MCSE–101

M. E./M. Tech. (First Semester)
EXAMINATION, July/August, 2008

(Computer Science & Engg. Branch)

ADVANCED COMPUTATIONAL MATHEMATICS

(MCSE–101)

Time : Three Hours

Maximum Marks : 10(

Minimum Pass Marks : 4(

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

1. (a) A bar of 30 cm length has its ends kept at 20° and 80° respectively until steady state conditions prevail. The temperature at each ends is then suddenly reduced to 0° and maintained thereafter using separation of variables method. Find the temperature in bar.

(b) State and explain Parseval's theorem for Fourier transform.

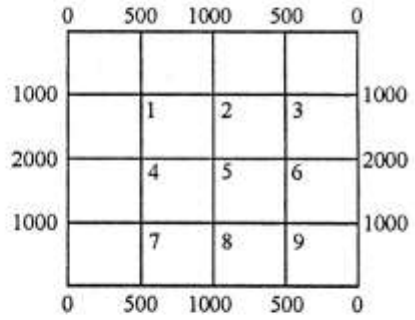
(c) Explain the following in relation to DFT :

(i) Time sharing

(ii) Aliasing error.

(d) Explain WFT.

2. (a) Determine all mesh points if it satisfies Laplace equation in the grid with given boundary conditions :



iterate by Gauss-Seidel method.

(b) Explain mother wavelet and give application of wavelet transform.

(c) Define Haar transform and where it is used in computer science ?

3. (a) Define stochastic process and explain classification of stochastic process.

(b) Define the Markov property for a discrete space continuous time process. Prove that a process having independent and stationary increments is Markov.

4. (a) Explain the difference between open queue network and closed queue network.

(b) Obtain the distribution of the number in the system in steady state for M/M/S model by considering it as birth and death process.

5. (a) Box A contains 4 red and 3 white marbles and box B contains 2 red and 6 white marbles. If a marble is drawn from each box, what is the probability that they are both of the same colour ?

(b) Find the mean and variance of Binomial distribution.

6. (a) Define fuzzy relations. Discuss fuzzy rules with some examples.

(b) Write a note on fuzzy reasoning.

(c) Let A and B be two fuzzy subsets of U and V respectively. Let R be the Catesian product of A and B. Is the projection of R on U identical to A ? If so, prove it. If not, give a counter example.

7. (a) Explain line space and log space functions in MATLAB.

(b) Write mathematical operators used on scalar quantities.

(c) Write a MATLAB program using a for loop to compute the factorial.

(d) What is the use of modular mathematics ?

8. (a) Prove that if W_1 and W_2 are two vector subspaces of a vector space $V(F)$, then $W_1 \cap W_2$ is also a vector subspace of $V(F)$.

(b) Let F be the field of complex numbers and let T be a function from F^3 into R^3 defined by :

$$T(x_1, x_2, x_3) = (x_1 - x_2 + 2x_3, 2x_1 + x_2 - x_3, -x_1 - 2x_2)$$

Verify that T is a linear transformation.

(c) Define Hermite polynomial and write its differential equation.