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Total No. of Pages: 02
Total No. of Questions: 09

B. Tech.(3D ANIMATION & Graphics) (IT)(CSE) (Sem.-3rd)
MATHEMATICS-III
Subject Code: BTAM-302
Paper ID: [A2143]

Time: 3 Hrs. **Max. Marks: 60**

INSTRUCTIONS TO CANDIDATE:

(i)Section –A, is Compulsory.
(ii)Attempt any four questions from Section-B.
(iii)Attempt any two questions from Section-C.

SECTION – A **(10x2=20)**

1. (a) Write down the Fourier series and Fourier coefficients for the function

$$f(x) = \begin{cases} -k, -\pi < x < 0, \\ k, 0 < x < \pi. \end{cases}$$

(b)Expand $f(x) = k$ for $0 < x < 2$ in half range Fourier cosine series.
(c)Find the Laplace transform of $f(t) = \text{[illegible}\ t-1\ \text{[illegible} + \text{[illegible}\ t+1\ \text{[illegible}, t \geq 0.$

(d Find the inverse Laplace transform of $f(s) = \frac{s+2}{s^2-4s+13}$.

(e) Form the partial differential equation from $z = f(x^2 - y^2)$.

(f) Examine the continuity of $f(z) = \begin{cases} \frac{Im(z)}{|z|}, z \neq 0 \\ 0, z = 0. \end{cases}$

(g) Explain Rayleigh's power method for finding the largest eigen-value and the corresponding Eigen-vector.

(h) Derive Euler's and modified Euler's method geometrically.

(i) Mention different type of applications of binomial distribution,

(j) Write down any four important properties of F-distribution.

Section-B ***(5 marks each)***

2. Find the Laplace transforms of (i) $f(t) = e^{-3t}(2\cos 5t - 3\sin 5t)$, (ii) $f(t) = \frac{1-\cos 2t}{t}$.

3. Determine the analytic function whose real part is

$$u(x, y) = e^{2x}(x\cos 2y - y\sin 2y).$$

4. Solve: $x + 10y + 4z - 6$, $2x - 4y + 10z = -15$, $9x + 2y + 4z = 20$, by Gauss-Seidel iteration method.

5. Apply Runge-Kutta method of order 4, find $y(0.2)$ in steps of 0.1 given that

$$\frac{dy}{dx} = 3x + 2y \text{ and } y=1 \text{ at } x = 0$$

6. A random sample of size 16 has 53 as mean. The sum of squares of the derivation from mean is 135. Can this sample be regarded as taken from the population having 56 as mean? Obtain 95% and 99% confidence limits of the mean of the population.

Section-C **(10 marks each)**

7. (a) Find the Fourier series expansion of the following periodic function with period 4

$$f(x) = \begin{cases} 2 + x, & -2 \le x < 0, \\ 2 - x, & 0 \le x \le 2 \end{cases} \qquad f(x + 4) = f(x).$$

(b) Solve the partial differential equation: $(z^2 - 2yz - y^2)p + (xy + zx)q - xy - zx$.

8. (a) Prove that if $u = x^2 - y^2$, $v = -\frac{y}{x^2+y^2}$, then both satisfy Laplace's equation, but $u + iv$ is not analytic.

(b) Solve the system of equations using Gauss elimination method with partial pivoting:

$$x_1 + x_2 - 2x_3 = 3,\ 4x_1 - 2x_2 + x_3 = 5,\ 3x_1 - x_2 + 3x_3 = 8.$$

9. A car hire-firm has two cars which it hires out day by day. The number of demands for a car on each day is distributed as a Poisson distribution with mean 1.5. Calculate the number of days in a year on which

(i) Neither car is on demand,

(ii) A car demand is refused

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