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328312 (14)

BE (3rd Semester)

Examination, Nov-Dec 2021

Branch : EEE, Et & T

NUMERICAL ANALYSIS

Time Allowed : Three Hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : Part (a) of each question is compulsory, attempt any two parts from (b), (c) and (d). Part (a) carries 2 marks. Part (b), (c) and (d) 7 marks each.

Q. 1. (a) State and explain Birge-Vieta method.

(b) Solve by Newton Raphson method

$x^3 - 3x + 1 = 0$

(c) Find a real root of the equation $x^3 - 11x^2 + 32x - 22 = 0$ by Birge Vieta method correct to four decimal place using the initial approximation $p = .5$

(d) Find a real root of the equation $x^3 - 9x + 1 = 0$ by the method of false position.

Q. 2. (a) Explain Gauss elimination method.

(b) Solve the following system of equation by the method of triangularisation :

$$x + 5y + z = 14$$

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

$$3x + y + 4z = 17$$

(c) Solve the following system of equation of Gauss-seidal method correct to four decimal places

$$28x + 4y - z = 32$$

$$x + 3y + 10z = 24$$

$$2x + 17y + 4z = 35$$

(d) Use Jacobi method and solve system of equations

$$6x + 3y + 12z = 35$$

$$8x - 3y + 2z = 20$$

$$4x + 11y - z = 33$$

Q. 3. (a) State and explain Simpson 1/3 rule.

(b) Calculate approximate value of $\int_0^{\pi/2} \sin x \, dx$ by (i) Trapezoidal rule and Simpson 1/3 rule.

(c) Give that :

x	1	1.2	1.4	1.6	1.8	2.0
y	0	.128	.544	1.296	2.432	4.0

Find the first derivative of y at x = 1.2 and 2.0.

(d) Find the missing value in the following table.

x	0	5	10	15	20	25
y	6	10	–	17	–	31

Q. 4. (a) State and explain Picard's method.

(b) Use Picard's method to approximate y when

x = .2 given that

y = 1 when x = 0 and

$$\frac{dy}{dx} = x - y$$

OR

(b) Solve $\frac{dy}{dx} = x + y^2, y(0) = 1$ using Taylor's series method and compute y(0.1) and y(0.2).

(c) Given $\frac{dy}{dx} = \frac{y-x}{y+x}$ with the initial condition $y = 1$ and $x = 0$. Find y for $x = .1$ by Euler's method.

(d) Use Runge-Kutta method to solve $\frac{dy}{dx} = xy$ for $x = 1.4$ initially $x = 1$, $y = 2$ (take $h = .2$)

Q. 5. (a) Explain method of least square.

(b) Fit a second degree parabolic to the following data :

x	1	1.5	2.0	2.5	3.0	3.5	4.0
y	1.1	1.3	1.6	2.0	2.7	3.4	4.1

(c) Using the principle of least square fit an equation of the form $y = ae^{bx}$ to the given data :

x	1	2	3	4
y	1.65	2.70	4.50	7.35

(d) Predict y at x = 3.75 by fitting a power curve $y = ax^b$ to the given data :

x	1	2	3	4	5	6
y	2.98	4.26	5.21	6.10	6.80	7.5