

B.Sc.IT: Semester – III [Computational Mathematics – I] Question Paper (Apr – 2014) [Old Course]

- Kamal T.

Time: 3 Hours

Total Marks: 100

- N.B.: (1) Questions No. 1 is Compulsory.
(2) Attempt any four questions from Q. No. 2 to 6.
(3) All question carry equal marks.

Q.1 Attempt Both The Question: (20 Marks)

- (A) Solve the following equations by gauss-seidal procedure. The answer should be correct to three Significant Digits. (10)
 $x_1 - 10x_2 + 4x_3 = 6$
 $2x_1 - 4x_2 + 10x_3 = -15$
 $9x_1 + 2x_2 + 4x_3 = 20$
- (B) Use the Runge-Kutta Fourth Order method to find the value of y when x=1 given that y=1 when x=0 and that: $\frac{dy}{dx} = \frac{x-y}{y+x}$. (10)

Q.2 Attempt Both The Question: (20 Marks)

- (A) Compute the inverse of the matrix $\begin{pmatrix} 3 & 2 & 4 \\ 2 & 1 & 1 \\ 1 & 3 & 5 \end{pmatrix}$ and use the result of solve, (10)
 $3x_2y + 4z = 7$
 $2x + y + z = 7$
 $x + 3y + 5z = 2$
- (B) Using bisection method to determine the root of $f(x) = e^x - x$. (10)

Q.3 Attempt Both The Question: (20 Marks)

- (A) Find the number of term of the exponential series such that their sum gives the value of e^x correct o five decimal place for all value of x in the range $0 \leq x \leq 1$. (10)
- (B) Approximated the integral given below using Trapezoidal Rule using 8 equal subdivisions. (10)
 $I = \int_{-1}^1 \frac{1}{1+x^2} dx.$

Q.4 Attempt Both The Question: (20 Marks)

- (A) From the data find y at 4.5. by Newton's Interpolation method. (10)
- | | | | | | |
|---|------|------|------|------|-------|
| X | 1 | 2 | 3 | 4 | 5 |
| Y | 2.38 | 3.65 | 5.85 | 9.95 | 14.85 |
- (B) Find y(0.2) using modified Euler's method $\frac{dy}{dx} = x + y, y(0) = 1, \text{step size} = 0.1$. (10)

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Q.5 Attempt Both The Question: (20 Marks)

- (A) Evaluate the root for the equation $f(x) = \cos x - xe^x = 0$ using false position method. (10)
- (B) Fit a straight line to the x and y values in the two columns. (10)

x_1	1	2	3	4	5	6	7
y_1	0.5	2.3	2.1	4.2	3.6	5.8	5.5

Q.6 Attempt Both The Question: (20 Marks)

- (A) Evaluate the integral $\int_0^1 \frac{1}{1+x} dx$ by taking $h = \frac{1}{6}$ using Simpson's $\frac{3^{th}}{8}$. (10)
- (B) Show that $\mu = \frac{2+\Delta}{\sqrt{(1+\Delta)}} = \frac{2-\nabla}{2\sqrt{(1-\nabla)}}$. (10)