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[4657]-539

S.E. (Electrical) (Second Semester) EXAMINATION, 2014
NUMERICAL METHODS AND COMPUTER PROGRAMMING
(2012 PATTERN)

Time : Two Hours

Maximum Marks : 50

N.B. :— (i) Answer Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6 and Q. 7 or Q. 8.

(ii) Neat diagrams must be drawn wherever necessary.

(iii) Figures to the right indicate full marks.

(iv) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

(v) Assume suitable data, if necessary.

1. (a) List various types of operators used in C. Give examples of each type. [6]
- (b) What is an error in computation ? Define absolute and relative error. [6]

Or

2. (a) What is user defined function in C ? Explain with example. [6]
- (b) Using Birge Vieta method, find the real root of the equation :

$$x^3 + 2x^2 - 5x - 6 = 0.$$

Perform two iterations. Take $P_0 = 1.3$. [6]

P.T.O.

3. (a) Explain with neat diagram Bisection method of solution of transcendental equations. [6]

(b) Using Lagrange's interpolation, find $f(27)$ given that : [7]

x	$y = f(x)$
14	68.7
17	64.0
31	44.0
35	39.1

Or

4. (a) Fit a straight line by method of least squares to the given data : [7]

x	y
1	14
2	27
3	40
4	55
5	68

(b) Derive formula for Newton's Forward Difference Interpolation method. [6]

5. (a) Explain Gauss Jordan method for solution of system of linear simultaneous equations. [6]
- (b) Using Jacobi iterative method solve the following system of linear simultaneous equations.

Take :

$$x^{(0)} = y^{(0)} = z^{(0)} = 0.$$

Perform 5 iterations :

$$27x + 6y - z = 85$$

$$6x + 15y + 2z = 72$$

$$x + y + 54z = 110. \quad [7]$$

Or

6. (a) Explain Gauss Seidel iterative method of solution of system of linear simultaneous equations. [6]
- (b) Using power method, find the largest eigenvalue correct upto 2 decimal places. Given that :

$$A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} \text{ and } X_0 = \begin{bmatrix} 1 \\ 0 \end{bmatrix}. \quad [7]$$

7. (a) Using Taylor's Series method, solve the following ordinary differential equation to obtain $y(0.1)$ and $y(0.2)$.

Given that :

$$\frac{dy}{dx} = x^2y - 1 \text{ and } y(0) = 1.$$

Truncate the series after first five terms. [6]

- (b) Derive Simpson's 3/8th formula as a special case of Newton Cote's quadrature formula for numerical integration. [6]

Or

8. (a) Explain with neat diagram, Modified Euler's method of solution of ordinary differential equation. [6]

- (b) Evaluate the given integral using Simpson's 1/3rd rule.
Take $h = k = 0.2$,

$$I = \int_2^{2.4} \int_4^{4.4} xy \, dx \, dy . \quad [6]$$