PVP 12

Code: **MEMD2T1**

I M.Tech - II Semester – Regular/Supplementary Examinations
JULY - 2017

ADVANCED OPTIMIZATION TECHNIQUES
(MACHINE DESIGN)

Duration: 3 hours Max. Marks: 70

Answer any FIVE questions. All questions carry equal marks

1. Food *X* contains 6 units of Vitamin A per gram and 7 units of Vitamin B per gram and costs 12 paise per gram. Food *Y* contains 8 units of Vitamin A per gram and 12 units of Vitamin B per gram and costs 20 paise per gram. The daily minimum requirements of Vitamin A and Vitamin B are 100 units and 120 units respectively. Use the BIG - M method to find the minimum cost of the product mix. 14 M

2. Four lecturers, each capable of teaching any one of the four different subjects. Class preparation time in hours for different subjects varies from teacher and is given in the table below. Each lecturer is assigned only one subject. Determine an assignment schedule so as to minimize the total preparation time for all subjects. 14 M

Lecturer	Thermodynamics	Machine Design	Production Engineering	Operation Research
A	2	10	9	7
B	15	4	14	8
C	13	14	16	11
D	4	15	13	9

3. Minimize $z = x_1^2 + x_2^2$ subject to constraints $x_1 + x_2 \geq 4$, $2x_1 + x_2 \geq 5$ and $x_1, x_2 \geq 0$ by Kuhn-Tucker conditions. 14 M

4. Use the Cauchy's steepest descent method to minimize $f(x_1, x_2) = 4x_1^2 + 3x_2^2 - 5x_1x_2 - 8x_1$ starting from the point $X_1 = (0, 0)$. Perform at least four iterations. 14 M

5. Explain the working principle of GA and explain Fitness function and convergence of GA solution. 14 M

6. a) Distinguish between GA and GP. 7 M

   b) Explain random population generation in GP. 7 M

7. Define and explain in detail representation of a Multistage Decision Process with a suitable example. 14 M

8. a) State and explain about various parameters of springs which are subjected to optimization. 6 M

b) State the typical formulation used for optimization of arc welding process. 8 M