Reg. No. : ....

Name : ....

IV Semester B.C.A. Degree (CBCSS – Reg./Supp./Imp.) Examination, April 2019
(2014 Admission Onwards)
General Course
4A14 BCA : NUMERICAL ANALYSIS

Time : 3 Hours

Max. Marks : 40

SECTION – A

1. **One** word answer. (8×.5=4)

   a) A matrix A is said to be invertible if and only if A is _____

   b) The errors introduced during the implementation of a numerical method are known as _____

   c) Decimal form of 2056_8 is _____

   d) The complement graph of a complete graph is _____

   e) A path in a graph G is called _____ path if it includes every edges exactly once.

   f) The omission of certain digits from a number results in _____ error.

   g) The method of obtaining the derivative of a function using a numerical technique is known as _____

   h) Give an example of a linear function.

SECTION – B

Write short notes on **any seven** of the following questions. (7×2=14)

2. Convert the hexadecimal number 12 AF to a decimal number.

3. Given the equation $\frac{dy}{dx} = 3x^2 + 1$, $y(1) = 2$, estimate y(2) by Euler's method using h = 0.5.

4. Use the trapezoidal rule with n = 4 to estimate $\int_{1}^{2} \frac{1}{x} dx$.

5. Solve x − 2y = 3; 3x − 2y = 1 by Guass elimination method.

6. Define Graph and subgraph.

7. Define planar Graphs.

8. Estimate approximate derivative of $f(x) = x^3$ at x = 1, for h = 0.1 and h = 0.01.

9. Is the matrix $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 4 \\ 3 & 5 & 7 \end{bmatrix}$ invertible. Justify your answer.

10. Obtain an upper bound of error occured in calculating $\int_{1}^{2} (x^3 + 1) dx$ by using trapezoidal rule.

11. Give examples for Algebraic, Polynomial and Transcendental equations.

SECTION – C

Answer **any four** of the following questions.   (4×3=12)

12. Use Taylor method to solve the equation $y' = x^2 + y^2$, y(0) = 1 for x = 0.25 and x = 0.5.

13. Explain the terms unique solution, no solution, non unique solution, Ill-conditioned system of the system AX = B, with examples.

14. Write an algorithm for the solution of non-linear equations by Bisection method.

15. Use simpson's rule with n = 4 to approximate $\int_{0}^{1} 5x^4 dx$.

16. Obtain the solution of the following system using the Jacobi iteration method.

$2x + y + z = 5$, $3x + 5y + 2z = 15$, $2x + y + 4z = 8$.

17. The following table gives the values of distances travelled by a car at various time intervals.

t in seconds	5	6	7	8	9
s(t)	10	14.5	19.5	25.5	32

Estimate velocity and acceleration at t = 7.

SECTION – D

Write an essay on **any two** of the following questions.   (2×5=10)

18. Using Runge-Kutta method to solve the equation $y' = 2xy + 1$, $y(0) = 0$, $h = 0.02$, for $x = 0.1$.

19. Derive Newton – Raphson formula using Taylor series expansion.

20. Compute the integral $I = \int_{-2}^{2} e^{-x/2}\, dx$ using Gaussian two-point formula.

21. Find the Lagrange interpolation polynomial to fit the following data.

i	0	1	2	3
xi	0	1	2	3
$e^{xi} - 1$	0	1.7183	6.3891	19.0855

Use the polynomial to estimate the value of $e^{1.5}$.