B. TECH. SEM –III (ELECTRICAL ENGG.) 2014 COURSE) (CBCS) : WINTER - 2017

SUBJECT : DIGITAL COMPUTATIONAL TECHNIQUES

Day **Friday** Time **10.00 AM TO 01.00 PM**

Date **19/01/2018** Max. Marks : 60

W-2017-2035

N.B.:

1) All questions are **COMPULSORY**.
2) Figures to the right indicate **FULL** marks.
3) **Use of non programmable calculator is allowed.**
4) Assume suitable data if necessary.

Q.1 **a)** Explain the terms Abstraction, Encapsulation, Inheritance and Polymorphism in C++. **[06]**

b) Define Array. Write a MATLAB program to form 2 × 2 matrix. **[04]**

OR

a) Explain programming in MATLAB with suitable function, its use and example. **[06]**

b) Explain the class and object in C++. **[04]**

Q.2 **a)** State and explain mean value theorem for derivatives used in numerical computations. **[06]**

b) Evaluate the sum $S = \sqrt{3} + \sqrt{5} + \sqrt{7}$ to 4 significant digits and find its absolute and relative errors. **[04]**

OR

a) Discuss the errors in numerical computation with formula and example. **[06]**

b) State and explain Intermediate Value Theorem. **[04]**

Q.3 **a)** The equation $f(x) = x^3 - 7x^2 + 16x - 12 = 0$ has a double root at x = 2. Starting with the initial approximation $x_0 = 1$, find the root correct to 3 decimal places using Newton-Raphson method. **[06]**

b) State and explain bisection method with intervals 'a' and 'b' for transcendental equations. **[04]**

OR

a) A real root of the equation $f(x) = x^3 - 5x + 1 = 0$ lies in the interval (0, 1). Perform four iterations of the Secant method and Regula-Falsi method to obtain this root. **[06]**

b) State and explain Newton-Raphson method to solve transcendental equations. **[05]**

P.T.O.

Q.4 **a)** From the table, estimate the number of students who obtained scores between 40 and 45. **(06)**

Scores	30-40	40-50	50-60	60-70	70-80
No. of Students	28	42	57	28	36

b) Use Sterling's formula to evaluate y_{28} **(04)**
Given: $y_{20} = 49225$, $y_{25} = 48316$, $y_{30} = 47236$
$y_{35} = 45926$, $y_{40} = 44306$,

OR

a) Derive Newton's forward difference interpolation formula for equal intervals. **(06)**

b) If y (10) = 35.3, y (15) = 32.4, y (20) = 29.2, y(25) = 26.1. Find y (22) using Newton's backward interpolation method. **(04)**

Q.5 **a)** Derive the formula for Trapezoidal rule for numerical integration using Newton-Coles formula. **(06)**

b) Find first derivative of y i.e. $\frac{dy}{dx}$ at x = 0.5 using proper method. **(04)**

x	0	1	2	3	4
y	1	1	15	40	85

OR

a) Apply Simpson's $(1/3)^{rd}$ rule to find value of $\int_0^2 \frac{dx}{1+x}$ dividing the interval [0, 2] into 12 equal parts. **(06)**

b) Explain modified Euler's method for solution of ordinary differential equation. **(04)**

Q.6 **a)** Find A^{-1} using Gauss Jordan method. **(06)**

$$A = \begin{bmatrix} 1 & 3 & 3 \\ 1 & 4 & 3 \\ 1 & 3 & 4 \end{bmatrix}$$

b) Explain Gauss elimination method for solution of linear simultaneous equation. **(04)**

OR

a) Use Gauss elimination method to solve the following system of equation: **(06)**

$3x - y + 2z = 13$
$2x + 3y + 3z = 10$
$x + 2y + z = 3$

b) Explain Gauss Jacobi method to solve the system of non-linear equations. **(04)**

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