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B. E. (Fifth Semester) Examination, April-May 2016

(New Scheme)

(Elect. Engg. Branch)

APPLIED NUMERICAL ANALYSIS

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : *Attempt all questions. Part (a) is compulsory of 2 marks. Attempt any two parts from (b), (c) and (d) is of 7 marks.*

Unit-I

(a) What is approximate numbers? 2

(b) Prove the following useful results from the Newton's iteration formula : 7

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(i) Iterative formula to find $\frac{1}{N}$ is

$$x_{n+1} = x_n(2 - Nx_n)$$

(ii) Iterative formula to find $\sqrt[K]{N}$ is

$$x_{n+1} = \frac{1}{K}\left[(K-1)x_n + N/x_n^{k-1}\right]$$

(c) Using Newton's iterative method, find the real root of $x \log_{10} x = 1 \cdot 2$ correct to five decimal places. 7

(d) Find a not of the equation $x - e^x = 0$ correct to three decimal places by the secant method. 7

Unit-II

2. (a) What is eigen values and eigen vector? 2

(b) Solve : 7

$$10x - 7y + 3z + 5u = 6$$

$$-6x + 8y - z - 4u = 5$$

$$3x + y + 4y + 11u = 2$$

$$5x - 9y - 2z + 4u = 7$$

by Gauss elimination method.

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(c) Apply Gauss Jordan method to solve the equations : 7

$$x+y+z=9$$

$$2x-3y+4z=13$$

$$3x+4y+5z=40$$

(d) Explain Jacobi iteration and Gauss seidal iteration method. 7

Unit-III

3. (a) Define interpolation. 2

(b) Explain weierstrass approximation theorem. 7

(c) Derive Newton's forward interpolation formula. 7

(d) A curve passes through the points (0, 18), (1, 10), (3, – 18) and (6, 90) find the slope of the curve at $x=2$ by using Langrange's formula. 7

Unit-IV

4. (a) Define numerical integration. 2

(b) Clculate the first and second derivatives of the functions tabulated below at the point $x=1{\cdot}1$: 7

x	:	1·0	1·2	1·4	1·6	1·8	2·0
$y=f(x)$	:	0	0·128	0·544	1·296	2·432	4·00

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(c) Determine derivatives using backward difference formula. 7

(d) Derive Newton cotes quadrature formula. 7

Unit-V

5. (a) What is ordinary differential equation? 2

(b) Explain modified Euler's method. 7

(c) Apply Runge Kutta method to find approximate value of y for $x=0{\cdot}2$, in steps of 0.1 if $\frac{dy}{dx}=x+y^2$ given that $y=1$ where $x=0$. 7

(d) Solve by Taylor series method of third order the equation

$$\frac{dy}{dx}=\frac{x^3+xy^2}{e^x}, y(0)=1$$

for y at $x=0{\cdot}1, x=0{\cdot}2$ and $x=0{\cdot}3$. 7

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