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

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MCSE–101

M. E./M. Tech. (First Semester) EXAMINATION, Feb./March, 2009

(Computer Science & Engg.)

ADVANCED COMPUTATIONAL MATHEMATICS

(MCSE–101)

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 40

Note : Attempt any *five* questions. All questions carry equal marks.

1. (a) Use separation of variables technique to solve $3u_x + 2u_y = 0$ with $u(x, 0) = 4e^{-x}$.

   (b) Find the Fourier transform of the Gaussian pulse $f(t) = e^{-a^2t^2}$.

   (c) Find the DFT of the sample sequence $x(n) = \{1, 1, 2, 2, 3, 3\}$ and compute the corresponding amplitude and phase spectrum.

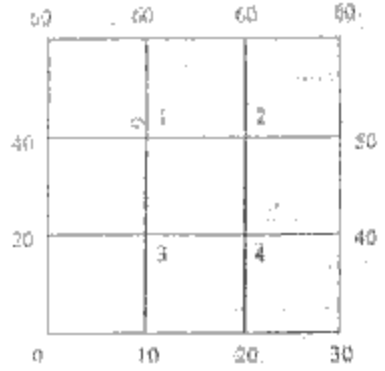
2. (a) Explain the following with *one* example in each case where it is applied :

   (i) Wavelet transform

   (ii) Haar transform

P. T. O.

(b) Solve Laplace equation at mesh points :



with given conditions.

3. (a) Derive stochastic matrix for one step transition probabilities.

(b) Define Markov chain. Distinguish between discrete parameter Markov chain and continuous parameter Markov chain.

4. (a) What do you understand by queue ? Give some important applications of queueing theory.

(b) Establish the probability distribution formula for pure death process.

5. (a) Fit a Poisson's distribution to the following data :

x	f_i
0	56
1	156
2	132
3	92
4	37
5	22
6	4
7	0
8	1

(b) A man alternatively tosses a coin and throws a die beginning with coin. What is the probability that he will get a head before he gets a 5 or 6 on the die ?

6. (a) What is fuzzy membership function ? Explain the triangular, trapezoidal and Gaussian membership function with their mathematical form

(b) Explain different defuzzification methods.

7. (a) Write and explain at least *five* built in functions from MATLAB and its tool boxes.

(b) Explain Creating and Accessing M files with commands used.

(c) Explain with examples the two types of loops used in MATLAB.

(d) Define Heavisides unit function and error function and where they are used.

8. (a) Prove that the vectors $\alpha_1 = (1, 0, -1)$ $\alpha_2 = (1, 2, 1)$ and $\alpha_3 = (0, -3, 2)$ form a basis of $V_3(R)$.

(b) Show that the mapping $T : R^2 \to R^3$ defined by $t(a, b) = (a - b, b - a, -a)$, $\forall a, b \in R$ is a linear transformation from R_2 into R_3. Find the range, rank, null space and nulity of T.

(c) Write the differential equation and mathematical form of Hermite polynomial.