

rgpvonline.com

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

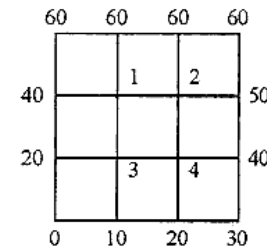
Minimum Pass Marks : 40

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 transformation of the Gaussian pulse $f(t) = e^{-a^2 t^2}$.
- (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.

rgpvonline.com

- (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 $V_3(\mathbb{R})$.
- (b) Show that the mapping $T: \mathbb{R}^2 \rightarrow \mathbb{R}^3$ defined by $t(a, b) = (a - b, b - a, -a)$, $\forall a, b \in \mathbb{R}$ is a linear transformation from \mathbb{R}_2 into \mathbb{R}_3 . Find the range, rank, null space and nullity of T .
- (c) Write the differential equation and mathematical form of Hermite polynomial.

□