Time: 2:00 Hours]   [Marks: 35

___

Instructions for candidates:

1. All questions are compulsory.

2. Figures to right indicate full marks.

3. Non-programmable, single memory scientific calculator is allowed.

___

Q.1) Attempt any five questions of the following.   [10]

a) If the approximate value of 7.013 is 7, find the absolute error and percentage error.

b) Prove that $E = 1 + \Delta$ by usual notations.

c) Let $f(x) = \frac{1}{x}$, find divided difference $f(a, b, c)$.

d) Write the Newton's Gregory Forward Interpolation Formula.

e) Write the Simpson's (1/3) rule.

f) Given that $\frac{dy}{dx} = xy$ with the initial condition y(1)=5. Find y(1.1) by using Euler's Method.

g) Write the Newton-Raphson formula for square root of any real number.

Q.2) Attempt any three questions of the following.   [15]

a) Find the real root of the equation $x^2 - 2x - 1 = 0$ by Regula Falsi method in the interval [1,3] correct up to 2 decimal places.

b) From the following table find the polynomial in x using Lagrange's interpolation formula.

X	1	2	3
Y	6	16	32

c) Using Newton's backward interpolation formula find the value of $f(18)$.

X	0	5	10	15	20
Y	5026	5674	6362	7088	7854

d) If $f(0) = 1, f(1) = 2.72, f(2) = 7.39, f(3) = 20.09, f(4) = 54.60$ find

$\int_0^4 f(x)dx$ using Simpson's (1/3) Rule.

e) Given that $\frac{dy}{dx} = x + 2y$ with y(0)=0, h=0.1. Find y(0.1) and y(0.2) by using

Euler's method.

Q.3) Attempt any one questions of the following. [10]

a) 1) Given that $\frac{dy}{dx} = x + y$ with y(0)=1, using Range-Kutta second order

method obtain y(0.2) and y(0.4).

2) Use Newton Raphson method to find the approximate root of equation

$2 - x^2 = \sin x$ correct up to 3 decimal places. Take $x_0 = 1$.

b) Derive trapezoidal Rule of the integration for the function $f(x) = 0$.

Find $\int_0^5 \frac{1}{1+x} dx$ using Trapezoidal rule. (Take h=0.5)

****