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B.E. III - Semester Examination

BE-III/11 (A)

181303021

247199

COMPUTER ENGINEERING

Course No. : BSC - 302

(Numerical Methods)

Time Allowed- 3 Hours *Maximum Marks-75*

***Note**: Attempt **five** questions in all, selecting at least two questions from each section. All carry equal marks. Use of calculator is allowed.*

Section - A

1. a) Using regula falsi method, find a negative real root of $x^3 - 3x + 4 = 0$, correct to three decimal places.

   b) Find the largest eigen value and the corresponding eigen vector of the matrix:

$$\begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix}$$ using the power method. (7,8)

2. a) Using secant method, find a real root of $5x^3 - 20x + 3 = 0$, correct to four decimal places.

b) Using Graeffe's root squaring method, find all the roots of $x^3 - 8x^2 + 17x - 10 = 0$. (7,8)

3. a) Using iteration method, find a real root of $\cos x = 3x - 1$.

b) List at least four properties of eigen values of a matrix. Also verify them for the matrix:

$$\begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 3 \\ 0 & 0 & -1 \end{bmatrix}$$ (7,8)

4. a) Derive Newton - Raphson iteration formula for finding the cube root of a positive number N. Also apply it to compute the cube root of 18.

b) Solve the system of equations. $x + y + z = 6$, $3x + 3y + 4z = 20$, $2x + y + 3z = 13$ by partition method. (7,8)

Section - B

5. a) Find the missing terms from the following data:

x	0	1	2	3	4	5	6
y	5	11	22	40	...	140	....

b) Using Eular's method, find the approximate value of y at x=0.3 given that $\frac{dy}{dx} = x^2 + y^2$ with y(0)=1. Take h=0.1. **(7,8)**

6. a) Using Bessel's formula, find $\frac{dy}{dx}$ at x=7.5 using the following data:

x	7.47	7.48	7.49	7.5	7.51	7.52	7.53
y	0.193	0.195	0.198	0.201	0.203	0.206	0.208

b) Explain Lagrange's interpolation formula and use it to compute f(7) for the following data:

x	5	9	11	13	17
f(x)	150	810	1452	2366	5202

(7,8)

7. a) Using Trapezoidal rule, evaluate $\int_0^1 x^3 dx$, taking h=0.1 Compare the result with actual value of the integral.

b) Compute y(0.2) in two steps of h=0.1 by using Runge Kutta method of 4th order, given that $\frac{dy}{dx} = 3x + y$ with y(0)=1. **(7,8)**

8. a) Using Taylor's series method, compute $y(0.1)$ for the initial value problem: $\frac{dy}{dx} = x^2 y - 1$ with $y(0) = 1$.

b) Tabulate the function $f(x)=2x^3-x$ at $x_0=2$, $x_1=4$, $x_2=5$ and $x_3=8$. Using Newton's divided difference formula, compute $f(x)$ and $f'(x)$ at $x=6$. **(7,8)**

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