मोतीलालनेहरूराष्ट्रीयप्रौद्योगिकीसंस्थानइलाहाबाद
प्रयागराज- 211 004 (भारत)
Motilal Nehru National Institute of Technology Allahabad
Prayagraj - 211 004 (India)

Department of Mathematics
Mid Semester Examination, Session 2023-24 (Odd)

Programme: *B.Tech* **Branch:** *Chemical Engineering* **Semester:** *3rd*
Course Name: *Numerical Methods and Statistical Techniques*
Course Code: *MAN13101* **Max. Marks:** *25*
Time: *90 Min* **Registration No.:** 2022206 8

Instructions: Answer ALL questions.

		Marks	Correspondi course outco
Q1	Demonstrate the effect of error on a difference table. Locate and correct the error in the following table, if y is a cubic polynomial.	(5)	CO2

x	0	1	2	3	4	5	6	7
y	25	21	18	18	27	45	76	123

Q2	**a**	Define rate of convergence and Derive the condition for convergence of general iteration method	(3)	CO1
	b	Obtaine the Everett's interpolation formula from Bessel's interpolation formula	(2)	CO2
Q3		Apply the quotient-difference method to obtain the approximate roots of the equation $x^3 - 7x^2 + 10x - 2 = 0$	(5)	CO1
Q4		Using Regula-falsi Method. Find the root of $2x = \log_{10} x + 7$ between 3 and 4 correct to 3 decimal places.	(5)	CO5
Q5		By means of Newton's general interpolation formula find the value of $f(8)$ and $f(15)$ from the following table:	(5)	CO4

x	4	5	7	10	11	13
f(x)	48	100	294	900	1210	2028

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Department of Mathematics
End Semester Examination, Session 2023-24 (Odd Sem)

Programme: *B.Tech* **Branch:** *Chemical Engineering* (35+) **Semester:** 3rd
Course Name: *Numerical Methods and Statistical Techniques*
Course Code: *MAN13101* **Max. Marks:** 50
Time: *2 1/2 hrs* **Registration No.:** 2 0 2 2 2 0 6 8

Instructions: Answer ALL questions.

		Marks	Course Outcome
Q1	Given from the table, use the Stirling's formula and estimate the value of tan 16°. 1 θ°: 0, 5, 10, 15, 20, 25, 30 $\tan\theta$: 0, 0.0875, 0.1763, 0.2679, 0.3640, 0.4663, 0.5774	(5)	CO2
Q2	Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by using Simpson's 3/8 rule and Weddle's rule and compare the results with its actual value. 3	(5)	CO3
Q3	Given from the table, find $\frac{d^2y}{dx^2}$ at $x = 1.1$ *and* 1.6 with the help of forward and backward difference formula. 5 x: 1.0, 1.1, 1.2, 1.3, 1.4, 1.5, 1.6 y: 7.989, 8.403, 8.781, 9.129, 9.451, 9.750, 10.031	(5)	CO2
Q4	Find the root of the equation $\cos x = xe^x$ using regular falsi method between 0 and 1 correct to 3 decimal places. 5	(5)	CO4
Q5	Given from the table, evaluate $f(9)$, using Newtons divide and difference formula 5 x: 5, 7, 11, 13, 17 $f(x)$: 150, 392, 1452, 2366, 5202	(5)	CO5
Q6	Apply Gauss-Seidal method to solve the sysytem of equations : $27x+6y-z = 85$; $x+y+54z = 110$; $6x+15y+2z = 72$ up to three iterations. 5	(5)	CO3
Q7	Fit a straight line to the following data x: 6, 7, 7, 8, 8, 8, 9, 9, 10 y: 5, 5, 4, 5, 4, 3, 4, 3, 3	(5)	CO2
Q8	Find the sum of the series using Euler-Maclaurin formula. 5 $\frac{1}{51^2}+\frac{1}{53^2}+\frac{1}{55^2}+\ldots\ldots\ldots+\frac{1}{99^2}$	(5)	C05
Q9	Calculate linear regreession coefficients from the following: 5 x: 1, 2, 3, 4, 5, 6, 7, 8 y: 3, 7, 10, 12, 14, 17, 20, 24	(5)	C03
Q10	A curve passes through the points (0,18), (1,10), (3, −18) and (6,90), use Lagrange's formula and find the slope of the curve at $x = 2.3$. 4	(5)	C01

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