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

CLASS: BTECH   SEMESTER : III/ADD
BRANCH: BT/CHEMICAL/ME/PIE/CE/FT   SESSION : MO/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)   Write the Newton Raphson procedure for finding $\sqrt[3]{N}$,where N is a real number. Use it   [5]
to find $\sqrt[3]{18}$ correct to 2 decimals, assuming x_0=2.5.

Q.1(b)   Find the root of the equation 2x-$\log_{10}$ x=7 which lies between 3.5 and 4, using method   [5]
of false Position up to two iterations only.

Q.2   Perform five iterations of Jacobi iteration method to find the numerical solution of the   [10]
system of equations: $4x + y + z = 2; \ x + 5y + 2z = -6; \ x + 2y + 3z = -4$ with initial
guess: (1/2, -1/2, -1/2).

Q.3(a)   Given that $\sqrt{12500} = 111.8034, \ \sqrt{12510} = 111.8481, \ \sqrt{12520} = 111.8928 ,$ [5]
$\sqrt{12500} = 111.9375$, Use Newton Forward difference formula to find $\sqrt{12516}$.

Q.3(b)   Find k in the following table :   [5]

x	:	1	3	4	5
f(x)	:	1	25	k	121

Q.4   Write the formula of composite simpson's 1/3 rule with n subintervals. Using this rule,   [10]
compute the Integral $I = \int_{1}^{2} e^{\left(-\frac{x}{2}\right)} \ dx$ with six sub-intervals and find the error with the
exact value of the integral.

Q.5   Using fourth-order Runge-Kutta method find numerical solution of first order initial   [10]
value problem: $y' = y^2 + x^2, y(2) = 3$. Find $y(2.1)$ and $y(2.2)$ by taking $h = 0.1$.

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