

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? (06)
Explain types of loops with examples for each.
b) What are arrays in MATLAB? Explain with examples. (04)

- Q.2 a) State and explain Intermediate value theorem with its graphical (06)
representation. Write an example which satisfies Intermediate value theorem.
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 (04)
numerical calculations.

- 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 (04)
to $x=6$

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. (06)
Perform 5 iterations only. Take initial approximation as (2, 3)
b) Find the root of $f(x) = 3x + \sin x - e^x$, correct to four decimal places using (04)
Newton Raphson method. Take initial approximations as 0.

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

$t^{\circ}C$	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

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 $\int_0^{\pi} x \cdot \sin x \, dx$ 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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