BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: B.TECH **SEMESTER : IV**
BRANCH: CSE, ECE, EEE **SESSION : SP/2024**

SUBJECT: MA203 NUMERICAL METHODS

TIME: 3 Hours **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

			CO	BL
Q.1(a)	Find a root of an equation $\boldsymbol{f(x) = 2x^3 - 2x - 5}$ using Regula Falsi method. (perform five iterations and take all values upto 4 decimal places).	[5]	1	
Q.1(b)	Find the root of the equation $f(x) = x^3 - 3 = 0$, if the initial value is 2. Perform 2 iterations of Newton Raphson method (all values taken upto 4 decimal)	[5]	1	
Q.2(a)	Solve by Gauss elimination method 6 x + y + z = 105 4 x + 8 y + 3 z = 155 5 x + 4 y - 10 z = 65	[5]	2	
Q.2(b)	Solve using Gauss Jacobi method with initial value (0,0,0) 4x+2y-2z=0, x-3y-z=7,3x-y+4z=5	[5]	2	

Q.3(a) Find f(0.15) using Newton backward difference table from the data [5] 3

x	f(x)
0.1	0.09983
0.2	0.19867
0.3	0.29552
0.4	0.38942
0.5	0.47943

Q.3(b) Find k in the following table using Lagrange's interpolation: [5] 3

x	:	0	1	2	3	4
f(x)	:	1	3	9	k	81

Q.4(a) The distance covered by an athlete for the 50-metre race is given as below: [5] 4
Determine the speed of athlete at t = 5 sec. correct to two decimal places.

time t (sec.):	0	1	2	3	4	5	6
distance s (metre):	0	2.5	8.5	15.5	24.5	36.5	50

PTO

Q.4(b) Compute the integral $I = \int_1^2 e^{\left\{-\frac{x^2}{2}\right\}}\, dx$ with four sub-intervals using Simpson's 1/3 rule. [5] 4

Q.5(a) $$y' = y - t^2 + 1,\ y(0) = 0.5$$ Use Runge Kutta method of 4th order with step size $h = 0.5$ and find the value of y for $0 \leq t \leq 1$. [5] 5

Q.5(b) Apply modified Euler's method to solve $y' = x + y, y(0) = 1$. Find y at $x = 0.4$, using step length $h = 0.1$. [5] 5

::::::23/04/2024::::::M