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Eastern University, Sri Lanka

EASTERN UNIVERSITY, SRI LANKA
FACULTY OF COMMERCE AND MANAGEMENT
DEPARTMENT OF MANAGEMENT

Third Year – First Semester Examination in Business Administration 2008/09 (Sep 2009)

MGT 302 MANAGEMENT SCIENCE

Answer all questions

Time: 3 hrs.

- Q1.** The ABC Company supplies its two retail outlets from its two plants. Plant 'A' will be supplying 30 units next month. Plant 'B' has not yet set its production schedule for next month but has the capacity to produce and send any amount up to a maximum of 50 units. Retail outlet one (1) has submitted its order for 40 units for next month. Retail outlet two (2) needs a minimum of 25 units next month but would be happy to receive more. The production costs are the same at the two plants but the distribution costs differ. The distribution cost per unit from each plant to each retail store is given below:

	Unit Distribution Cost	
	Retail Outlet One (1)	Retail Outlet Two (2)
Plant 'A'	Rs.700/=	Rs.400/=
Plant 'B'	Rs.800/=	Rs.600/=

The distribution manager, Aruna, now needs to develop a plan for how many units to send from each factory to each of the retail stores next month. His objective is to minimize the total distribution cost

Questions

1. Identify the individual decisions that Aruna needs to make. For each of these decisions, define a decision variable to represent the decision. **(04 marks)**
2. Write a mathematical expression for the total distribution cost in terms of the decision variables. **(03 marks)**
3. Write a mathematical expression for each of the constraints. **(04 marks)**
4. State a complete mathematical model for Aruna's problem. **(04 marks)**
5. What do you think Aruna's distribution plan should be? Explain your reasoning and distribution plan in terms of the decision variables. **(05 marks)**

(Total 20 marks)

Q2. A Manager allocates Rs. 180,000 to purchase two types of tables. A round table with eight (8) seats costs Rs.600 while a square table with four (4) seats costs Rs.500. Seating for at least 1800 persons is required. There should be at least as many square tables as round tables (the number of square tables equals the number of round tables). The accountant is requested to purchase the smallest number of tables to meet these requirements.

Questions

1. State the objective function. (01 mark)
2. Give all constraints. (03 marks)
3. Draw a graph of these constraints and make the feasible region. (04 marks)
4. Determine the quantities of each type of table to be bought. (02 marks)

(Total 10 marks)

Q3 Kannahi Limited has five destinations (D1, D2, D3, D4, and D5) to receive goods from four distribution centres (S1, S2, S3, and S4). The estimated transportation cost per unit (in rupees) from each supplying centre to destinations and the quantity supplied and demanded are:

Destination Centre	D1	D2	D3	D4	D5	Supply
S1	5	7	1	1	2	100
S2	4	8	2	1	2	100
S3	5	7	5	4	4	200
S4	6	7	2	3	6	200
Demand	50	150	150	150	50	550

You are required to find the minimum cost of transportation by using least cost based initial allocation and MODI method for optimality testing.

(Total 20 marks)

Q4 Kannaah Limited has five building contracts (C1, C2, C3, C4, and C5) to assign to different contractors. There are six contractors (A1, A2, A3, A4, A5, and A6) demanded each of the contracts at the following costs (in million rupees).

	A1	A2	A3	A4	A5	A6
C1	12	15	18	16	20	22
C2	14	18	20	19	22	25
C3	14	19	20	21	23	24
C4	16	19	21	23	22	23
C5	15	18	22	22	21	25

Kannaah Limited has a policy of assigning each building contract to different contractors.

Required:

- How does Kannaah Limited assign each of the building contracts to different contractors in order to minimize the total cost? **(10 marks)**
- If you find any alternative solution, where a contractor can get any two of the building contracts, identify them and determine the minimum total cost for the assignments to be made. **(10 marks)**

(Total 20 marks)

Q5 From the following information available with regard to a project, you are required to determine:

- Normal duration, cost, critical path to complete the project; and **(15 marks)**
- Minimum cost and associated cost of the project. **(15 marks)**

Information

- There is a fixed cost of Rs 5,500/= per month. Further, the penalty cost of Rs 8,000/= incurs if the project completion exceeds 60 months. However, if the completion duration is less than 60 months, there is a bonus of Rs 500/= per month saved.

- 2) The numbers of ~~days~~^{months} to be saved from each of the activities are 5, 4, and 2, if an activity falls within less than 20, 20-40, and above 40 months during the completion of the project, respectively.
- 3) The table below gives the order of the activities to be completed with their respective normal duration, and normal and crashed costs.

Activity	Preceding Activity	Normal Duration (in months)	Normal Cost Rs.	Crashed Cost Rs.
A	I	16	60,000/=	80,000/=
B	F, G	15	50,000/=	60,000/=
C	E	15	50,000/=	90,000/=
D	---	15	60,000/=	90,000/=
E	---	16	70,000/=	100,000/=
F	A, H	17	60,000/=	80,000/=
G	A, C, H	18	70,000/=	80,000/=
H	D	14	45,000/=	55,000/=
I	---	14	55,000/=	75,000/=
J	G	12	20,000/=	30,000/=

(Total 30 marks)