Total No of Questions: [8] *SEAT NO. :*

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S.E. 2012 (Electrical)
(203148-Numerical Methods and Computer Programming)
(Semester - II)

Time: 2Hours ***Max. Marks : 50***

Instructions to the candidates:

1) ***Answer Q1 or Q2 , Q3 or Q4 , Q5 or Q6 , Q7or Q8***
2) ***Figures to the right side indicate full marks.***
3) ***Use of Scientific Calculator is allowed.***
4) ***Assume Suitable data if necessary***

Q1) a) Write short note on decision making statements and loops in 'C' language. [6]

b) Find the root of equation $x^3 + 2x^2 + 10x - 20 = 0$ that is near 1, using Birge-Vieta method, at the end of second iteration. [7]

OR

Q2) a) What are the different data types in 'C' language? Explain each with their ranges. [6]

b) State and explain Descarte's Rule of sign with example given as $x^3 + 2x^2 + 10x - 20 = 0$ [7]

Q3) a) Explain Regula-Falsi method to find the root of equation. [6]

b) Use Newton's divided difference interpolation to find polynomial equation to fit following the data points (0, 2), (1, 3), (2, 12) and (5, 147) [6]

OR

Q4) a) Derive formula of Newton's forward interpolation for equally spaced data points. [6]

b) Find the negative root of $x^3 - \sin(x) + 1 = 0$ correct to four decimal places using NR method. Take $x_0 = -2$ [6]

Q5) a) Explain Gauss elimination method to solve the system linear simultaneous equations. [6]

b) Find the numerically larger eigen value of the matrix $A = \begin{bmatrix} 3 & -5 \\ -2 & 4 \end{bmatrix}$ by power method taking initial vector as $\begin{pmatrix} 1 \\ 1 \end{pmatrix}$. [6]

OR

Q6) a) Explain Gauss Seidel method to solve the system linear simultaneous equations. [6]

b) Find inverse of matrix A=$\begin{bmatrix} 8 & -4 & 0 \\ -4 & 8 & -4 \\ 0 & -4 & 8 \end{bmatrix}$ using Gauss Jordan method [6]

Q7) a) Explain Taylor's Series method to solve ordinary differential equations. [6]

b) Solve $\int_0^{\pi/2} \int_{\pi/2}^{\pi} \cos(x+y)\, dxdy$ using Trapezoidal rule. Take $h = k = \frac{\pi}{4}$ [7]

OR

Q8) a) Derive formula to Simpson's$\left(\frac{1}{3}\right)^{rd}$ rule using Newton Cote's formula for numerical integration [6]

b) Using 4th order RK method solve $\frac{dy}{dx} = \sqrt{x^2 + y}$ at $x = 0.2$ with $x(0) = 0.8$ and $h = 0.2$ [7]