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JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION, 2017

M.TECH IV SEMESTER

COURSE CODE: 10M13CE432   MAX. MARKS: 35

COURSE NAME: CONSTRUCTION METHODS IMPROVEMENT

COURSE CREDITS: 03   MAX. TIME: 2 HRS

Note: All questions are compulsory. Draw figure, sketches and give suitable example to illustrate your answers. Assume missing data suitably if required.

1. A cement company has three factories which manufacture cement which is then transported to four distribution centers. The quantity of monthly production of each factory, the demand of each distribution centre and the associated transportation cost per quintal are given as follows: [10]

		Distribution Centers				Monthly Production (quintals)
		W	X	Y	Z	
	A	10	8	5	4	7000
Factories	B	7	9	15	8	8000
	C	6	10	14	8	10000
Monthly demand (quintals)		6000	6000	8000	5000	

   i. Suggest the optimal transportation schedule.

   ii. Is there any other transportation schedule which is equally attractive? If so, write that.

   iii. Suppose the company desires to send at most 500 quintals of cement from factory C to distribution centre Y, what will be the optimal schedule? Also obtain the total transportation cost in such case.

2. How is sensitivity analysis carried out in case there are multiple changes in parameters? In this context, explain the 100% Rule. [3]

3. How would you deal with the assignment problems where [3]
   a) Some assignments are prohibited
   b) An unbalanced assignment problem

4. A company manufactures and sells three models of large sized pressure cookers for canteen use. While market demands pose no constraints, supplies of aluminum limited to 750 kg per week and availability and availability of machine time limited to 600 hours

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per week restrict the product mix. The resource usage of the three models and their profitability are given below: [12]

	Model		
	M1	M2	M3
Aluminum/unit	6	3	5
Machine-time/unit	3	4	5
Contribution Rs/unit	60	20	80

(a) Formulate the problem as an LPP and solve for optimal solution by simplex method.
(b) Using the information in optimal solution tableau, determine whether and how the current solution would be sensitive to the following changes. Treat each of the conditions given below independently.

    i.   An additional 150 kg of aluminum would become available.

    ii.   The machine hours available would reduce from current level of 600 hours to 450 hours.

    iii. Following a reduction in selling price of M3, its contribution margin decreases by Rs 15.

    iv. What minimum contribution of M2 would make it feature in the optimal solution?

    v.   A new model has been developed requiring 3 kg of aluminum and 3 hours of machine time per unit, with an estimated unit contribution of Rs 40. Would it be worthwhile manufacturing this new model?

5. A firm produces four products. There are four operators who are capable of producing any of these four products. The firm records 8 hours a day and allows 30 minutes for lunch. The processing time in minutes and the profit for each of the products are given below:

Operator	Products			
	A	B	C	D
1	15	9	10	6
2	10	6	9	6
3	25	15	15	9
4	15	9	10	10
Profit (Rs.) per unit	8	6	5	4

Find the optimal assignments of products to operators. [7]