



Reg. No.: .....

Name: .....

**University of Kerala**

W7177

Third Semester FYUGP Degree Examination, November 2025

Discipline Specific Elective

**MATHEMATICS**

**UK3DSEMAT201 - Numerical Analysis**

Academic Level: 200-299

2024 Admission

**Time: 1 Hour 30 Minutes(90 Mins.)**

**Max. Marks: 42**

**Part A. 6 Marks.Time:6 Minutes.(Cognitive Level:Remember(RE)/Understand(UN)) Objective Type. 1 Mark Each.Answer all questions**

Qn No.	Question	CL	CO
1	Write the general form of Taylor's series for a function $f(x)$	RE	4
2	What is polynomial interpolation?	RE	3
3	Express the forward difference $\Delta^2 y_0$ in terms of $y_0, y_1$ and $y_2$ .	UN	2
4	Define Central Difference operator $\delta$ .	UN	2
5	Give one example of a transcendental function	UN	1
6	What is the main advantage of the False Position method over the Bisection method?	UN	1

**Part B.8 Marks.Time:24 Minutes.(Cognitive Level:Understand(UN)/Apply(AP))Short Answer. 2 marks each.Answer all questions**

Qn No.	Question	CL	CO												
7	Construct the forward difference table for the following data: <table border="1" style="margin: 10px auto; width: 80%;"> <tr> <td><b>x</b></td> <td><b>0</b></td> <td><b>1</b></td> <td><b>2</b></td> <td><b>3</b></td> <td><b>4</b></td> </tr> <tr> <td><b>y</b></td> <td><b>1</b></td> <td><b>3</b></td> <td><b>7</b></td> <td><b>13</b></td> <td><b>21</b></td> </tr> </table>	<b>x</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>y</b>	<b>1</b>	<b>3</b>	<b>7</b>	<b>13</b>	<b>21</b>	UN	2
<b>x</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>										
<b>y</b>	<b>1</b>	<b>3</b>	<b>7</b>	<b>13</b>	<b>21</b>										
8	State Boole's and Weddle's Rules.	UN	4												
9	From the following values of x and y, find $\frac{dy}{dx}$ at $x = 0.7$ :	AP	3												

Qn No.	Question	CL	CO																
	<table border="1"> <thead> <tr> <th>x</th> <th>y</th> </tr> </thead> <tbody> <tr> <td>0.4</td> <td>1.5836</td> </tr> <tr> <td>0.5</td> <td>1.7974</td> </tr> <tr> <td>0.6</td> <td>2.0442</td> </tr> <tr> <td>0.7</td> <td>2.3275</td> </tr> </tbody> </table>	x	y	0.4	1.5836	0.5	1.7974	0.6	2.0442	0.7	2.3275								
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10	<p>The following table gives the values of <math>f(x)</math> at equal intervals of <math>x</math>.</p> <table border="1"> <thead> <tr> <th>x</th> <th>0</th> <th>0.5</th> <th>1</th> <th>1.5</th> <th>2</th> <th>2.5</th> <th>3</th> </tr> </thead> <tbody> <tr> <td>f(x)</td> <td>0</td> <td>0.7071</td> <td>1</td> <td>1.2247</td> <td>1.4142</td> <td>1.5811</td> <td>1.732</td> </tr> </tbody> </table> <p>Evaluate <math>\int_0^3 f(x) dx</math>.</p>	x	0	0.5	1	1.5	2	2.5	3	f(x)	0	0.7071	1	1.2247	1.4142	1.5811	1.732	AP	4
x	0	0.5	1	1.5	2	2.5	3												
f(x)	0	0.7071	1	1.2247	1.4142	1.5811	1.732												

**Part C. 28 Marks. Time: 60 Minutes (Cognitive Level: Apply (AP)/Analyse (AN)/Evaluate (EV)/Create (CR)) Long Answer. 7 marks each. Answer all 4 Questions choosing among options \* within each question**

Qn No.	Question	CL	CO																																
11	<p>A)</p> <p>From the following table, find the value of <math>e^{1.17}</math> using Gauss' forward formula:</p> <table border="1"> <thead> <tr> <th>x</th> <th><math>e^x</math></th> </tr> </thead> <tbody> <tr> <td>1.00</td> <td>2.7183</td> </tr> <tr> <td>1.05</td> <td>2.8577</td> </tr> <tr> <td>1.10</td> <td>3.0042</td> </tr> <tr> <td>1.15</td> <td>3.1582</td> </tr> <tr> <td>1.20</td> <td>3.3201</td> </tr> <tr> <td>1.25</td> <td>3.4903</td> </tr> <tr> <td>1.30</td> <td>3.6693</td> </tr> </tbody> </table> <p>OR</p> <p>B)</p> <p>Find <math>\frac{dy}{dx}</math> at <math>x = 1.5</math> for the tabulated function:</p> <table border="1"> <thead> <tr> <th>x</th> <th>1.0</th> <th>1.2</th> <th>1.4</th> <th>1.6</th> <th>1.8</th> <th>2.0</th> <th>2.2</th> </tr> </thead> <tbody> <tr> <td>y</td> <td>2.7183</td> <td>3.3201</td> <td>4.0552</td> <td>4.4581</td> <td>4.9530</td> <td>6.0496</td> <td>7.3891</td> </tr> </tbody> </table>	x	$e^x$	1.00	2.7183	1.05	2.8577	1.10	3.0042	1.15	3.1582	1.20	3.3201	1.25	3.4903	1.30	3.6693	x	1.0	1.2	1.4	1.6	1.8	2.0	2.2	y	2.7183	3.3201	4.0552	4.4581	4.9530	6.0496	7.3891	AP	2, 2
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12	<p>A)</p> <p>Find the real root of the equation <math>x^3 - 2x - 5 = 0</math> and also find the percentage of error.</p>	AN	3, 1																																

Qn No.	Question	CL	CO												
	OR B) Find a root of the equation $3x - \cos x - 1 = 0$ by the Regula Falsi method.														
13	A) Use Trapezoidal rule to find $\int_{-2}^2 \frac{x}{5+2x} dx$ with five ordinates. OR B) Using Newton's forward difference formula, find the sum $S_n = 1^3 + 2^3 + 3^3 + \dots + n^3$ .	EV	3, 2												
14	A) From the following table, find x, correct to two decimal places, for which y is maximum and find this value of y. <table border="1" data-bbox="132 1025 970 1104"> <tr> <td>x</td> <td>1.2</td> <td>1.3</td> <td>1.4</td> <td>1.5</td> <td>1.6</td> </tr> <tr> <td>y</td> <td>0.9320</td> <td>0.9636</td> <td>0.9855</td> <td>0.9975</td> <td>0.9996</td> </tr> </table> OR B) Given the differential equation $y' = \frac{x^2}{y^2 + 1}$ with the initial condition $y(0) = 0$ . Use Picard's method to obtain y for $x = 0.5$ .	x	1.2	1.3	1.4	1.5	1.6	y	0.9320	0.9636	0.9855	0.9975	0.9996	CR	3, 4
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