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Total number of pages:[3]
Total number of questions:06

B.Tech. || CSE || 3rdSem

MATH-III

(RP)

Subject Code:BTAM-302A)

Paper ID: M/18 (for office use)

Time allowed: 3 Hrs

(2015 batch onwards)

Max Marks: 60

Important Instructions:

- All questions are compulsory
- Assume any missing data
- Calculators and tables are allowed

PART A (2×10)

Q. 1. Short-Answer Questions:

All COs

- (a) State Dirichlet's Conditions for a function to be expanded in Fourier Series
- (b) Write Fourier Series of periodic function $f(x)$ defined in interval $c < x < c + 2l$
- (c) Solve following system of equations by Gauss elimination method

$$x + 2y + z = 3; 2x + 3y + 3z = 10; 3x - y + 2z = 13$$

- (d) Using Euler's method, solve numerically the equation.

$$\frac{dy}{dx} = x + y; y(0) = 1 \text{ at } x = 1.0 \text{ by taking } h = 0.2$$

- (e) Write Fourier series of $f(x) = e^{-x}$ in the interval $(0, 2\pi)$.

- (f) If the probability that an individual suffers a bad reaction from certain injection is 0.001. Find the probability that out of 2000 individual, exactly 3 individuals will suffer a bad reaction
- (g) Three urn contain 6 red and 4 black; 4 red and 6 black; 5 red and 5 black respectively. One of the urn is selected at random and a ball is drawn from it. If the ball is drawn red, find the probability that it is drawn from the first urn.
- (h) A coin was tossed 400 times and head turned up 216 times. Test the hypothesis that coin is unbiased
- (i) Define Critical Region in sampling
- (j) A manufacturer intends that his electric bulbs have a life of 1000 hrs. He tests a sample of 20 bulbs drawn at random from a batch and discovers that the mean life of the sample bulb is 990 hours with SD of 22 hours. Does this signify that batch is not upto the mark?

Q. 2. Obtain a half range sine series for

CO1

$$f(x) = \begin{cases} kx, & 0 \leq x \leq \frac{l}{2} \\ k(l-x), & \frac{l}{2} \leq x < l \end{cases}$$

Hence deduce the sum of the series $\frac{1}{1^2} + \frac{l}{3^2} + \frac{l}{5^2} + \dots$

OR

If $f(x) = \left(\frac{\pi-x}{2}\right)^2$ in the range of $(0, 2\pi)$. Show that in this range

CO1

$$f(x) = \frac{\pi^2}{12} + \sum_{n=1}^{\infty} \frac{\cos nx}{n^2}$$

Hence show that $\frac{1}{1^2} + \frac{l}{2^2} + \frac{l}{3^2} + \dots = \frac{\pi^2}{6}$

Q. 3. Solve the following system of linear equations by using Gauss-Siedel iteration method CO2

$$28x + 4y - z = 32$$

$$x + 3y + 10z = 24$$

$$2x + 17y + 4z = 35$$

by taking $[0, 0, 0]^T$ as initial solution

OR

Solve the following system of linear equations by using Gauss-Jordan method CO2

$$5x_1 + x_2 + x_3 + x_4 = 4;$$

$$x_1 + 7x_2 + x_3 + x_4 = 12$$

$$x_1 + x_2 + 6x_3 + x_4 = -5;$$

$$x_1 + x_2 + x_3 + 4x_4 = -6;$$

Q. 4. Using Euler's Modified method, solve the equation

CO3

$$\frac{dy}{dx} = -y \text{ for } x = 0.4 \text{ and } h = 0.2 \text{ with condition } y(0) = 1$$

Also compare the result with exact solution

OR

Estimate the solution of the differential equation

CO3

$$\frac{dy}{dx} = 1 + y^2; y(0) = 1 \text{ at } x = 0.2$$

by Runge-Kutta fourth order method using $h = 0.1$

Q. 5. The student of a class were given an aptitude test. Their marks were found to be normally distributed with mean 60 and standard deviation 5. What percentage of students scored

CO4

- More than 60 marks
- Less than 66 marks
- Between 45 and 65 marks

OR

In 800 families with 5 children each, how many families would be expected to have CO4

- i. 3 boys and 2 girls
- ii. 2 boys and 3 girls
- iii. no girl
- iv. at the most 2 girls

500 articles from a factory are examined and found to be 2% defective. 800 CO5
similar articles from a second factory are found to have only 1.5 % defective.
Can it reasonably be concluded that the products of first factory are inferior to
those of second

OR

Verify whether Poisson distribution can be assumed from data given below CO5

No. of defects	0	1	2	3	4	5
Frequency	6	13	13	8	4	3