

Roll No.

OLE-3026

B. Tech. 3rd Semester (Civil Engg.)

Examination – April, 2021

MATHEMATICS-III

Paper : BSC - Math 205-G

Time : Three Hours]

[Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in total by selecting **one** from each Unit. Question No. **1** is *compulsory*.

1. (a) Differentiate between linear and non- linear partial differential equations.
- (b) Define interpolation and write Newton's forward interpolation formula.
- (c) Find Laplace Transform of $e^{2t} \cos^2 t$.
- (d) State pigeon- hole- principle.

UNIT – I

2. (a) Solve $x^2(y - z)p + y^2(z - x)q = z^2(x - y)$.
- (b) Solve $2xz - px^2 - 2qxy + pq = 0$.

3. A tightly stretched string of length l with fixed ends is initially in equilibrium position. It is set vibrating by giving each point a velocity $v_0 \sin^3 \frac{\pi x}{l}$. Find the displacement $y(x, t)$.

UNIT – II

4. (a) If $y(1) = -3$, $y(3) = 9$, $y(4) = 30$, $y(6) = 132$, find the Lagrange's interpolation polynomial that takes the same values as y at the given points.
- (b) By using Trapezoidal rule evaluate :

$$\int_0^1 \frac{dx}{1+x^2}$$

5. Find the positive root of $x^4 - x = 10$ correct to three decimal places, using Newton-Rapson and Bisection method.

UNIT – III

6. Find inverse Laplace Transform of :

(i) $\tan^{-1}\left(\frac{2}{s^2}\right)$

(ii) $\frac{s}{(s^2 + a^2)^2}$

7. Solve by the method of Laplace Transforms, the equation $y''' + 2y'' - y' - 2y = 0$ given $y(0) = y'(0) = 0$ and $y''(0) = 6$.

UNIT – IV

8. Describe the following with the help of suitable examples :
- (i) Group
 - (ii) Lagrange's theorem
9. What is the number of ways of choosing 4 Cards from a pack of 52 playing cards ? In how many of these :
- (i) Four cards are of the same suit,
 - (ii) Four cards belong to four different suits,
 - (iii) Are face cards
 - (iv) Two are red cards and two are black cards
 - (v) Cards are of the same colour ?
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