B. Tech. Sem –III (Electrical Engg.) 2014 COURSE) (CBCS) :
SUMMER - 2019
SUBJECT: DIGITAL COMPUTATIONAL TECHNIQUES

Day: Tuesday
Date: 14/05/2019

S-2019-2564

Time: 02.30 PM TO 05.30 PM
Max Marks. 60

N.B. :

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

Q.1 **a)** State and explain operators in C++ along with one example each. **(06)**

b) Write a short note on control statements in C++. **(04)**

OR

Q.1 **a)** What are the loops in C++? Why it is required while writing any program? Explain types of loops with examples for each. **(06)**

b) What are arrays in MATLAB? Explain with examples. **(04)**

Q.2 **a)** State and explain Intermediate value theorem with its graphical representation. Write an example which satisfies Intermediate value theorem. **(06)**

b) Solve the following: **(04)**
Multiply the floating numbers: 47.31834×10^{15} & 3.1942×10^{12}
Add the following numbers: 0.4731923×10^{7} & 0.783329×10^{7}

OR

Q.2 **a)** Explain Rolle's Theorem in detail. **(06)**

b) Discuss briefly the different types of errors encountered in performing numerical calculations. **(04)**

Q.3 **a)** Using 3 iterations of bisection method, determine roots of the equation: **(06)**
$f(x)=-0.9x^2+1.7x+2.5$. take initial values : $x_1=2.8$ & $x_2=3$

b) Find straight line to following data and estimate the value of y corresponding to x=6 **(04)**

x	0	5	10	15	20	25
y	12	15	17	22	24	30

OR

Q.3 **a)** Find the root of sin x = x-2 by Regula - Falsi method, where x is in radians. Perform 5 iterations only. Take initial approximation as (2, 3) **(06)**

b) Find the root of $f(x)=3x+\sin x-e^x$, correct to four decimal places using Newton Raphson method. Take initial approximations as 0. **(04)**

Q.4 **a)** The temperature viscosity relationship is given for hydrodynamic bearing is as follows: **(06)**

t^0C	40	41	42	43	44	45
Z(CP)	52.5	50	47.5	45	43	41

Calculate the temperature of lubricant for viscosity of (43.2) using Newton's backward difference method.

b) Given that: $y(5)=4$, $y(6)=3$, $y(7)=4$, $y(8)=10$, $y(7)=4$. find $\Delta^4 y(5)$ **(04)**

x	5	6	7	8
y	4	3	4	10

P.T.O.

OR

Q.4 a) Find f(x) at x=7 from following table by using Sterling Interpolation formula. **(05)**

x	2	4	6	8	10
y=f (x)	5	49	181	449	901

b) Find the value of y at x = 1.5 by using Lagrange's Interpolation method **(05)**

x	0	1	2	5
y=f (x)	2	3	12	147

Q.5 a) Find the value of $\frac{dy}{dx}$ for x = 0.2 from following table: **(05)**

x	0.1	0.2	0.3	0.4	0.5	0.6
y = log x	- 2.30	- 1.6	- 1.2	- 0.91	- 0.69	- 0.51

b) Evaluate $\int_0^{\pi} x.\sin x \, dx$ using Trapezoidal rule for 13 ordinates. **(05)**

OR

Q.5 a) Solve $\frac{dy}{dx} = x^2 + y^2$. Given that y (0) = 1, find y at x = 0.1 and x = 0.2 using Taylor series method. **(06)**

b) State and explain Euler's Method for solution of ordinary differential equation. **(04)**

Q.6 a) Solve the following equations by Gauss-Seidel Iterative method correct to three significant digits **(05)**

$$x_1 + 10x_2 - 4x_3 = 6$$
$$2x_1 - 4x_2 + 10x_3 = -15$$
$$9x_1 + 2x_2 + 4x_3 = 20$$

b) Solve the following equations by Gauss elimination method **(05)**

$$x_1 + 20x_2 + x_3 = 22$$
$$-x_1 - x_2 + 20x_3 = 18$$
$$20x_1 + x_2 - x_3 = 20$$

Q.6 a) Find the inverse of following matrix using Gauss Jordan elimination method **(06)**

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

b) Find the numerically larger Eigen value of the matrix by Power method **(04)**

$$A = \begin{bmatrix} 5 & 4 \\ 1 & 2 \end{bmatrix}$$

Take initial value as

$$X_0 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

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