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PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF ENGINEERING

SUMMER TERM / MAKE-UP END TERM EXAMINATION

Semester: Summer Term 2019
Course Code: MATH A 201
Course Name: Numerical Methods
Program: B.Tech & III Sem(2015 Batch)

Date: 26 July 2019
Time: 3 Hours
Max Marks: 100
Weightage: 50%

Instructions:
(i) Question paper consists of 3 parts.
(ii) Scientific and Non-programmable calculators are permitted.

Part A

Answer **all** the Questions. **Each** question carries **ten** marks. (3Q x 10M = 30)

1. Using Newton-Raphson method find a real root in the interval [1, 2] of the algebraic equation $2x^3 - 3x - 6 = 0$ correct up to three decimal places.

2. Using divided difference method of interpolation estimate the value of y at x = 5 for the following data

x	0	2	3	4	7	9
y	4	26	58	112	466	922

3. Obtain the value of $y(0.2)$ and $y(0.4)$ using Euler's method with $h = 0.2$ given $\frac{dy}{dx} = y + e^x$, $y(0) = 0$.

Part B

Answer **all** the Questions. **Each** question carries **ten** marks. (4Q x 10M = 40)

4. Use the Gauss-Seidel iterative method to solve the system of simultaneous linear equations $27x + 6y - z = 85$, $6x + 15y + 2z = 72$, $x + y + 54z = 110$.

5. Employ the Rayleigh's power method to determine the dominant eigenvalue and the corresponding eigenvector of the following matrix $\begin{bmatrix} 1 & -3 & 2 \\ 4 & 4 & -1 \\ 6 & 3 & 5 \end{bmatrix}$.

6. Solve $\frac{dy}{dx} = x + y,\ y(0) = 1$, using the Picard's method up to the third approximation. Hence find the values of $y(0.1)$ and $y(0.2)$.

7. Using Taylor's series method determine $y(0.1)$ and $y(0.2)$, given

$$\frac{dy}{dx} = 3e^x + 2y,\ y(0) = 0.$$

Part C

Answer **both** Questions. **Each** question carries **fifteen** marks. (2Q x 15M = 30)

8. Evaluate $\int_0^6 \frac{1}{1+x^2}\,dx$, with $h = 1$, using (i) trapezoidal rule (ii) Simpson's 1/3 rule and (iii) Simpson's 3/8 rule.

9. Compute the value of $y(0.1)$ using Runge-Kutta method of fourth order with $h = 0.1$ given that $\frac{dy}{dx} = x + y^2,\ y(0) = 1.$