PVP 12

Code: **MEMD2T1**

I M.Tech-II Semester-Regular Examinations-December 2013

ADVANCED OPTIMIZATION TECHNIQUES
(MACHINE DESIGN)

Duration: 3 hours Marks: 5x14=70

Answer any FIVE questions. All questions carry equal marks

1. Use 2-phase simplex method to:

Minimize $Z = 2x_1 + 3x_2$

Subject to $\frac{1}{2}x_1 + \frac{1}{4}x_2 \leq 4$

$x_1 + 3x_2 \geq 20, \quad x_1 + x_2 = 10$

$x_j \geq 0 \ (j = 1, 2)$ 14M

2. A company has five jobs *V*, *W*, *X*, *Y* and *Z* and five machines *A*, *B*, *C*, *D* and E. The given matrix shows the return in Rs. of assigning a job to a machine. Assign the jobs to machines so as to maximize the total returns. 14M

Machines
Returns in Rs.

Jobs	A	B	C	D	E
V	9	3	4	2	10
W	12	10	8	11	9
X	11	2	9	0	8
Y	8	0	10	3	7
Z	7	5	6	2	9

3. Consider the minimization of the function

$$f = \frac{1}{x_1^2 + x_2^2 + 2}$$

Perform two iterations of Newton's method from the starting point $\begin{Bmatrix} 4 \\ 0 \end{Bmatrix}$ 14M

4. Minimize $f = (x_1 - 1)^2 + (x_2 - 5)^2$

Subject to the constraints $-x_1^2 + x_2 \leq 4$

$-(x_1 - 2)^2 + x_2 \leq 3$

using Kuhn Tucker conditions. 14M

5. What are the steps involved in maximizing the fitness function in a Genetic Algorithm? What are the drawbacks of GA? 14M

6. Explain the procedure for solving differential equations using Genetic Programming. 14M

7. Use Dynamic Programming to :

Minimize $Z = a^2 + b^2 + c^2$

subject to $a + b + c \geq 15$ and all a, b, c are ≥ 0

14M

8. Explain in detail the optimization procedure involved in minimization of the weight of a cantilever beam without compromising its strength. 14M