National Forensic Science University, Delhi
LNJN-NICFS
Integrated B-Tech & M-Tech (IV Sem.)
Term Assessment-1
Engineering Mathematics-IV

Total Marks – 25
Time- 11.30 AM to 12.15 PM

1. Fit the straight-line curve with the help of the least-square method. [10]

x	75	80	93	65	87	71	98	68	84	77
y	82	78	86	72	91	80	95	72	89	74

2. If the equation $y = ae^{bx}$ is written in linear form $Y=A + BX$, then what is Y, X, A, B?

[5]

3. The following are the marks of 150 students in an examination. Calculate Karl Pearson's coefficient of skewness. [10]

Marks	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
No. of Students	10	40	20	0	10	40	16	14

National Forensic Science University, Delhi
LNJN-NICFS
Integrated B-Tech & M-Tech (IV Sem.)
Mid-Semester Examination
Engineering Mathematics-IV

102CTBMC[redacted]

Total Marks – 50

1.

Compute Pearsons coefficient of correlation between advertisement cost and sales as per the data given below.

Advertisement Cost in 1000's .	39	65	62	90	82	75	25	98	36	78
Sales in lakhs .	47	53	58	86	62	68	60	91	51	84

[10]

2.

Fit power curve $Y = aX^b$ for the following data: [10]

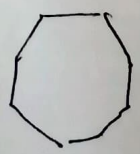
x	6	2	10	5	8
y	9	11	12	8	7

3. Fit a second degree parabola for the following data [10]

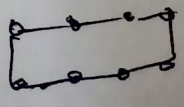
x	0	1	2	3	4
y	1	3	4	5	6

4. State and prove Handshaking theorem. [10]

5. A non-directed graph G has 8 edges. Find the no. of vertices, if the degree of each vertex in G is 2. [5]



6. What do you mean by isomorphic graph? [5]



Seat No. [redacted] Enrolment No. 162C7B7[redacted]

NATIONAL FORENSIC SCIENCES UNIVERSITY

B.Tech + M.Tech. Cyber Security-Semester-IV- JUNE-2023

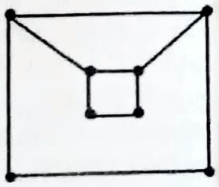
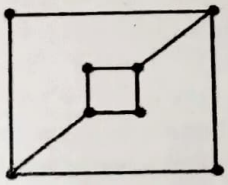
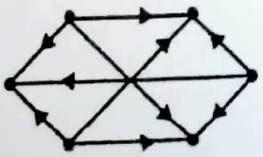
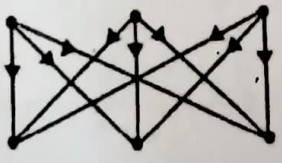
Subject Code: CTBTCSE SIV P1 **Date: 03/07/2023**

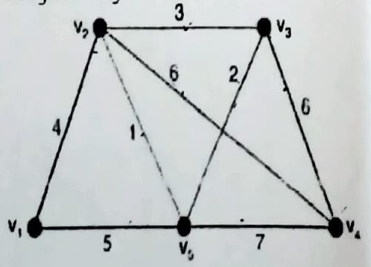
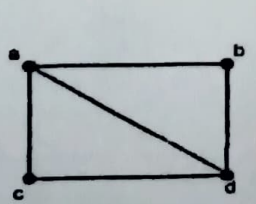
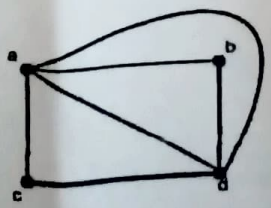
Subject Name: Engineering Mathematics - 4

Time: 11:00 a.m to 2:00 p.m **Total Marks: 100**

Instructions:

1. **Write down each question on a separate page.**
2. **Attempt all questions.**
3. **Make suitable assumptions wherever necessary.**
4. **Figures to the right indicate full marks.**

