Roll No.

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

B. Tech. 3D Animation & Graphics/CSE/IT (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.

a) Find the Laplace transform of t.sin at.

b) Find inverse Laplace transform of $\frac{1}{s(s+1)^3}$

c) Form the partial differential equation by eliminating the functions from the relation $z = f(x + 4t) + g(x - 4t)$.

d) Solve the given linear PDE $p.e^y = q.e^x$.

e) Prove that the function sinhz is analytic and find its derivatives.

f) Determine p such that the functions $f(z) = \frac{1}{2}\log(x^2 + y^2) + i\tan^{-1}\frac{px}{y}$ be analytic.

g) Define partial pivoting with example.

h) For the given ODE $y' = y - \frac{2x}{y}$, $y(0)=1$ find $y(0.1)$ using modified Euler's method.

i) If the mean of a binomial distribution is 3 and the variance is 3/2, find the probability of obtaining at least 4 success.

j) Suppose that X has Poisson distribution. If $P(X = 2) = (2/3)P(X = 1)$ then find $P(X = 0)$.

SECTION-B

2. Find the Fourier series to represent $x - x^2$ in the interval $-\pi \le x \le \pi$. Hence show that $\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \cdots = \frac{\pi^2}{12}$

3. State and prove Convolution Theorem for Laplace transform.

4. Solve the linear PDE $(x^2 - yz)p + (y^2 - zx)q = z^2 - xy$.

5. Find analytic function whose real part is $u = e^x (x \cos y - y \sin y)$.

6. Solve the given system of linear equations using Gauss-Seidal method
$x + 2y + 5z = 20,\ 5x + 2y + z = 12,\ x + 4y + 2z = 15$.

SECTION C

7. Find the laplace transform of rectified semi-wave function defined by

a) $f(t) = \begin{cases} \sin\omega t, & 0 < t < \frac{\pi}{\omega} \\ 0, & \frac{x}{\omega} < t < \frac{2\pi}{\omega} \end{cases}$

b) Solve $(D^2 + DD' - 6D'^2)Z = y \cos x$.

8. a) By using Power method calculate the dominant eigen values and corresponding eigen value $\begin{bmatrix} 1 & -3 & 2 \\ 4 & 4 & -1 \\ 6 & 3 & 5 \end{bmatrix}$

b) Given $y' = x^2 + y^2$, $y(1) = 1.5$, find $y(1.1)$ and $y(1.2)$ using Runge-Kutta method of fourth order.

9. a) Let X denotes the number of scores on a test. If X is normally distributed with mean 100 and standard deviation 15, find the probability that X does not exceed 130.

b) A bag contains defective articles, the exact number of which is not known. A sample of 100 from the bag gives 10 defective articles. Find the limits for the proportion of defective articles in the bag.