Roll No. ☐☐☐☐☐☐☐☐☐☐☐   **Total No. of Pages : 02**

Total No. of Questions : 09

B.Tech.(3DAnimation & Graphics) (2012 Onwards)
B.Tech.(CSE/IT) (2012 Batch)
(Sem.–3)

MATHEMATICS – III

Subject Code : BTAM-302
Paper ID : [A2143]

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

INSTRUCTIONS TO CANDIDATES :
1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

1. **Write briefly :**

   a) Explain the Dirichlet's conditions for the existence of Fourier series of a function $f(x)$.

   b) Evaluate $L\left\{\int_0^t \frac{e^t \sin t}{t} dt\right\}$

   c) Evaluate $L\{|t-1|+|t+1|\}, \quad t \ge 0$

   d) Form the differential equation from $z = f_1(y + 2x) + f_2(y - 3x)$

   e) Find the particular integral of the differential equation $\frac{\partial^2 z}{\partial x^2} - 4\frac{\partial^2 z}{\partial x \partial y} + 4\frac{\partial^2 z}{\partial y^2} = e^{2x+y}$.

   f) Give any four differences between Gauss Elimination and Gauss-Seidel methods.

   g) Why Modified Euler method is better than Euler?

   h) What is the mean, median and mode of a normal distribution?

   i) Find the probability of number 4 turning up at least once in two tosses of a fair dice.

   j) What is Central Limit Theorem?

SECTION-B

2) Find $L\left(2^t + \dfrac{\cos 2t - \cos 3t}{t} + t\sin t\right)$

3) Solve the following system of equations using the Gauss Seidel Method. $10x + y + z = 12$; $2x + 10y + z = 13$; $2x + 2y + 10z = 14$.

4) Prove that the mean deviation from the mean of the normal distribution is about $\dfrac{4}{5}$ of its standard deviation.

5) Using Runge-Kutta fourth order method, Find y for $x = 0.1$, 0.2 given that $\dfrac{dy}{dx} = xy + y^2$, $y(0) = 1$.

6) The height of 6 randomly chosen sailors in inches are 63, 65, 68, 69, 71 and 72. Those of 9 randomly chosen soldiers are 61, 62, 65, 66, 69, 70, 71, 72 and 73. Test whether the sailors are on the average taller than soldiers.

SECTION-C

7) Obtain the Fourier series for the function $f(x) = \begin{cases} 1 + \dfrac{2x}{\pi}, & -\pi < x < 0 \\ 1 - \dfrac{2x}{\pi}, & 0 < x < \pi \end{cases}$

Also deduce that $\dfrac{1}{1^2} + \dfrac{1}{3^2} + \dfrac{1}{5^2} + .. = \dfrac{\pi^2}{8}$

8) Solve the PDE $(D^2 + 2DD' + D'^2)z = 2\cos y - x\sin y$

9) Prove that

$u = x^2 - y^2 - 2xy - 2x + 3y$ is harmonic. Find the function v such that $f(z) = u + iv$ is analytic. Also express $f(z)$ in terms of z.