

Reg. No.:



W7177

Name:

University of Kerala

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 δ .	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

Questions								
Qn No.	Question					CL	CO	
7	Construct the forward difference table for the following data:					UN	2	
	x	0	1	2	3			4
	y	1	3	7	13			21
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	

Question		CL	CO																
Qn No.																			
	<table><tr><th>x</th><th>y</th></tr><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></table>	x	y	0.4	1.5836	0.5	1.7974	0.6	2.0442	0.7	2.3275								
x	y																		
0.4	1.5836																		
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	The following table gives the values of $f(x)$ at equal intervals of x .																		
	<table><tr><th>x</th><td>0</td><td>0.5</td><td>1</td><td>1.5</td><td>2</td><td>2.5</td><td>3</td></tr><tr><th>f(x)</th><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></table>	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												
10	Evaluate $\int_0^3 f(x) dx$.																		

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

Part C: 20 Marks. Find the correct answer for each question. Each question carries 2 marks each. Answer all 4 Questions choosing among options within each question.		CL	CO																																
Qn No.	Question																																		
11	A) From the following table, find the value of $e^{1.17}$ using Gauss' forward formula: <table><tr><th>x</th><th>e^x</th></tr><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></table> OR B) Find $\frac{dy}{dx}$ at $x = 1.5$ for the tabulated function: <table><tr><th>x</th><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>2.0</td><td>2.2</td></tr><tr><th>y</th><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></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
x	e^x																																		
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y	2.7183	3.3201	4.0552	4.4581	4.9530	6.0496	7.3891																												
12	A) Find the real root of the equation $x^3 - 2x - 5 = 0$ and also find the percentage of error.	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"><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
x	1.2	1.3	1.4	1.5	1.6										
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