***Question 2:*** ***(4 Marks)***

**Objectives: This question is about Newton-Raphson Iterative Method.**

Given the following non-linear equation, it is required to solve it using N-R iterative method. Start with $x_{\circ} = 0.4$ and approximate the root with a relative error ≤ 5%.

$$f(x) = 8\sin(x)e^{-x} - 1$$

***Question 3:*** ***(6 Marks)***

**Objectives: This question is about Guass-Sidel iterative method.**

Given the following system of linear equations, it is required to apply 3-iteration using Guss-Sidel iterative method and find the absolute error in the last iteration.

$$\begin{array}{rrrl} 5x & -2y & +z & =11 \\ -2x & +6y & -3z & =-7 \\ x & +2y & +4z & =36 \end{array}$$

***Question 4:*** ***(6 Marks)***

**Objectives: This question is about interpolation.**

Estimate f(1) for the following readings by using 3rd order Newton interpolating polynomial.

| x | 1.2 | 1.4 | 1.6 | 1.8 |
|---|---|---|---|---|
| f(x) | 5.72 | 5.28 | 4.68 | 3.92 |

***Question 5:*** ***(6 Marks)***

**Objectives: This question is about numerical integration.**

Use 7-sample point of 1/3 composite Simpson's rule to approximate the integral of the following function over the interval x=1 to x=10.

$$f(x) = x^2 \log(x + \sqrt{x^2 + 1})$$

**Question 6:** **(6 Marks)**

**Objectives: This question is about 2nd order Runge-Kutta (Huen's) numerical integration method.**

Given $\dfrac{dy}{dx} = \dfrac{\cos(6x)}{(y^2 + x + 1)}$ with y(0)=0.1, it is required to find y(0.2) using Huen's numerical integration method with step size h=0.1.

Good Luck