Course Code: MAT 202

JSRK/MW - 17 / 2021

Third Semester B. E. (Computer Science and Engineering/Information Technology) Examination

ENGINEERING MATHEMATICS - III

Time: 3 Hours [Max. Marks: 60

Instructions to Candidates :—

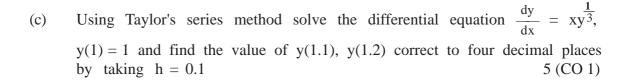
- (1) All questions carry marks as indicated against them.
- (2) Use of Non-programmable calculator is permitted.
- (3) Use of Normal Distribution table is permitted.
- 1. Solve any Two :—
 - (a) Find values of 1, m, n and A^{-1} if $A = \begin{bmatrix} 0 & 2m & n \\ l & m & -n \\ l & -m & n \end{bmatrix}$ is orthogonal 5 (CO 1)
 - (b) If $A = \begin{bmatrix} 3 & 1 & -\overline{1} \\ -1 & 5 & -1 \\ 1 & -1 & 3 \end{bmatrix}$, find eigen values and eigen vectors of the matrix 5 (CO 1)
 - (c) Using Sylvestor's theorem verify $\log_e e^A = A$ if matrix

$$A = \begin{bmatrix} 0 & 1 \\ -2 & 3 \end{bmatrix}$$
 5 (CO 1)

- 2. Solve any Two :—
 - (a) Find the root of the equation $x\log_{10}x 1.2 = 0$ correct to four decimal places by method of False position. 5 (CO 1)
 - (b) Solve by Crout's method the following system of equations :

$$x + y + z = 1$$
, $4x + 3y-z = 6$, $3x + 5y + 3z = 4$. 5 (CO 1)

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3. Solve :-

- (a) Find the Z transform and draw pole zero plot, region of convergence of the sequence $x[n] = \left(\frac{-1}{3}\right)^n u(n)$ 3 (CO 2)
- (b) Using change of scale property find $Z\left\{\frac{a^n}{n!}\right\}$ 2 (CO 2)
- (c) Solve the difference equation $y_{k+1} y_k = k + 1$, $y_0 = 1$ 5 (CO 2)

4. Solve:

(a) The distribution function for a random variable X is $F(x) \ = \ \begin{cases} 1-e^{-2x} & x \ge 0 \\ 0 & x \le 0 \end{cases}$

Find:

- (i) Density function,
- (ii) Probability that X > 2,
- (iii) Probability that $-3 < X \le 4$. 5 (CO 3)
- (b) The joint density function of the random variables X and Y is $f(x, y) = \begin{cases} 8xy, & 0 \le x \le 1, & 0 \le y \le x \\ & 0 & \text{otherwise} \end{cases}$

Find:

- (i) Marginal density function of x,
- (ii) Marginal density function of y
- (iii) Conditional density of x
- (iv) Conditional density of y. 5 (CO 3)

5. Solve:

(a) Find the m. g. f. of the random variable x if

$$x = \frac{\frac{1}{2} \text{ with prob. } \frac{1}{2}}{\frac{1}{2} \text{ with prob. } \frac{1}{2}}$$

Also find first four moments about the origin.

5 (CO 3)

(b) Find the range, Semi-interquartile range and mean deviation for

$$f(x) = \begin{bmatrix} 2(1-x), & 0 \le x \le 1 \\ 0, & \text{otherwise} \end{bmatrix}$$
 5 (CO 3)

- 6. Solve any Two :—
 - (a) Establish the validity of the Poisson approximation to the binomial distribution. 5 (CO 3)
 - (b) If a binomial distribution with n = 100 is symmetric, find its coefficient of kurtosis. 5 (CO 3)
 - (c) Find mean, variance and moment generating function of exponencial distribution. 5 (CO 3)