Printed Pages – 6 Roll No. : ....

B000311(014)

B.Tech. (Third Semester) Examination
April-May 2022

(AICTE Scheme)

(All Branches)

MATHEMATICS-III

Time Allowed : Three hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : *Attempt all questions. Part (a) is compulsory from each unit & Solve any* ***two*** *parts from (b), (c) and (d) of each question.*

Unit-I

1. (a) (i) Define Laplace transform. 2

(ii) Write any two properties of Laplace transform. 2

(b) Evaluate : 8

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

(c) Find the inverse transform of the function 8

$$s \log \frac{s-a}{s+a} + 2a$$

(d) Solve :

$$\left[D^2 - 2D + 2\right]y = 0,\ y = Dy = 1 \text{ when } t = 0$$ 8

Unit-II

2. (a) (i) Derive a partial differential equation (by eliminating constants from the equation 2

$$2z = \frac{x^2}{a^2} + \frac{y^2}{b^2}$$

(ii) Form a partial differential equation by eliminating the arbitrary functions $z = (x+y)$ and $(x^2 - y^2)$. 2

(b) Solve : 8

$$x(y-z)p + y(z-x)q = z(x-y)$$

(c) Solve : 8

$$\left(D^2 - 6DD' + 9D'^2\right)z = 12x^2 + 36xy$$

(d) Using the method of seperation of variables, solve

$$\frac{\partial^2 z}{\partial x^2} - 2\frac{\partial z}{\partial x} + \frac{\partial z}{\partial y} = 0$$ 8

Unit-III

3. (a) (i) Define Random variable. 2

(ii) Define continuous variable. 2

(b) Function $f(x)$ is defined as : 8

$$f(x) = e^{-x} \quad x > 0$$
$$= \quad 0 \quad x < 0$$

(i) Is the function $f(x)$ a density function.

(ii) If so, determine the probability that the variate having this density will fall in interval (1, 2).

(c) If the probability of a bad reaction from a certain infection is 0·001, determine the chance that out of 2,000 individuals more than two will get a bad reaction. 8

(d) In a precission bombing attack there is a 50% chance that any one bomb will strike the target. Two direct hits are required to destroy the target completely. How many bombs must be dropped to give a 99% change or better of completely destroying the target. 8

Unit-IV

4. (a) (i) Prove that :

$$\Delta \log f(x) = \log\left\{1+\frac{\Delta f(x)}{f(x)}\right\} \qquad 2$$

(ii) Prove that :

$$E = e^{hD} \qquad 2$$

(b) Estimate the sale for 1966 using Newton forward interpolation formula : 8

Year	1931	1941	1951	1961	1971	1981
Sale (in thousand)	12	15	20	27	39	52

(c) A three degree polynomial passes through the points (0, –1), (1, 1) and (3, –2) find the polynomial. 8

(d) Give the values :

x	5	7	11	13	17
$f(x)$	150	392	1452	2366	5202

Evaluate $f(9)$ using Lagrange's formula. 8

Unit-V

5. (a) (i) Write Picard iteration formula. 2

(ii) Write Taylor series method for obtaining the solution of an initial value problem of ordinary differential equation. 2

(b) Solve :

$$\frac{dy}{dx} = y - \frac{2x}{y};\ y(0)=1 \ \text{ for } y(0{\cdot}1)$$

taking h = 0·1 and using modified Euler's method. 8

(c) Using Range-Kutta method of fourth order solve $y' = xy$ for $x = 1 \cdot 2$ initially $x = 1,\ y = 2$. (take h = 0·1) 8

(d) The differenctial equation $\frac{dy}{dx} = 1 + y^2$ satisfies following set of values :

x	0	0·2	0·4	0·6
y	0	0·2027	0·4228	0·6841

Compute y (0·8) using Milne's method. 8