Total No. of Questions: 8]

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Roll No.....

MCSE/MSE-101

M.E./M.Tech., I Semester

Examination, December 2017

Advanced Computational Mathematics

Time: Three Hours

Maximum Marks: 70

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Note: i) Answer any five questions out of eight questions.

- ii) All questions carry equal marks.
- Show that the vector (1, 2, 0), (0, 3, 1), (-1, 0, 1) forms linearly independent set over the field R.
 - Find the matrix of the linear transformation

$$T: v_3(R) \rightarrow v_3(R)$$
 given by

$$T: v_3(R) \rightarrow v_3(R)$$
 given by
$$T(x, y, z) = (2y + z, x - 4y, 3x)$$

- Write a short note on the followings:
 - Hash function
 - Error function
 - Prove the following formula for Hermite polynomial.

$$H_n(x) = (-1)^n e^{x^2} \frac{d^n}{dx^n} \{ \exp(-x^2) \}$$

242

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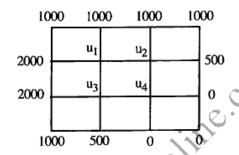
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[2]

- 3. a) Solve $\frac{\partial u}{\partial x} = 2 \frac{\partial u}{\partial t} + u$ by the method of separation of variables, where $u(x,0) = 6e^{-3x}$.
 - Solve the elliptic equation $u_{xx} + u_{yy} = 0$ for the following square mesh with boundary values as shown:



- Find Fourier sine transform of $\frac{e^{-ax}}{}$
 - Solve the equation $\nabla^2 u = -10(x^2 + y^2 + 10)$ over the square with sides x = 0 = y, x = 3 = y with u = 0 on the boundary and mesh length = 1.
- A random variable X has following distribution:

x	-2	-1	0	Ĩ	2
p(x)	0.2	0.1	0.3	0.3	0.1

Find:

- E(X)
- Var(X)

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244

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