

Total No. of Questions—8]

[Total No. of Printed Pages—4

Seat No.	
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[5152]-549

S.E. (Electrical) (Second Semester) EXAMINATION, 2017

NUMERICAL METHODS AND COMPUTER

PROGRAMMING

(2015 PATTERN)

Time : Two Hours

Maximum Marks : 50

N.B. :— (i) Attempt Q. No. 1 or Q. No. 2, Q. No. 3 or Q. No. 4
and Q. No. 5 or Q. No. 6, Q. No. 7. or Q. No. 8.

(ii) Neat diagram 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) Find the real root of equation :

$$x^4 - 3x^3 + 3x^2 - 3x + 2 = 0$$

using Birge-Vieta method. Take $p_0 = 0.5$, show two iterations
only. [6]

(b) What do you mean by entry control loop and exit control loop
in 'C' language ? Write the syntax of any command from each
type of loop. [6]

P.T.O.

Or

2. (a) What are the rules to declare a variable in 'C' language ? Distinguish which of the following are valid or invalid variable names : [6]

(i) 123 sppu

(ii) sppu_123

(iii) sppu @ 123

(iv) sppu123.

(b) Two numbers are defined with absolute error as $a \pm \epsilon_{a1}$ and $b \pm \epsilon_{a2}$. Prove that absolute error in $a \times b$ is $a\epsilon_{a2} + b\epsilon_{a1}$ and absolute error in $\frac{a}{b}$ is $\frac{b\epsilon_{a1} - a\epsilon_{a2}}{b^2}$. [6]

3. (a) Find the negative real root of equation $x^2 + 4 \sin(x) = 0$, correct to three decimal places with initial value of (-2) using NR method. [6]

(b) Obtain the Newton's backward differences polynomial passing through all points given below : [7]

x	y
0.1	1.4
0.2	1.56
0.3	1.76
0.4	2.00
0.5	2.28

Or

4. (a) A series RC circuit is connected across a DC supply of 100V. Voltage across a capacitor is recorded at different instant of time. Fit the following data point into second order degree curve using least square error method : [6]

t (in msec)	v_c (in Volts)
0	0
2	33
4	55
6	70
8	80
10	85

- (b) Find the interpolating polynomial using Newton's divided difference formula for the following table : [7]

x	y
1	0
2	7
3	26
5	125

5. (a) Evaluate $\int_0^{0.9} \log_e (1 + \sqrt{x}) dx$ using Trapezoidal rule of integration with nine subintervals. [6]
- (b) Using modified Euler's method solve the following differential equation to find the value of y at $x = 0.1$ and 0.2 Take step size of 0.1 . Allowed error is 0.0001 $\frac{dy}{dx} = 1 + xy$ with $y(0) = 1$. [7]

Or

6. (a) Calculate following by Simpson's $\frac{3}{8}$ th rule in 8 equal intervals : [6]

$$\int_0^{\frac{\pi}{2}} e^{\sin \theta} d\theta.$$

- (b) Use 4th order RK method to estimate $y(0.2)$ when $y' = x^2 + y^2$ with $y(0) = 0$. Take step size of 0.2 . [7]
7. (a) Explain Gauss Jacobi method to solve linear simultaneous equations. [6]
- (b) Find the values of x_1, x_2 and x_3 using Gauss Jordan method : [6]

$$\begin{bmatrix} 1 & 1 & 1 \\ 4 & 3 & -1 \\ 3 & 5 & 3 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} 1 \\ 6 \\ 4 \end{bmatrix}$$

Or

8. (a) Explain Gauss elimination method to solve linear simultaneous equations. [6]
- (b) Use Gauss Seidel method to solve the following system of equations at the end of 3rd iterations. Use initial values as $x = 3, y = 2$ and $z = 1$: [6]

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

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

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