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 $v_0 \sin^3 \dfrac{\pi x}{l}$. 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 :

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

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

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

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 ?