Total No. of Question : [4] **Registration No. :** | | | | | | | | | |

Programme Name : F.Y.B.Tech
Regular F.Y.B.Tech. Sem. II ESE (2022 - 23)July 2023
II SEMESTER (2022 BATCH)
221FYL110-Differential Equations and Numerical Techniques

Duration : 2 Hours **Marks : 50**
Instructions :

(Q1) **Attempt the following questions** [20.0]

(1.1) Solve $(\tan y + x)dx + (x\sec^2 y - 3y)dy = 0$ [6.0]

CO :- 110.1
Blooms Taxonomy :- Remember, Understand

(1.2) The circuit consist of a resistance R, an inductance L and voltage E, the current i is given by $L\frac{di}{dt} + Ri = E$. Find the current i at any time t, if t = 0, i = 0 and L, R, E are constants. [7.0]

CO :- 110.2
Blooms Taxonomy :- Apply

(1.3) Using Euler's method, find the approximate value of y when x=3, given that $\frac{dy}{dx} = x + \sqrt{y};\ with\ x_0 = 2, y_0 = 4$ and h = 0.2. [7.0]

CO :- 110.3
Blooms Taxonomy :- Apply

(Q2) **Attempt any TWO questions of the following** [10.0]

(2.1) Using Newton Raphson method, Find the approximate root of $x^4 - x - 9 = 0$ in the interval $(1, 2)$. Choose $x_0 = 2$. [5.0]

CO :- 110.4
Blooms Taxonomy :- Understand, Apply

(2.2) [5.0]

Using Bisection method, Find the approximate value of the $\sqrt{10}$ by in the interval $(3, 4)$ up to 4 iterations.

CO :- 110.4
Blooms Taxonomy :- Understand, Apply

(2.3) Using Regula-Falsi method, compute the root of the equation $xe^x - 3 = 0$ in the interval $(1, 1.5)$ up to 4 iterations. [5.0]

CO :- 110.4
Blooms Taxonomy :- Understand, Apply

(Q3) **Attempt any TWO questions of the following** [10.0]

(3.1) [5.0]

Calculate first and second derivatives of the function f(x) at x= 1.5, if

x	1.5	2.0	2.5	3.0	3.5	4.0	4.5
f(x)	3.375	7.00	13.625	24.00	38.875	59	85.125

CO :- 110.5
Blooms Taxonomy :- Apply

(3.2) Obtain first two derivatives at x = 1, for [5.0]

x	-2	-1	0	1	2	3	4
y	104	17	0	-1	8	69	272

CO :- 110.5
Blooms Taxonomy :- Apply

(3.3) Using Lagrange's formula, compute $f(2)$, given [5.0]

x	0	1	3	6
f(x)	18	10	-18	90

CO :- 110.5
Blooms Taxonomy :- Apply

(Q4) **Attempt any TWO questions of the following** [10.0]

(4.1) Solve $p(1 + q) = qz$ [5.0]

CO :- 110.6
Blooms Taxonomy :- Understand, Apply

(4.2) [5.0]

Solve $yp - x^2q = x^2y$

CO :- 110.6
Blooms Taxonomy :- Understand, Apply

(4.3) [5.0]

Solve $x(y-z)p + y(z-x)q = z(x-y)$

CO :- 110.6
Blooms Taxonomy :- Understand, Apply

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