SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN
(AUTONOMOUS)
(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)
Chromepet, Chennai — 600 044.
B.C.A. - END SEMESTER EXAMINATIONS APRIL-2023
SEMESTER - V
20UCAET5RM1 - Resource Management Techniques

Total Duration : 2 Hrs 30 Mins. Total Marks : 60

Section B

Answer any **SIX** questions $(6 \times 5 = 30$ Marks)

1. A farmer has a 100-acre farm. He can sell all tomatoes, lettuce, and radishes he can grow. The price he can obtain is Re.1.00 per kg of tomatoes, Re.0.75 a head for lettuce, and Rs.2.00 per kg of radishes. The average yield per acre is 2000kgs of tomatoes, 3000 heads of lettuces, and 1000 kgs of radishes. Fertilizer is available at Re.0.50 per kg and the amount required per acre is 100 kgs each for tomatoes and lettuce, and 50 kg for radishes. Labour required for sowing, cultivation, and harvesting per acre is 5 man-days for tomatoes and radishes and 6 man-days for lettuce. A total of 400 man-days of labour are available at Rs.20 per man-day. Formulate this problem as LP to maximize the farmer's profit.
2. Determine an initial basic feasible solution to the following transportation problem using Vogel's Approximation method. Also, determine the initial total cost of transportation.

Source	**Destination**				**Supply**
	D1	D2	D3	D4	
S1	21	16	15	3	11
S2	17	18	14	13	13
S3	37	27	18	41	19
Demand	6	10	12	15	43

3. Solve the game whose pay-off matrix is given below:

	Player B				
Player A	9	3	1	8	0
	6	5	4	6	7
	2	4	3	3	8
	5	6	2	2	1

Contd...

4. List down the advantages and disadvantages of PERT/CPM.

5. Find the non-degenerate basic feasible solution for the following transportation problem using North-West Corner Rule

Source	**Destination**				**Supply**
	1	2	3	4	
1	10	20	5	7	10
2	13	9	12	8	20
3	4	5	7	9	30
4	14	7	1	0	40
5	3	12	5	19	50
Demand	60	60	20	10	150

6. Consider a set of given jobs as shown in the following table. Find a sequence of jobs, which will be completed within their deadlines and will give maximum profit. Each job is associated with a deadline and profit.

Job	$\mathbf{J}_1$	$\mathbf{J}_2$	$\mathbf{J}_3$	$\mathbf{J}_4$	$\mathbf{J}_5$
Deadline	2	1	3	2	1
Profit	60	100	20	40	20

7. Describe the Dominance Property method with example.

8. A small project consisting of eight activities has the following characteristics. Draw the PERT network for the project and Determine the critical path.

Time - Estimates(in Weeks)

Activity	**Preceding Activity**	**Most Optimistic time(a)**	**Most Likely time(m)**	**Most Pessimestic time(b)**
A	None	2	4	12
B	None	10	12	26
C	A	8	9	10
D	A	10	15	20
E	A	7	7.5	11
F	B,C	9	9	9
G	D	3	3.5	7
H	E,F,G	5	5	5

Section C

Answer any **THREE** questions $(3 \times 10 = 30$ Marks)

9. A firm manufactures two products A and B on which the profit earned per unit is Rs.3 and Rs.4 respectively. Each product is processed on two machines M1 and M2. Product A requires one minute of processing time on M1 and two minutes on M2. Product B requires one minute on M1 and one minute on M2. Machine M1 is available for not more than 7 hours and 30 minutes. Machine M2 is available for 10 hours during any working day. Find the number of units of products A and B to be manufactured to get maximum profit, Solve by Graphical method.

10. A company has a team of four salesmen and there are four districts where the company wants to start its business. After taking into account the capabilities of salesmen and the nature of districts, the company estimates that the profit per day in rupees for each salesman in each district is as follows. Find the assignment of salesmen to various districts which will yield maximum profit.

Salesmen	**Districts**			
	1	2	3	4
A	16	10	14	11
B	14	11	15	15
C	15	15	13	12
D	13	12	14	15

11. Given the jobs, their deadlines and associated profits as shown
Answer the following questions
    a. Write the optimal schedule that gives maximum profit.
    b. Are all the jobs completed in the optimal schedule?
    c. What is the maximum earned profit?

Job	$\mathbf{J}_1$	$\mathbf{J}_2$	$\mathbf{J}_3$	$\mathbf{J}_4$	$\mathbf{J}_5$	$\mathbf{J}_6$
Deadline	5	3	3	2	4	2
Profit	200	180	190	300	120	100

12. Solve the following 2×4 game graphically whose pay-off matrix is given below:

	Player B			
Player A	1	0	4	-1
	-1	1	-2	5

Contd...

13. A Project is composed of seven activities whose time estimates are listed in the following table. Activities are simplified by this beginning (i) and ending (j) Node member. Calculate expected project length.

Activity		**Estimated Duration in Weeks**		
i	j	**Optimistic**	**Most Likely**	**Pessimestic**
1	2	1	1	7
1	3	1	4	7
1	4	2	2	8
2	5	1	1	1
3	5	2	5	14
4	6	2	5	8
5	6	3	6	15

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