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Department of Computer Science and Engineering

B. Sc. in CSE

Final Exam, Autumn 2021

Course Code: **CSE 4745** Course Title: Numerical Methods

Time: 2 hours 30 minutes **Full Marks: 50**

Answer all questions. The figures in the right-hand margin indicate full marks

Course Outcomes and Bloom's Levels are mentioned in additional Columns

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		Group A		
1.	a)	Solve the following system of linear equation by *Gauss-Jordan* method: $2x1 + 11x2 - 3x3 = 4$ $3x1 + 3x2 + 20x3 = 7$ $x1 + 28x2 + 80x3 = 20$	4.5	CO1
1.	b)	Solve the following system of linear equation by *Gauss Seidel* method: $3x1 + 25x2 - x3 = 7$ $2x1 + 13x2 + 20x3 = 5$ $x1 + 21x2 + 80x3 = 29$	4.5	CO1
1.	c)	Write the difference between *Jacobi Iteration* and *Gauss Seidel method* in context of iteration.	1	CO1
2.	a)	The observations from an experiment are as given below **x 2 10 26 61** **y 600 500 4XX 350** [*XX* means the last two digits of your ID number. Example: for C191017, *XX* will be *17]* It is known that a relation of type $Y = a + bX$ exists. Find the best possible values of *a* and *b*. **OR**	5	CO4
2.	a)	The observations from an experiment are as given below **x 2 10 26 61** **y 600 500 4XX 350** [*XX* means the last two digits of your ID number. Example: for C191017, *XX* will be *17]* It is known that a relation of type $Y = ae^{bx}$ exists. Find the best possible values of *a* and *b*.	5	CO4

2.	b)	Find the best linear fit to the data (x, y) = (1,0.5), (2,2.5), (3,2), (4,4), (5,3.5), (6,6), (7,5.5) **OR**	5	CO4
2.	b)	Compare with appropriate example for fitting a polynomial n degree equation and a parabola.	5	CO3
		Groups B		
3.	a)	Derive the equations of 1st order *differentiation* and discuss which equation is better than other?	5	CO1
3.	b)	Find y' and y'' from the following table for x=2: x | 1 | 2 | 3 | 4 | 5 | 6 | 7 y | 12.89 | 14.56 | 17.45 | 19.34 | 20.45 | 22.34 | 26.89	5	CO2
		OR		
3.	b)	From the following table find x, correct to two decimal places, for which y is maximum and find this value of y. x 1.2 1.3 1.4 1.5 1.6 y 0.9320 0.9636 0.9855 0.9975 0.9996	5	CO2
4.	a)	Derive *Trapezoidal rule* for integration.	4	CO1
4.	b)	Do you think *Simpson's 3/8* rule is better to get the more accurate result than *Simpson's 1/3 rule*? If yes then why or if no then why?	1	CO2
4.	c)	Evaluate $\int_1^9 1/3\,x\,dx$ by i) *Simpson's 1/3* and *Simpson's 3/8* rule and compare the result with the exact value loge9 of the integral.	5	CO2
		OR		
4.	c)	Evaluate $\int_0^{45} \cos x\,dx$ by *Trapezoidal* rule. Here both upper limit and lower limit is in degree. The interval will be divided into 3 strips.	5	CO2
5.	a)	A rod is rotating in a plane. The following table gives the angle θ in radians through which the rod has turned for various values of the time t seconds. Calculate the i) **angular velocity** and the ii) **angular acceleration** of the rod, when t = 0.7 sec. t-seconds 0.0 0.2 0.4 0.6 0.8 1.0 θ-radians 0.0 0.22 0.48 1.10 2.0 3.2	5	CO6
5.	b)	Use the *fourth order Runge-Kutta method* to solve $\frac{dy}{dx} = Ax^2 + y^2$, y(0) = 1 [A means the *last digit* of your ID number.] for the interval $0 < x \leq 0.4$, with h = 0.2.	5	CO6