B. Tech. Sem –III (Electrical Engg.) 2014 COURSE) (CBCS) : WINTER - 2018

SUBJECT: DIGITAL COMPUTATIONAL TECHNIQUES

Day: Friday
Date: 30/11/2018

Time: 10.00 AM TO 01.00 PM
Max Marks. 60

W-2018-2299

N.B. :

1) All questions are **COMPULSORY**.
2) Figures to the right indicate **FULL** marks.
3) Draw neat diagrams **WHEREVER** necessary.
4) Use of scientific calculator is **ALLOWED**.

Q.1 **a)** What are the features of object oriented programming (OOPS)? Give any two applications. **(05)**

b) Explain the various operators in MATLAB with examples. **(05)**

OR

Q.1 **a)** Explain: Polymorphism and Encapsulation with example. **(05)**

b) What do you mean by commands and arrays in MATLAB? Explain with examples. **(05)**

Q.2 **a)** Explain the basic principle of numerical methods with block diagram. Also explain the necessity of computer for high speed calculations. **(06)**

b) Find the relative error, absolute error and percentage error if $\frac{2}{3}$ is approximated as 0.667. **(04)**

OR

Q.2 **a)** State and explain Rolle's Theorem with example. **(06)**

b) Explain floating point algebra and normalized floating point algebra with examples. **(04)**

Q.3 **a)** Fit a second degree parabola by taking x as the independent variable. **(06)**

x	0	1	2	3	4
y	1	5	10	22	38

b) Find the root of f (x) = 3x – cos x – 1, correct to four decimal places by using Newton Raphson method. Take initial approximation as 0.6. **(04)**

OR

Q.3 **a)** Explain Secant method to find root of transcendental equation along with suitable diagram. **(06)**

b) Using Regula – Falsi method, correct to three decimal places $\sqrt[3]{29}$. Solve up to 4 iterations. Take initial approximation as (3, 4). **(04)**

Q.4 **a)** Given : $y_{20} = 24$, $y_{24} = 32$, $y_{28} = 35$, $y_{32} = 40$. Find y_{25} using Bessel's interpolation formula. **(05)**

b) From the following table of half-yearly premium for policies maturing at different ages, estimate the premium for policy maturing at the age of 63. **(05)**

Age	45	50	55	60	65
Premium (Rs.)	114.84	96.16	83.32	74.48	68.48

OR

P.T.O

Q.4 **a)** Find the cubic polynomial which takes the following values: **(05)**

x	0	1	2	3
f(x)	1	2	1	10

b) Derive Lagrange's Interpolation formula for unequally spaced data. **(05)**

Q.5 **a)** Explain Euler's method to solve the first order ordinary differential equation. **(05)**

b) Find the value of $\int_1^5 \log_{10} x\,dx$ taking 8 sub-intervals correct to 4 decimal places by trapezoidal rule. **(05)**

OR

Q.5 **a)** Drive the formula of Simpson's $\left(\frac{3}{8}\right)^{th}$ rule using Newton's formula for numerical integration. **(06)**

b) Use Runge - Kutta method of 4th order to approximate y when x = 0.1. Given that y (0) = 1 $\frac{dy}{dx} = 3x + y^2$ **(04)**

Q.6 **a)** Explain Gauss Jacobi method for solution of simultaneous algebraic equation. **(05)**

b) Find the inverse of following matrix using Gauss Jordan elimination method **(05)**

$$\begin{bmatrix} 1 & 2 & -1 \\ 3 & 8 & 2 \\ 4 & 9 & -1 \end{bmatrix}$$

Q.6 **a)** Find the values of x, y & z using Gauss. Seidel iteration method up to 6 iterations for following linear equations: **(06)**

$$4x + y + z = 5$$
$$x + 6y + 2z = 19$$
$$-x - 2y - 5z = 10$$

b) Use Gauss elimination method to solve the following equations. **(04)**

$$x + 4y + 9z = 16$$
$$2x + y + z = 10$$
$$3x + 2y + 3z = 18$$

* * * *