

B000311(014)

B. Tech. 3rd Semester (AICET Scheme)

Examination Nov-Dec 2021

Branch: Chem, Civil, CSE, Elec, EEE, ET & T, IT, Mech, Mining,
Mechatronics, Automobile, Agriculture, Plastic

Mathematics-III

Time Allowed : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note: Attempt all questions. Part (a) of each question is compulsory and carries 4 marks. Attempt any two parts from (b), (c) and (d) of each question carry 8 marks.

UNIT-I

Q. 1. (a) Find the inverse transform of
$$\frac{4s+5}{(s-1)^2(s+2)}$$

4

(b) Find the Laplace transform of
$$\frac{1-\cos t}{t^2}$$

8

(c) Using convolution theorem to prove that
$$L^{-1}\left\{\frac{8}{(s^2+1)^3}\right\} = (3-t^2)\sin t - 3t\cos t.$$

8

(d) Solve the differential equation by transform method
$$ty'' + 2y' + ty = \sin t, \text{ when } y(0) = 1$$

8

UNIT-2

Q. 2. (a) Form the partial differential equation from $z = f(x^2 + y^2, z - xy)$

(b) solve $z(y^2 - z^2)p + y(z^2 - x^2)q = z(x^2 - y^2)$

(c) solve $(D^2 - DD' - 2D'^2)z = (y-1)e^x$

(d) solve by method of separation of variables

$$\frac{\partial u}{\partial x} = 4 \frac{\partial u}{\partial y}, \quad u(0, y) = 8e^{-3y}$$

UNIT-3

Q. 3. (a) A variate x has a probability distribution

x :	-3	6	9
$P(x=x)$:	$\frac{1}{6}$	$\frac{1}{2}$	$\frac{1}{3}$

Find $E(x)$ and $E(x^2)$. Hence evaluate $E(2x+1)^2$

(b) If x is a continuous random variable with probability density function given by

$$f(x) = \begin{cases} kx & 0 \leq x \leq 2 \\ 2k & 2 \leq x < 4 \\ -kx + 6k & 4 \leq x < 6 \end{cases}$$

Find k and mean value of x .

(c) Find the moment generating function of the exponential distribution

$$f(x) = \frac{1}{c} e^{-x/c}, \quad 0 \leq x < \infty, \quad c > 0$$

Hence find its mean and S.D.

- (c) out of 800 families with 5 children each, how many would you expect to have
 (a) 3 boys (b) 5 girls (c) Either 2 or 3 boys
 Assume equal probabilities for boys and girls.

UNIT-4

Q.4. (a) Find the missing values in the following

$x:$	0	5	10	15	20	25
$f(x):$	6	10	$\bar{\quad}$	17	$-$	31

(b) Given $\sin 45^\circ = 0.7071$, $\sin 50^\circ = 0.7660$,
 $\sin 55^\circ = 0.8192$, $\sin 60^\circ = 0.8660$
 find $\sin 52^\circ$ using Newton's forward interpolation

(c) Find $F(35)$ correct upto 2 places, using Stirling's formula

$x:$	20	30	40	50
$F(x):$	512	439	346	243

(d) Using Newton's divided difference formula evaluate $f(9)$ and $f(15)$, given

$x:$	4	5	7	10	11	13
$f(x):$	48	100	294	900	1210	2028

UNIT-5

Q.5. (a) If $\frac{dy}{dx} = x - y$, $y(0) = 1$ find the value of $y(1)$ using Picard's method

(b) solve $\frac{dy}{dx} = x+y$, $y(0)=1$ by Taylor's series method. Hence find the value of y at $x=0.1$ and $x=0.2$

(c) Using Runge-Kutta method of fourth order to solve

$$\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}, \quad y(0)=1 \quad \text{at } x=0.2 \text{ and } x=0.4.$$

(d) Given $2 \frac{dy}{dx} = (1+x^2)y^2$ and

$$y(0)=1, \quad y(0.1)=1.06, \quad y(0.2)=1.12$$

$$y(0.3)=1.21$$

Evaluate $y(0.4)$ by Milne's predictor corrector method.

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