PRN:		Course Code :	UME 404

Second Year **B. Tech** Semester End Examination Winter 2024

Numerical Methods

000169

Day and Date: Fri 29 NOV 2024 Max Marks: **100**

Time : 02:00PM TO 05:00PM Duration: **03** hrs

Instructions: All questions are compulsory.

			Marks	Bloom's Level	CO
Q.1		**Attempt the following**			
	a)	Find positive root of $X^4 - 32 = 0$ by the method false position which lies in the range (2,2.5)	08	2	1
	b)	Find the root of the equation $X^3 - 4X - 9 = 0$ using Bisection Method	08	2	1
		OR			
	b)	Use Bisection method to find the positive root of $x^2-30=0$ correct to four decimal places in the interval (5.477,5.478)	08	2	1
Q.2		**Attempt the following**			
	a)	Solve the following equation using Jacobi's iteration method correct to three decimal places $8x - 3y + 2z = 20$ $6x + 3y + 12z = 35$ $4x + 11y - z = 33$ Using starting values of $x = y = z = 0$.	08	3	2
	b)	Solve the following equation using Jacobi's iteration method correct to three decimal places $x + y + 54z = 110$ $27x + 6y - z = 85$ $6x + 15y + 2z = 72$ Using starting values of $x = y = z = 0$.	08	3	2
		OR			
	b)	Solve the following system by Gauss Elimination method. $3x - y + 2z = 12$ $x + 2y + 3z = 11$ $2x - 2y - z = 2$	08	3	2
Q.3		**Attempt any two from the following**			
	a)	Solve $dy/dx = 1 + y^2$, $y(0)=0$ taking $h=0.2$ at $x=1$ using Euler's Method.	08	3	3
	b)	Solve $dy/dx = x+y+xy$, $y(0)=1$ taking $h= 0.025$ at $x =0.1$ using Euler's Method	08	3	3
	c)	Solve $dy/dx = x-y$, $y(0) = 1$ upto y_2 Using Picards Method.	08	3	3
Q.4		**Attempt any two from the following**			
	a)	Using Newton's Divided Difference formula, find the values of f(9)	08	3	4

x	5	7	11	13	17
F(x)=y	150	392	1452	2366	5202

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b) Using Newton's Divided Difference formula, find the values of f(2) — 08 — 3 — 4

x	4	5	7	10	11	13
F(x)=y	48	100	294	900	1210	2028

c) Fit a Straight Line to fit the following data — 08 — 3 — 4

X	1	2	3	4	5	6
Y	49	54	60	73	80	86

Q.5 **Attempt any Two of the following**

a) Evaluate $\int_{0.6}^{2} y\,dx$ where — 09 — 3 — 5

x	0.6	0.8	1	1.2	1.4	1.6	1.8	2
y	1.23	1.58	2.03	4.32	6.25	8.36	10.23	12.45

Use Trapezoidal Rule

b) Evaluate $\int_{0}^{6} 1/(1+x^2)\,dx$ where — 09 — 3 — 5

x	0	1	2	3	4	5	6
y	1	0.5	0.2	0.1	0.0588	0.0385	0.027

Use Simpson's $3/8^{th}$ Rule.

c) Evaluate $\int_{0}^{6} 1/(1+x^2)\,dx$ where — 09 — 3 — 5

x	0	1	2	3	4	5	6
y	1	0.5	0.2	0.1	0.0588	0.0385	0.027

Use Simpson's $1/3^{rd}$ Rule.

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Q.6 **Attempt any Two of the following**

a) Solve the equation Uxx + Uyy = 0 for the following square mesh with shown boundary values.Iterate until the maximum difference between two values at any point is less than 0.001 — 09 — 3 — 5

A	1	2	B
1	U1	U2	4
2	U3	U4	5
D	4	5	C

b) Solve the equation Uxx + Uyy = 0 for the following square mesh with shown boundary values.Iterate until the maximum difference between two values at any point is less than 0.001 — 09 — 3 — 5

A	1	2	B
1	U1	U2	2
2	U3	U4	1
D	4	5	C

c) Apply Runge Kutta method to find y for x=0.1 in steps of 0.1, dy/dx= x+y2 , given that y=1 when x=0. — 09 — 3 — 5

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