Total No. of Questions : 8] *[Total No. of Printed Pages : 3*

Roll No .....

MCSE/MSE-101

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

Examination, December 2016

Advanced Computational Mathematics

Time : Three Hours

Maximum Marks : 70

Note : i) Attempt any five questions.
ii) All questions carry equal marks.

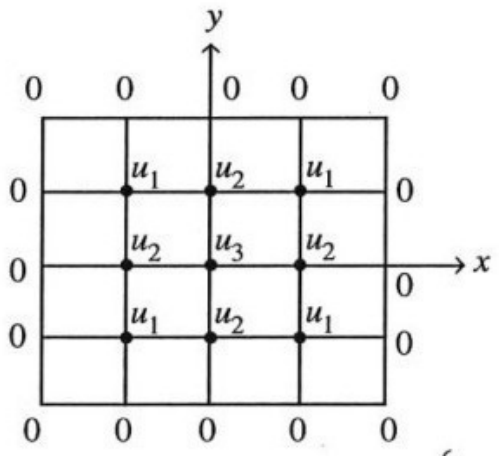
1. a) Define Vector space with properties.
   b) Show that the mapping $T : V_2(R) \rightarrow V_3(R)$ defined by $T(a, b) = (a + b, a - b, b)$ is a linear transformation from $V_2(R)$ into $V_3(R)$.

2. a) Express $H(x) = x^4 + 2x^3 + 2x^2 - x - 3$, in terms of Hermite polynomials.
   b) Expand $erf(x)$ in ascending powers of x.

3. a) Solve $\frac{\partial u}{\partial x} = 2\frac{\partial u}{\partial t} + u$ by the method of separation of variables, where $u(x, o) = 6.\ e^{-3x}$.
   b) Solve the partial differential equation

$$\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 8x^2 y^2$$

for the square mesh of the following figure with $u(x, y) = 0$ on the boundary and mesh length = 1.



4. a) Find the Fourier transform of $f(x)=\begin{cases} x, & |x|\le a \\ 0, & |x|>a \end{cases}$.

   b) Calculate the four-point DFT of the periodic sequence $x[n]$ of length N = 4, which is defined as follows :

$$x[n]=\begin{cases} 2, & n=0 \\ 3, & n=1 \\ -1, & n=2 \\ 1, & n=3 \end{cases}$$

5. a) If A and B are two events, where $P(A)=\frac{1}{2}$, $P(B)=\frac{1}{3}$ and $P(A\cap B)=\frac{1}{4}$, then evaluate the following :

   i) P(A / B)

   ii) P(B / A)

   iii) P (A∪B)

   b) Find the mean and variance of Poisson distribution.

6. a) The following data are the number of seeds germinating out of 10 on damp filter for 80 set's of seeds. Fit a binomial distribution to these data :

x :	0	1	2	3	4	5	6	7	8	9	10	Total
f :	6	20	28	12	8	6	0	0	0	0	0	80

   b) Find the probability that at most 5 defective fuses will be found in a box of 200 fuses, if experience shows that 2 percent of such fuses are defective.

7. a) Draw the graph for the Markov chain with the following transition probability matrix :

$$\begin{bmatrix} 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 1 \\ 1/2 & 1/2 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix}$$

   b) Write a note on Queue discipline.

8. a) Write a note on application of fuzzy logic.

   b) Write a note on graphical representation of data in MATLAB.

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