

Day: Monday & Date: 16/1/2023

Time: 2.00 pm to 4.00 pm.

Seat No:

Max. Marks- 50

Instructions:

- i. Figure to the right indicate full marks.
- ii. Use of a nonprogrammable calculator is allowed.

BT	CO's	Q. No.	Statement of Question	Marks														
		Q.1	Attempt the following questions.	20														
L 3	C201.1	a	Solve $(D^4 + 10D^2 + 9)y = \cos(2x + 3)$	5 M														
L3	C201.2	b	A random variable X has the following probability distribution <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>X</td> <td>-2</td> <td>-1</td> <td>0</td> <td>1</td> <td>2</td> <td>3</td> </tr> <tr> <td>P(X=x)</td> <td>0.1</td> <td>k</td> <td>0.2</td> <td>2k</td> <td>0.3</td> <td>3k</td> </tr> </table> Find i) k ii) $P(X \geq 2)$ iii) $P(-2 < X < 2)$	X	-2	-1	0	1	2	3	P(X=x)	0.1	k	0.2	2k	0.3	3k	5 M
X	-2	-1	0	1	2	3												
P(X=x)	0.1	k	0.2	2k	0.3	3k												
L3	C201.3	c	Find Laplace Transform of $t e^{-4t} \sin 3t$	5 M														
L3	C201.3	d	Find Inverse Laplace Transform of $\frac{1}{(s+1)(s-2)}$	5 M														
		Q.2	Attempt any TWO of the following questions.	10														
L3	C201.4	a	From 8 observations the following results were obtained: $\sum x = 59, \sum y = 40, \sum x^2 = 524, \sum y^2 = 256, \sum xy = 364$, Find the equation of the line of regression of x on y and the coefficient of correlation.	5 M														
L3	C201.4	b	Fit a parabola to the following data: <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>x</td> <td>0</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> <tr> <td>y</td> <td>1.0</td> <td>1.8</td> <td>1.3</td> <td>2.5</td> <td>6.3</td> </tr> </table>	x	0	1	2	3	4	y	1.0	1.8	1.3	2.5	6.3	5 M		
x	0	1	2	3	4													
y	1.0	1.8	1.3	2.5	6.3													

L3	C201.4	c	<p>Given the following information</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>x series</th> <th>y series</th> </tr> </thead> <tbody> <tr> <td>Mean</td> <td>18</td> <td>100</td> </tr> <tr> <td>S.D</td> <td>14</td> <td>20</td> </tr> </tbody> </table> <p>Coefficient of correlation $r=0.8$. Find the most probable value of y when $x=70$.</p>		x series	y series	Mean	18	100	S.D	14	20	5 M
	x series	y series											
Mean	18	100											
S.D	14	20											
		Q.3	Attempt any TWO of the following.	10									
L3	C201.5	a	If a vector $\vec{F} = (x + 3y)\mathbf{i} + (y - 2z)\mathbf{j} + (az + x)\mathbf{k}$ is solenoidal, find the value of a .	5 M									
L3	C201.5	b	Find the angle between the normals to the surface $xy = z^2$ at the points $(1,4,2)$ & $(-3,-3,3)$.	5 M									
L3	C201.5	c	If $\vec{F} = (x+y+1)\mathbf{i} + \mathbf{j} - (x+y)\mathbf{k}$. Prove that $\vec{F} \cdot \text{curl } \vec{F} = 0$	5 M									
		Q.4	Attempt the following questions .	10									
L3	C201.6	a	Solve $p^2 + q^2 = 1$.	3 M									
L3	C201.6	b	<p>Solve the Laplace Equation $u_{xx} + u_{yy}=0$ for the following square mesh with boundary values as shown. Using Gauss-Seidel Iteration process obtain the values up to two iterations.</p>	7 M									
			OR										
L3	C201.6	b	Solve $(y-z)p + (z-x)q = x-y$	7 M									
