CBCS SCHEME

15MA71

Seventh Semester B.E. Degree Examination, June/July 2019
Operations Research

Time: 3 hrs.

Max. Marks: 80

Note: *1. Answer any FIVE full questions, choosing*
ONE full question from each module.
2. Use of statistical tables is permitted.

Module-1

1   a. What is operations research? Describe briefly its applications. **(04 Marks)**
    b. What is the role of operations research in decision making? **(02 Marks)**
    c. A company wishes to advertise its products through magazine I and II. Magazine I has a reach of 20,000 potential customers. The cost per page of advertising is Rs. 4,000 and Rs. 6000 in magazines I and II respectively. The firm has a monthly budget of Rs. 60,000. There is an important requirement that the total reach for the income group under Rs. 2,00,000 per annum should not exceed 4,000 potential customers. The reach in magazines I and II for this income group is 4,000 and 2000 potential customers. How many pages should be budget in two magazines to maximize the total reach? (use graphical method). **(10 Marks)**

OR

2   a. List and explain the various phases of OR. **(06 Marks)**
    b. An industry employs 5 skilled men and 10 semi skilled men to produce a product in two qualities, a deluxe model and an ordinary model. A deluxe model requires 2 hours work by a skilled man and 2 hours work by a semi skilled man. The ordinary model requires 1 hour work by a skilled men and 3 hours work by a semi skilled man. No employees can work more than 8 hours per day. An industry earns a profit of Rs.100 on deluxe model and Rs. 80 on the ordinary model. Formulate the problem as LPP and solve it graphically. **(10 Marks)**

Module-2

3   a. For the following problem :
        Maximize $Z = x_1 + 3x_2 + 3x_3$
        Subject to $x_1 + 2x_2 + 3x_3 = 4$
        $2x_1 + 3x_2 + 5x_3 = 7$ **(04 Marks)**
        Determine : i) basic solutions ii) feasible solutions iii) non – degenerate basic feasible solution and iv) optimal feasible solutions.
    b. Solve the following LPP by simplex method :
        Maximize $Z = 4x_1 + 10x_2$
        Subject to $2x_1 + x_2 \leq 10$
        $2x_1 + 5x_2 \leq 20$
        $2x_1 + 3x_2 \leq 18$
        $x_1, x_2 \geq 0.$ **(12 Marks)**

OR

4 a. Obtain the dual for the following primal problem :
   Minimize $Z = 3x_1 - 2x_2 + x_3$
   Subject to $2x_1 - 3x_2 + x_3 \leq 5$
   $4x_1 - 2x_2 \geq 9$
   $-8x_1 + 4x_2 + 3x_3 = 8$
   $x_1, x_2 \geq 0$, x_3 is unrestricted   (04 Marks)

   b. Solve the following LPP by Big-M method :
   Minimize $= 2x_1 + 3x_2$
   Subject to $x_1 + x_2 \geq 5$
   $x_1 + 2x_2 \geq 6$
   $x_1, x_2 \geq 0.$ (12 Marks)

Module-3

5 a. Determine the optimum schedule and minimum total shipping cost for the following transportation problem :

		To (Markets)				
		I	II	III	IV	Supply
From (Ware house)	A	50	20	40	30	22
	B	40	80	10	60	15
	C	40	60	70	50	8
	Demand	7	12	17	9	

   The transportation cost/unit is in rupees.   (10 Marks)

   b. Show that assignment model is a special case of transportation model.   (06 Marks)

OR

6 a. A product is produced by four factories A, B, C and D. the unit production costs in them are Rs.2, Rs.3 Rs.1 and Rs.5 respectively. Their production capacities are at A -- 50 units, B – 70 units, c – 30 units and D – 50 units. These factories supply the product to four stores, demands of which are 25, 35, 105 and 20 units respectively. The unit transportation cost in rupees from each factory to each store is given below. Determine the optimum schedule which minimizes the total production and transportation cost.   (10 Marks)

		Stores			
		1	2	3	4
Factories	A	2	4	6	11
	B	10	8	7	5
	C	13	3	9	12
	D	4	6	8	3

   b. A project consists of four hobs for which four contractors have submitted tenders. The tender amounts quoted in lakhs of rupees are given in the matrix. Find the optimal assignment, which minimizes the total cost of the project.

		Jobs			
		A	B	C	D
Contractors	1	10	24	30	15
	2	16	22	28	12
	3	12	20	32	10
	4	9	26	34	16

(10 Marks)