CBCS SCHEME

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15ME81

Eighth Semester B.E. Degree Examination, Aug./Sept.2020
Operation Research

Time: 3 hrs. Max. Marks: 80

Note: i) For Regular Students: Answer any FIVE full questions irrespective of modules.
ii) For Arrear Students : Answer any FIVE full questions, choosing ONE full question from each module.
iii) Use of normal distribution table is allowed.

Module-1

1 a. Define operation research and explain all phases of operation research. **(05 Marks)**

b. Old hens can be brought at Rs.20 each and young one at Rs.50 each. The old hens lay 3 eggs per week and young one lay 5 eggs per week. Each egg being worth of one rupee and thirty paise. A hen cost Rs.4 per week to feed. He has only Rs.800 to spend for hens. How many of each kind should be buy to give a profit of more than Rs.600 per week. Assuming that he cannot handle more than 200 hens, formulate the above problem as LPP model. **(11 Marks)**

2 a. Explain the limitations of operation research. **(05 Marks)**

b. Solve the below given LPP graphically and find the value of 'Z'.

Minimize $Z = 1.5x_1 + 2.5x_2$

$$x_1 + 3x_2 \geq 3$$
$$x_1 + x_2 \geq 2$$
$$x_i \geq 0$$

(11 Marks)

Module-2

3 a. Solve the below given LPP by Big-M method.

Maximize $Z = -2x_1 - x_2$

$$3x_1 + x_2 = 3$$
$$4x_1 + 3x_2 \geq 6$$
$$x_1 + 2x_2 \leq 4$$
$$x_i \geq 0$$

(11 Marks)

b. Define slack, surplus and artificial variable. **(05 Marks)**

4 a. Explain how do you resolve degeneracy in simplex method. **(05 Marks)**

b. Solve the below given LPP by two phase method.

Minimize $Z = \frac{15}{2}x_1 - 3x_2$

$$3x_1 - x_2 - x_3 \geq 3$$
$$x_1 - x_2 + x_3 \geq 2$$

(11 Marks)

Module-3

5 Solve the following transportation problem and find the minimum transportation cost.

Warehouse → Factory ↓	W_1	W_2	W_3	W_4	Factory Capacity
F_1	19	30	50	10	7
F_2	70	30	40	60	9
F_3	40	8	70	20	18
Warehouse Requirement	5	8	7	14	

(16 Marks)

6 Solve the following assignment problem and find minimum time required to complete all jobs. Time each man would take to perform each task is given in the matrix.

Job → Men ↓	I	II	III	IV
A	8	26	17	11
B	13	28	4	26
C	38	19	18	15
D	19	26	24	10

(16 Marks)

Module-4

7 a. Explain the Fulkerson's rule for number of nodes. **(05 Marks)**

b. Time estimates in weeks for PERT net work is given below. Calculate the following:

(i) Total expected time for the critical path

(ii) Standard deviation and varience for the project

(iii) Probability of project completion atleast 4 weeks earlier than expected time

(iv) If the project due date is 19 weeks, what is the probability of not meeting the due date?

Activity	t_o	t_m	t_p
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

(11 Marks)

8 a. Explain the queuing system description parameters. **(05 Marks)**

b. A TV repairman finds that the time spent on his jobs has an exponential distribution, with mean 30 minutes. If he repairs set in the order in which they come in and if the arrival of sets is approximately Poisson with an average rate of 10/8 hrs day, what is repairman's expected idle time each day. How many jobs are ahead of average set just brought in? **(11 Marks)**

Module-5

9 a. Explain maximini and minimaxi principle and also explain characteristics of Game theory. **(05 Marks)**

b. Solve the following game graphically.

Player 'B'

Player 'A'	a	b	c	d	e
I	–5	5	0	–1	8
II	8	–4	–1	6	–5

(11 Marks)

10 a. Explain the assumptions made while solving sequencing problems. **(05 Marks)**

b. Find the sequence that minimizes the total elapsed time 'T' required to complete the following tasks. Each task can be processed in any two machines A, B and C in any order.

Tasks

Machines	1	2	3	4	5	6	7
A	12	6	5	3	5	7	6
B	7	8	9	8	7	8	3
C	3	4	11	5	2	8	4

(11 Marks)

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