Hall Ticket No | | | | | | | | | | Question Paper Code: AHS012

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Four Year B.Tech V Semester End Examinations (Regular) - November, 2018

Regulation: IARE – R16

OPTIMIZATION TECHNQUES

Time: 3 Hours **(Common to CSE | IT |EEE)** **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

UNIT – I

1. (a) Discuss about the limitations of Operation Research. **[7M]**

   (b) In the production of 2 types of toys, a factory uses 3 machines A, B and C. The time required to produce the first type of toy is 6 hours, 8 hours and 12 hours in machines A, B and C respectively. The time required to make the second type of toy is 8 hours, 4 hours and 4 hours in machines A, B and C respectively. The maximum available time (in hours) for the machines A, B, C are 380, 300 and 404 respectively. The profit on the first type of toy is 5 dollars while that on the second type of toy is 3 dollars. To find the number of toys of each type that should be produced to get maximum profit, formulate the problem as an LPP and solve it. **[7M]**

2. (a) Use simplex method to find an improved solution for the linear problem represented by the following tableau shown in Table 1 where basic variables are s_1, s_2, s_3. **[7M]**

Table 1

x_1	x_2	s_1	s_2	s_3	b	Basic Variables
-1	1	1	0	0	11	s_1
1	1	0	1	1	27	s_2
2	5	0	0	1	90	s_3
-4	-6	0	0	0	0	

   The objective function for this problem is Z= $4x_1 + 6x_2$.

   (b) Solve the following problem by two phase simplex method **[7M]**

   max z=$2x_1$+$3x_2$+x_3

   x_1+ x_2+$x_3 \leq 40$

   $2x_1$+ x_2-$x_3 \geq 10$

   - x_2+$x_3 \geq 10$

   x_1, x_2, $x_3 \leq 0$

UNIT – II

3. (a) Explain Vogel's approximation method to find initial basic feasible solution of a given transportation problem with an example. **[7M]**

   (b) A contractor pays his subcontractors a fixed fee plus mileage for work performed. On a given day the contractor is faced with three electrical jobs associated with various projects. Given Table 2 are the distances between the subcontractors and the projects. **[7M]**

Table 2

	A	B	C
Westside	50	36	16
Federated	28	30	18
Goliath	35	32	20
Universal	25	25	22

How should the contractors be assigned to minimize total costs?

4. (a) How to achieve optimal solution in Hungarian assignment method? **[7M]**

   (b) Solve the assignment problem represented by the matrix shown in Table 3. **[7M]**

Table 3

Person	1	2	3	4
A	20	25	22	28
B	15	18	23	17
C	19	17	21	24
D	25	23	24	24

UNIT – III

5. (a) Explain (i) Pure strategy (ii) Mixed strategy (iii) Value of the game and Fair game **[7M]**

   (b) There are four jobs each of which has to go through the machines Mi, i=1,2,...,6 in the order M1,M2,...,M6. Processing times are given Table 4. **[7M]**

Table 4

Jobs(j)	M1	M2	M3	M4	M5	M6
J1	20	10	9	4	12	27
J2	19	8	11	8	10	21
J3	13	7	10	7	9	17
J4	22	6	5	6	10	14

Determine a sequence for these four jobs which minimizes the total elapsed time, also find the total elapsed time.

6. (a) Solve the gaming problem by graphical method. **[7M]**

	B1	B2
A1	-2	0
A2	3	-1
A3	-3	2
A4	5	-4

(b) Solve the 2x2 game with no saddle point. **[7M]**

	B	
A	5	1
	3	4

UNIT – IV

7. (a) Explain the basic concepts of dynamic programming. **[7M]**

(b) Solving Linear Programming using Dynamic Programming.
Maximize $Z = 3x_1 + 5x_2$
Subject to $x_1 \leq 4;\ \ x_2 \leq 6;\ \ 3x_1 + 2x_2 \leq 18;\ \ x_1,\ \ x_2 \geq 0;$ **[7M]**

8. (a) Outline the significance of principle of optimality in dynamic programming with an example. **[7M]**

(b) Find shortest route from node 1 to all other nodes by dynamic programming for Figure 1. **[7M]**

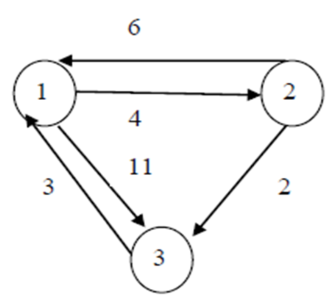

Figure 1

UNIT – V

9. (a) Illustrate the advantages of constrained programming. **[7M]**

(b) Derive the Lagrangian function used in quadratic approximation. **[7M]**

10. (a) Explain variable metrics method for constrained optimization. **[7M]**

(b) Derive the mathematical form of direct quadratic optimization. **[7M]**

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