



PRESIDENCY UNIVERSITY

BENGALURU

Mid - Term Examinations - MARCH 2026

Date: 10-03-2026

Time: 09:30am - 11:00am

School: SOE	Program: B. Tech.	
Course Code: MAT2502	Course Name: Numerical Methods and Complex Variables	
Semester: IV	Max Marks: 50	Weightage: 25%

CO - Levels	C01	C02	C03
Marks	12	10	28

Instructions:

- (i) Read all questions carefully and answer accordingly.
- (ii) Do not write anything on the question paper other than roll number.

Part A

Answer ALL the Questions. Each question carries 2 marks.

5Q x 2M = 10M

1	Write the Newton-Raphson formula for third iteration.	2 Marks	L2	C01
2	Write the expressions of the first forward and first backward differences of $f(x)$.	2 Marks	L2	C03
3	Define interpolation and extrapolation.	2 Marks	L1	C03
4	Define normal equations and write the number of normal equations for fitting a straight line.	2 Marks	L1	C03
5	What are the normal equations for fitting the curve of the form $y = ae^{bx}$ in the least square sense?	2 Marks	L1	C03

Part B

Answer the Questions.

Total Marks 40M

6	Apply Secant method to find a real root of the equation $e^{-x} - x = 0$ correct to four decimal places.	10 Marks	L3	CO1
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Or

7	Apply fixed point iteration method to find the negative root of the equation $x^3 - 2x - 5 = 0$ correct to four decimal places.	10 Marks	L3	CO1
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8	Apply LU decomposition method to find the lower and upper triangular matrix for the system of equations $3x + 2y + 7z = 4$, $2x + 3y + z = 5$ and $3x + 4y + z = 7$.	10 Marks	L3	CO2
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Or

9	Apply Gauss-seidel iteration method to solve $28x + 4y - z = 32$, $x + 3y + 10z = 24$ and $2x + 17y + 4z = 35$ correct to three decimal places.	10 Marks	L3	CO2
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10	<p>The table gives the distance in nautical miles of the visible horizon for the given heights in feet above the earth's surface.</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <tr> <td style="padding: 2px;">x = height</td> <td style="padding: 2px;">150</td> <td style="padding: 2px;">200</td> <td style="padding: 2px;">250</td> <td style="padding: 2px;">300</td> <td style="padding: 2px;">350</td> <td style="padding: 2px;">400</td> </tr> <tr> <td style="padding: 2px;">y = distance</td> <td style="padding: 2px;">13.03</td> <td style="padding: 2px;">15.04</td> <td style="padding: 2px;">16.81</td> <td style="padding: 2px;">18.42</td> <td style="padding: 2px;">19.90</td> <td style="padding: 2px;">21.27</td> </tr> </table> <p>Calculate the value of y when $x = 160ft$ and $x = 410ft$.</p>	x = height	150	200	250	300	350	400	y = distance	13.03	15.04	16.81	18.42	19.90	21.27	10 Marks	L3	CO3
x = height	150	200	250	300	350	400												
y = distance	13.03	15.04	16.81	18.42	19.90	21.27												

Or

11	<p>Apply Lagrange's interpolation formula to fit a polynomial to the data given</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <tr> <td style="padding: 2px;">x</td> <td style="padding: 2px;">0</td> <td style="padding: 2px;">1</td> <td style="padding: 2px;">3</td> <td style="padding: 2px;">4</td> </tr> <tr> <td style="padding: 2px;">y</td> <td style="padding: 2px;">-12</td> <td style="padding: 2px;">0</td> <td style="padding: 2px;">6</td> <td style="padding: 2px;">12</td> </tr> </table> <p>Hence, find y when $x = 2$.</p>	x	0	1	3	4	y	-12	0	6	12	10 Marks	L3	CO3
x	0	1	3	4										
y	-12	0	6	12										

12	<p>Compute the equation of the best fitting straight line in the least square sense for the following data and hence estimate the value of the dependent variable corresponding to the value 30 of the independent variable</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <tr> <td style="padding: 2px;">x</td> <td style="padding: 2px;">5</td> <td style="padding: 2px;">10</td> <td style="padding: 2px;">15</td> <td style="padding: 2px;">20</td> <td style="padding: 2px;">25</td> </tr> <tr> <td style="padding: 2px;">y</td> <td style="padding: 2px;">16</td> <td style="padding: 2px;">19</td> <td style="padding: 2px;">23</td> <td style="padding: 2px;">26</td> <td style="padding: 2px;">30</td> </tr> </table>	x	5	10	15	20	25	y	16	19	23	26	30	10 Marks	L3	CO3
x	5	10	15	20	25											
y	16	19	23	26	30											

Or

13	<p>Apply the method of least squares to fit a parabola $y = a + bx + cx^2$ for the following data.</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <tr> <td style="padding: 2px;">x</td> <td style="padding: 2px;">0</td> <td style="padding: 2px;">1</td> <td style="padding: 2px;">2</td> <td style="padding: 2px;">3</td> <td style="padding: 2px;">4</td> </tr> <tr> <td style="padding: 2px;">y</td> <td style="padding: 2px;">1</td> <td style="padding: 2px;">1.8</td> <td style="padding: 2px;">1.3</td> <td style="padding: 2px;">2.5</td> <td style="padding: 2px;">2.3</td> </tr> </table>	x	0	1	2	3	4	y	1	1.8	1.3	2.5	2.3	10 Marks	L3	CO3
x	0	1	2	3	4											
y	1	1.8	1.3	2.5	2.3											