CB – 476

II Semester B.C.A. Examination, August/September 2023
(CBCS) (Repeaters) (2014 – 15 and Onwards)
COMPUTER APPLICATIONS
BCA 205 : Numerical and Statistical Methods

Time : 3 Hours Max. Marks : 100

Instruction : *Answer **all** the Sections.*

SECTION – A

I. Answer **any ten** of the following : **(10×2=20)**

1) Define Roundoff Error.
2) Write the formula for secant method.
3) Write the Langrange's interpolation method.
4) Write the formula for Newton's Raphson method.
5) Construct a forward difference table for the following data :

X	0	1	2	3	4
Y	8	11	9	15	6

6) Write the Simpson's $\left(\frac{1}{3}\right)^{rd}$ formula.
7) Write the Newton's Backward interpolation method.
8) Explain Gauss-elimination method for system of linear equation.
9) Find the geometric mean of the following series 16, 625, 256, 81.
10) Find the median of the following data 10, 15, 9, 25, 19.
11) Write the alternate formula for Karl Pearson's coefficient of correlation.
12) Define conditional probability.

SECTION – B

II. Answer **any six** of the following : **(6×5=30)**

13) Find the root of the equation $x^3 - 7x + 5 = 0$ by using bisection method in 6 stages.

P.T.O.

14) Estimate f(7.5) from the table :

x	1	2	3	4	5	6	7	8
f(x)	1	8	27	64	125	216	343	512

15) Using Langrange's formula find f(10) from the following data :

x	5	6	9	11
f(x)	12	13	14	16

16) Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by Trapezoidal rule.

17) Evaluate $\int_0^6 \frac{dx}{1+x}$ by Simpson's $\left(\frac{3}{8}\right)^{th}$ rule.

18) Solve by Gauss-Jacobi method $x + 2y + z = 3$, $2x + 3y + 3z$, $3x - y + 2z = 13$.

19) Solve the system of equation by Crout's LU decomposition method.

$x_1 + x_2 + x_3 = 1$, $4x_1 + 3x_2 - x_3 = 6$, $3x_1 + 5x_2 + 3x_3 = 4$.

20) Determine the machine representation of the decimal number 492.234375 in both single precision and double precision.

SECTION – C

III. Answer **any six** of the following : **(6×5=30)**

21) Solve the system of equation by Gauss elimination method.

$x + y + z = 9$, $2x + y - z = 0$, $2x + 5y + 7z = 52$

22) Solve by Gauss-Seidal method $10x + y + z = 12$, $x + 10y + z = 12$, $x + y + 10z = 12$.

23) Find the largest eigen value of the matrix $A = \begin{bmatrix} 5 & 4 \\ 1 & 2 \end{bmatrix}$.

24) Solve $\frac{dy}{dx} = x^2 + y^2, y(0) = 1$ by Picard's method.

25) Using Taylor's series find the solution of $x\frac{dy}{dx} = x - y, y(2) = 2$ at $x = 2.1$ correct to five decimal places.

26) Solve $\frac{dy}{dx} = x + y$ with initial condition y = 1 when x = 0 when x = 0.2 using Runge Kutta method.

27) Find the mean from the following method by shortcut method.

Marks	30	40	50	60	70	80
No. of Students	8	12	20	10	6	4

28) Compute Harmonic mean of the following series :

x	6	7	8	9	10	11
f	4	6	9	5	2	8

SECTION – D

IV. Answer **any four** of the following : **(4×5=20)**

29) Compute the standard deviation of the following data :

X	43	48	65	57	31	60	37	48	78	54

30) Calculate Karl Pearson's coefficient of correlation between the age and weight of the children.

Age	1	2	3	4	5
Weight (kg)	3	4	6	7	12

31) Calculate the rank correlation of the following :

x	4	2	7	5	3	1	8	6
y	8	3	6	5	1	2	7	4

32) State and prove Baye's theorem.

33) Find the probability that in a family of 4 children there will be

i) Atleast one boy

ii) Atleast one boy and atleast one girl.

34) A die is thrown twice and the sum of the number appearing is observed to be 6. What is the conditional probability that the number 4 has appeared at least once ?