



Date: 21-04-2016

Dept. No.

Max. : 100 Marks

Time: 09:00-12:00

PART – A

Answer ALL questions:

(10 x 2 = 20 marks)

1. What is the condition for convergence of solving $AX = b$ by indirect methods?
2. Explain Cramer's rule.
3. Which method is called method of chords?
4. Write the Newton-Raphson formula for \sqrt{N} , where N is a positive integer.
5. Define interpolation.
6. Write the relation between divided differences and forward differences.
7. Write the range values of p so that the Stirling's formula gives good estimate.
8. Write the Laplace-Everett's formula.
9. Write Simpson's $\frac{3}{8}$ rule for numerical integration.
10. Write the formula for Range-kutta method of second order.

PART – B

Answer any FIVE questions:

(5 x 8 = 40 marks)

11. Solve the following system of equations by Gauss elimination method

$$10x + y + z = 12, 2x + 10y + z = 13, 2x + 2y + 10z = 14.$$

12. Derive the condition for convergence of Newton Raphson method.

13. Find the approximate value of the real root of $x \log_{10} x = 1.2$ by regula-falsi method.

14. Write a C program to interpolate Newton's forward interpolation formula.

15. Find a cubic polynomial which takes the following set of values (0,1), (1, 2), (2, 1) and (3, 10).

16. Using Everett's formula find $f(1.15)$ given that $f(1) = 1$, $f(1.10) = 1.049$,

$$f(1.20) = 1.096, f(1.30) = 1.140.$$

17. Find the value of $\log 2^{\frac{1}{3}}$ from $\int_0^1 \frac{x^2 dx}{1+x^3}$ using Simpson's $\frac{1}{3}$ rule with $\lambda = 0.25$.

18. Given $y' + y - x^2 = 0$, $y(0) = 1$, $y(0.1) = 0.9052$, $y(0.2) = 0.8213$ find correct to four decimal places $y(0.3)$ using modified Euler's method.

PART – C

Answer any **TWO** questions:

(2 x 20 = 40 marks)

19. a) Using Gauss-Seidel iterative method, solve the system of equations.

$$10x - 2y - z - w = 3, \quad -x - y + 10z - 2w = 27, \quad -2x + 10y - z - w = 15, \quad -x - y - 2z + 10w = -9.$$

b) Solve $\sin x = 1 + x^3$ using Newon-Raphson method, perform upto four iterations. (12+8)

20. a) Find a polynomial satisfied by the following table:

x:	-4	-1	0	2	5
F(x):	1245	33	5	9	1335

b) Using Gauss's backward formula find $\sin 45^\circ$ from the following:

$$\sin (20^\circ) = 0.34202, \quad \sin (30^\circ) = 0.502, \quad \sin (40^\circ) = 0.64279, \quad \sin (50^\circ) = 0.76604, \\ \sin (60^\circ) = 0.86603, \quad \sin (70^\circ) = 0.93969. \quad (12+8)$$

21. a) The population of a certain town is shown in the following table.

Year:	1951	1961	1971	1981	1991
Population: (in thousands)	19.96	36.65	58.81	77.21	94.61

Find the rate of growth of the population in the year 1981.

b) Write a C program to find the value of $\int_a^b f(x)dx$ using simpson's $\frac{1}{3}$ rule. (12+8)

22. Using Range-kutta method of fourth order, solve for y at

$$x=1.2, 1.4 \text{ from } (x^2 + xe^x)y' - e^x = 2xy \text{ with } x_0 = 1, y_0 = 0.$$

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