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 8

$$L^{-1}\left\{\frac{8}{(s^2+1)^3}\right\} = (3-t^2)\sin t - 3t\cos t.$$

(d) Solve the differential equation by transform method $ty'' + 2y' + ty = \sin t$, when $y(0) = 1$ 8

UNIT-2

Q.2.(a) Form the partial differential equation from $z = f(x^2+y^2, z-xy)$ — 14

(b) Solve $z(y^2-z^2)p + y(z^2-x^2)q = z(x^2-y^2)$ — 18

(c) solve $(D^2 - DD' - 2D'^2)z = (y-1)e^x$ — 18

(d) solve by method of separation of variables — 18

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

UNIT-3

Q.3.(a) A variate x has a probability distribution — 14

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 — 18

$$f(x) = \begin{cases} Kx & 0 \le x \le 2 \\ 2K & 2 \le x < 4 \\ -Kx+6K & 4 \le x < 6 \end{cases}$$

Find K and mean value of x.

(c) Find the moment generating function of the exponential distribution — 18

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

Hence find its mean and SD.

(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. 18

UNIT-4

Q.4.(a) Find the missing values in the following 14

x:	0	5	10	15	20	25
f(x):	6	10		17	—	31

(b) Given $\sin 45° = 0.7071$, $\sin 50° = 0.7660$, $\sin 55° = 0.8192$, $\sin 60° = 0.8660$ find $\sin 52°$ using Newtons forward interpolation 18

(c) Find F(35) correct upto 2 places, using Stirling's formula 18

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

(d) Using Newtons divided difference formula evaluate f(9) and f(15), given 18

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 picards method 14

(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 $x=0.2$ | 8

(c) Using Runge-kutta method of forth order to solve | 8

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

(d) Given $2\frac{dy}{dx} = (1+x^2)y^2$ and | 8

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

$y(0.3)=1.21$

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

— x —