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CS/M.TECH(EIE)/SEM-1/EAM-101/2011-12	

2011 ADVANCED ENGINEERING MATHEMATICS

Time Allotted: 3 Hours Full Marks: 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Answer any *five* questions. $5 \times 14 = 70$

1. Solve the following by Dynamic Programming approach

Maximize $Z = 2x_1 + 3x_2$

Subject to
$$x_1 - x_2 \le 1$$
; $x_1 + x_2 \le 3$; $x_1, x_2 \ge 0$,

2. Determine the largest eigenevalue and corresponding eigenvector of the following matrix by using power method:

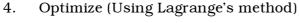
$$\begin{bmatrix} 5 & 0 & 1 \\ 0 & -2 & 0 \\ 1 & 0 & 5 \end{bmatrix}$$
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3. Solve by Gradient search method:

Maximize
$$f(x_1, x_2) = 2x_1x_2 + x_2 - x_1^2 - 2x_2^2$$
 starting from (0, 0).

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$$z=10x_1+4x_2-{x_1}^2+4x_1x_2-5{x_2}^2$$

subject to $x_1+x_2=6$; $x_1, x_2 \ge 0$



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- 5. a) Given that $u(x, y) = 4xy x^3 + 3xy^2$, show that u is harmonic function in C and find the harmonic conjugate v in C for u(x, y).
 - b) Define entire function and explain with an example. 4
 - c) Evaluate $\int_{C} f(z)dz$, where $f(z) = \overline{z}$ and C is a line segment joining 0 and 4 + 2i.
- 6. Let $T: IR^3 \to IR^3$ be a linear transformation defined by

 $T(x,y,z)=(x+y,\ y+z)$ verify the theorem Rank T + Nullity T = dim V.

7. a) Find the positive real root of the following equation by Chebysev method up to three decimal places

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$$x^3 - 3x - 7 = 0.$$

b) Prove the following:

$$\Delta \log f(x) = \log \left[1 + \frac{\Delta f(x)}{f(x)} \right]$$

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