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

Total No. of Questions : 09

B.Tech.(3DAnimation & Graphics)(CSE/IT) (2012 Onwards)
(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/Fill in the blank :

a) Define even and odd function. Give an example of a function which is neither even nor odd.

b) Write the sufficient conditions for the existence of Laplace transform.

c) Find the Laplace transform of sinh(at).

d) Eliminate the arbitrary function from z = $f(x^2 + y^2)$ to obtain a first order partial differential equation.

e) Define analytic function. Give an example of a function which is not analytic.

f) Find the limit of $f(z) = \frac{z}{|z|}$ as $z \to 0$. where z is a complex variable.

g) Gauss elimination method is used to solve….

h) Write the modified Euler's method to solve initial value problems of ordinary differential equations.

i) In a book of 600 pages, there are 60 typographical errors. Assuming Poisson law for the number of errors per page, find the probability that a randomly chosen 4 pages will contain no errors.

j) Define two types of errors in the testing of hypothesis.

SECTION-B

2. Find the Fourier series expansion of the following periodic function with period 2π

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

3. Let $f(t)$ and $g(t)$ be any two functions whose Laplace transforms exist. Then show that for any two constants α and β, we have $L[\alpha f(t) + \beta g(t)] = \alpha L[f(t)] + \beta L[g(t)]$. Use this property to find the Laplace transform of $\cosh(3t)$.

4. Solve $x^2(y-z)\,p + y^2\,(z-x)\,q = z^2(x-y)$. where $p=\dfrac{\partial z}{\partial x} : q = \dfrac{\partial z}{\partial y}$.

5. In a distribution which is exactly normal, 12% of the items are under 30 and 85% are under 60. Find the mean and standard deviation of the distribution.

6. The heights of 8 males participating in an athletic championship are found to be 175 cm, 168 cm, 165 cm, 170 cm, 167 cm, 160 cm, 173 cm and 168 cm. Can we conclude that the average height is greater than 165 cm? Test at 5% level of significance.

SECTION-C

7. Show that the function

$$f(z)=\begin{cases}\dfrac{x^3(1+i)-y^3(1-i)}{x^2+y^2}, & z \ne 0,\\ 0, & z=0\end{cases}$$

satisfies the Cauchy-Riemann equations at $z = 0$ but $f'(0)$ does not exist

8. Find the solution of the system of equations

$$45x_1 + 2x_2 + 3x_3 = 58$$

$$-3x_1 + 22x_2 + 2x_3 = 47$$

$$5x_1 + x_2 + 20x_3 = 67$$

correct to three decimal places using the Gauss-Seidel iteration method.

9. Solve the initial value problem $\dfrac{dy}{dx} = x + y, y(0) = 1$ on the interval [0, 0.5] using the modified Euler's method with the step size $h = 0.1$. The exact solution of the problem is $y(x) = 2e^x - x - 1$. Find the absolute errors at each step.