<table>
<tr><th></th><th></th><th></th><th>Marks</th></tr>
<tr><td>Q.1</td><td>(a)</td><td>Show that $<\{\emptyset,\{a\},\{b\},\{a,b\},\cap,\cup>$ is a sub-lattice of $<P(X),\cap,\cup>$ where $X=\{a,b\}$</td><td>05</td></tr>
<tr><td></td><td>(b)</td><td>Find the standard deviation for the following data:
<table>
<tr><td>X:</td><td>20</td><td>24</td><td>30</td><td>35</td><td>38</td><td>40</td></tr>
<tr><td>F:</td><td>8</td><td>7</td><td>10</td><td>12</td><td>6</td><td>3</td></tr>
</table></td><td>05</td></tr>
<tr><td></td><td>(c)</td><td>Calculate mean, median and mode from the following data:
<table>
<tr><td>Class interval:</td><td>20-30</td><td>30-40</td><td>40-50</td><td>50-60</td><td>60-70</td><td>70-80</td><td>80-90</td></tr>
<tr><td>Frequency:</td><td>4</td><td>6</td><td>10</td><td>17</td><td>11</td><td>9</td><td>3</td></tr>
</table></td><td>07</td></tr>
<tr><td></td><td></td><td>OR</td><td></td></tr>
<tr><td></td><td>(c)</td><td>Define the Isomorphism of two graphs in detail. Check whether the following pair of graphs G & H are isomorphic or not with the description.

G

H

G

H</td><td>07</td></tr>
<tr><td>Q.2</td><td>(a)</td><td>Give an example of POSET which is not a Lattice.</td><td>05</td></tr>
<tr><td></td><td>(b)</td><td>Define with examples: Loop, Parallel edges, Directed Graph, Isolated nodes, Simple graph.</td><td>05</td></tr>
</table>

	(c)	Fit a curve of the form $y = ax^b$ for the data: X: 1 2 3 4 5 6 Y: 151 100 61 50 20 8	07
		OR	
	(c)	Compute the coefficient of Kurtosis and also the coefficient of Skewness based on the third moment for the following data. Class: 0-20 | 20-40 | 40-60 | 60-80 | 80-100 Frequency: 13 | 25 | 27 | 19 | 16	07
Q.3	(a)	10 competitors in a musical test were ranked by the three judges in the following order. 1st Judge: 1 6 5 10 3 2 4 9 7 8 2nd Judge: 3 5 8 4 7 10 2 1 6 9 3rd Judge: 6 4 9 8 1 2 3 10 5 7	08
	(b)	Show that $< S_{30}, *, \oplus >$ and $< P(A), \cap, \cup >$ are Isomorphic lattices for A={a,b,c}	08
		OR	
	(b)	Differentiate the Universal Quantifier and Existential Quantifier with the help of example.	08
Q.4	(a)	Definition of covariance. Find r or r_{xy} from the following data: N=10 , $\sum(x-\bar{x})(y-\bar{y})$= 1650, σ_{x^2}=196, σ_{y^2}=225	05
	(b)	Define Compliment and Union of Fuzzy sets with proper examples.	05
	(c)	Compute the Skewness based on the third moment for the following data: Class: 0-4 | 4-8 | 8-12 | 12-16 | 16-20 Frequency: 4 | 6 | 8 | 5 | 2	07
		OR	
	(c)	Describe the Hasse Diagram and draw the Hasse Diagram of $<S_{24}, D>$ and $<S_{36}, D>$.	07
Q.5	(a)	If A = {3,5,7,9,11}, B = {7,9,11,13}, C ={ 11,13,15}and D = {15,17}find i) A∩B ii) A∩C iii) B∩C iv) B∩D v) A∩B∩C vi) A∩B∪C vii) A∩(B∪D)	05
	(b)	Define the Adjacency matrix representation of Multigraph and develop the Adjacency matrix for the following three graphs:   G1  G2	05

	(c)	From the following data calculate two equations of the line of regression, where the Correlation coefficient between X and Y is 0.50. Also, estimate the value of Y for X=72 using the appropriate regression equation.	07

	X	Y
Mean	60	67.5
Standard Deviation	15	13.5

OR

	(c)	Prove the logical equivalence of the following using truth table. ¬(p∨q) &¬p^¬q ¬(p^q) &¬p∨¬q	07
Q.6	(a)	Compute the correlation coefficient between X&Y using the following data:	08

X:	2	4	5	6	8	11
Y:	18	12	10	8	7	5

	(b)	The first moments of a distribution about the value 3 are $2, 10, -30$. Show that the moments about $x = 0$ *are* 5,31,141. Find the mean and Variance.	08

OR

	(b)	Nine students secured the following percentage of marks in Mathematics & Chemistry.	

Roll No.:	1	2	3	4	5	6	7	8	9
Marks in Mathematics:	78	36	98	25	75	82	90	62	65
Marks in Chemistry:	84	51	91	60	68	62	86	58	53

Find the Rank correlation coefficient and comment on its value by Spearmen's rank correlation method.

END OF PAPER