

ONE TIME EXIT SCHEME

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10AU71

Seventh Semester B.E. Degree Examination, April 2018 Operations Research

Time: 3 hrs.

Max. Marks:100

- Note:** 1. Answer any FIVE full questions, selecting at least TWO questions from each part.
2. Missing data if any, may be suitable assumed.

PART – A

- 1 a. A farmer has 100 acres farm. He can sell all tomatoes, Lettuce or radishes. The price he can obtain is Rs.10 per kg for tomatoes, Rs. 7.5 a head of lettuce and Rs.20 per kg of radish. The average yield per acre is 2000 kg of tomatoes, 3000 heads of lettuce, and 1000kg of radishes. Fertilizer is available at Rs.5 per kg and amount required per acre is 100kgs each for tomatoes and Lettuce, and 50kgs for radishes. Labour required per is 5 man-days for tomatoes and radish and 6man-days for lettuce. Total of 400 man days of labour are available at Rs. 200per man-day. Formulate this problem as a LPP model to maximum farmer's total profit. (12 Marks)

- b. Solve the following problem using graphical method :

$$\text{Maximize : } Z = 0.5x_2 - 0.1x_1$$

$$\text{Subject to : } 2x_1 + 5x_2 \leq 80$$

$$x_1 + x_2 \leq 20$$

$$x_1, x_2 \geq 0$$

$$\text{Check } Z \geq 6.$$

(08 Marks)

- 2 a. Solve the following LPP by BIG – M method :

$$\text{Maximizes : } Z = -2x_1 - x_2$$

$$\text{Subjected to : } 3x_1 + x_2 = 3$$

$$4x_1 + 3x_2 \geq 6$$

$$x_1 + 2x_2 \leq 4$$

$$x_1, x_2 \geq 0.$$

(14 Marks)

- b. Define slack, surplus and artificial variable.

(06 Marks)

- 3 a. If $x_{13} = 50$ $x_{14} = 55$ $x_{21} = 55$
 $x_{31} = 30$ $x_{32} = 35$, $x_{34} = 25$

Find optimum solution of following transportation problem? If not modify to obtain feasible solution. (14 Marks)

		To				Supply
		6	1	9	3	70
From		11	5	2	8	55
		10	12	4	7	90
Demand		85	35	50	45	

- b. Explain unbalanced transportation problem, how to solve this type of transportation problem. (06 Marks)

- 4 a. Solve the following assignment problem so that total time of production is minimized.

(08 Marks)

Jobs	A	B	C	D
P	10	14	22	12
Q	16	10	18	12
R	8	14	20	14
S	20	8	16	6

- b. A tourist organization is planning to arrange a tour to 5 historical places. Starting from the head office at A then going round B, C, D and E and then come back to A. Their objective is to minimize the total distance covered. Help them in sequencing the cities. A, B, C, D and E as shown in Fig.Q4(b). The numbers on the arrows show the distance in km. (12 Marks)

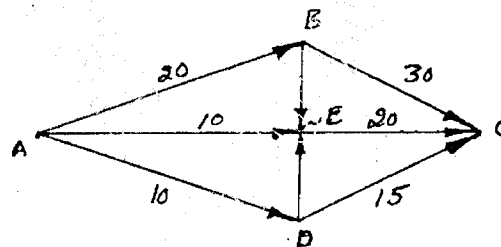


Fig.Q4(b)

PART - B

- 5 a. Use graphical method to minimize the time needed to process the following jobs on the machines. For each machine find which job is to be loaded first? Calculate the total time required to process the jobs. The time is given in hours. The machine order for job 1 is ABCDE and takes 3, 4, 2, 6, 2 hours respectively. The machine order for job2 is BCDE and takes 5, 4, 3, 2, 6 hours respectively for processing. (14 Marks)
- b. Explain the procedure of Johnson's algorithm for n-jobs to 2 machines with example. (06 Marks)
- 6 a. Use the relation of dominance to solve the rectangular game where pay off matrix to A is given as. (12 Marks)

	I	II	III	IV	V	VI
I	0	0	0	0	0	0
II	4	2	0	2	1	1
III	4	3	1	3	2	2
IV	4	3	7	-5	1	2
V	4	3	4	-1	2	2
VI	4	3	3	-2	2	2

- b. Solve the following (2x3) game graphically.

(08 Marks)

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

- 7 a. Arrival rate of telephone calls at a telephone booth are according to Poisson distribution, with an average time of 9 minutes between two consecutive arrivals. The length of telephone calls is assumed to be exponentially distributed with mean 3 minutes.
- Determine the probability that a person arriving at the booth will have to wait
 - Find the average queue length
 - The telephone company will install a second booth. When convinced that an arrival would expect to have to wait at least four minutes for the phone. Find the increase in flow arrivals which will justify a second booth.
 - What is the probability that an arrival will have to wait for more than 10 minutes before the phone is free? **(10 Marks)**
- b. Define five operating characteristics of a queuing system. **(10 Marks)**
- 8 a. What are the characteristic of a project? Also define the PERT and crashing cost. **(06 Marks)**
- b. A project consists of a series or tasks labelled A, B,.....H, I with following relationships (W < X, Y. Means X and Y can't start until W is completed and X, Y < W means vice versa). With those notation, construct the network diagram having following constraints :
 A < D, E ; B, D < F; C < G; B < H; F, G < I.
 Find the optimum time of completion of project, when the time of completion of each task is as follows :

Task	A	B	C	D	E	F	G	H	I
Time	23	8	20	16	24	18	19	4	10

Clearly indicate critical path.

(14 Marks)

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