. **(04 Marks)**

c. In a machine shop, the inter arrival times at the tool rib are exponential, with an average time of 10 minutes. The length of the service time is assumed to be exponential with a mean of 6 minutes. Find

i) The probability that a person arriving at the booth will have to wait.

ii) Average length of the queue

iii) The probability that an arrival will have to wait for mote than 12 minutes for service and to obtain his tools. **(10 Marks)**

6 a. Define: i) Critical path ii) Total slack iii) Free slack. **(06 Marks)**

b. Draw the network for the following project. Identify the critical path and calculate the total slack and free slack. **(14 Marks)**

Activity	A	B	C	D	E	F	G	H	I	J
Predecessor	-	-	A	A	B,C	B,C	E	E	D,G	F,H,I
Time (weeks)	15	15	3	5	8	12	1	14	3	14

7 a. Define: i) Saddle point ii) Fair game. **(04 Marks)**

b. If the following payoff matrix has a saddle point, determine the value of game and ranges of 'P' and 'Q'. **(06 Marks)**

		B		
		1	Q	6
A		P	5	10
		6	2	3

c. Solve the following game graphically. **(10 Marks)**

		B		
		I	II	III
A	I	1	3	11
	II	8	5	2

8 Solve the following integer programming problem using the Gomory's technique.

Maximize $Z = 7x_1 + 9x_2$

Subject to constraints $-x_1 + 3x_2 \leq 6$

$7x_1 + x_2 \leq 35$

$x_1, x_2 \geq 0$ and integers. **(20 Marks)**

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