

B.Tech IV Year I Semester (R13) Regular Examinations November/December 2016

OPERATIONS RESEARCH
(Mechanical Engineering)

Time: 3 hours

Max. Marks: 70

PART - A
(Compulsory Question)

- 1 Answer the following: (10 X 02 = 20 Marks)
- What is operations research? What are the main characteristics of operation research?
 - Give the matrix form of representing a LPP.
 - Write short note on travelling salesman problem.
 - Mention the rules of drawing a network diagram.
 - What are pure and mixed strategies?
 - State the components of queuing system.
 - Define free float in CPM.
 - Define sequencing problem.
 - State the features of dynamic programming problem.
 - What are the basic reasons for replacement?

PART - B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT - I

- 2 A company makes two products (P1 & P2), which must be processed by two departments (D1 & D2). D1 has 60 hours available and D2 can handle 48 hours of work. Manufacturing one P1 requires 4 hours in D1 and 2 hours in D2. Each P2 requires 2 hours in D1 and 4 hours in D2. If the profit is Rs. 80 per P1 and Rs. 60 per P2. Determine the best possible combination of products to produce. Formulate as a LP problem and solve using graphical method.

OR

- 3 What is operation research? Briefly explain the various phases of operations research study.

UNIT - II

- 4 Explain the steps involved in setting up of a simplex method.

OR

- 5 Solve the following LPP by using simplex method.

$$\begin{aligned} \text{Max } z &= -2x_1 - x_2 \\ \text{Subjected to } 3x_1 + x_2 &= 3 \\ 4x_1 + 3x_2 &\geq 6 \\ x_1 + 2x_2 &\leq 4 \\ x_1, x_2 &\geq 0 \end{aligned}$$

UNIT - III

- 6 Solve the following game by linear programming:

	B ₁	B ₂	B ₃	Row min
A ₁	3	-1	-3	-3
A ₂	-2	4	-1	-2
A ₃	-5	-6	2	-6
Column max	3	4	2	

The value of the game, v, lies between -2 and 2.

OR

- 7 Write short notes on the following:

- Arrival pattern.
- Departure pattern.

Contd. in page 2

UNIT - IV

8 Define the problem of sequencing. Describe the method of processing 'n' jobs through two machines.

OR

9 A small project consists of seven activities for which the relevant data are given below.

Activity	Preceding activities	Activity Duration (days)
A	-	4
B	-	7
C	-	6
D	A,B	5
E	A,B	7
F	C,D,E	6
G	C,D,E	5

(i) Draw the network and find the project completion time.

(ii) Calculate the total flow for each of the activities and highlight the critical path.

(iii) Draw the time scale diagram.

UNIT - V

10 Explain Bellman's principle of optimality.

OR

11 Define maintenance and types of maintenance.

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