65223

Second Semester B.C.A. Degree Examination, September/October 2022
(CBCS – 2014-15 Onwards-Repeaters)
MATHEMATICS
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) Add 0.4546E5 and 0.5433E5.

2) Define relative and absolute error.

3) Write the formula for Secant method to find the real root of the equation $f(x) = 0$.

4) State Newton backward Interpolation formula.

5) Construct the difference table for the following data.

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

6) Write Simpson's 1/3rd rule formula.

7) Explain Gauss-Jacobi method for solving system of Linear Equations.

8) Define mode and median.

9) Write the formula to find standard deviation by actual mean method.

10) Calculate mean for the following data :
40, 50, 55, 78, 58, 60, 73, 35, 43, 48.

11) Define positive and negative correlation.

12) If $P(B) = \frac{3}{8}$; $P(A \cap B) = \frac{1}{4}$, then find $P(A \mid B)$.

P.T.O.

SECTION – B

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

13) Find a real root of the equation $x^3 - 5x + 1 = 0$ using bisection method in 5 stages.

14) Find f(1.4) from the following data.

x	1	2	3	4	5
f(x)	10	26	58	112	194

15) Estimate f(6) using Lagrange Interpolation formula.

x	3	7	9	10
f(x)	168	120	72	63

16) Evaluate $\int_0^6 \frac{dx}{1+x^2}$ using Simpson's 3/8[th] rule by dividing into 6 sub intervals with h = 1.

17) Find the value of $\int_0^1 \frac{x}{1+x}dx$ upto three decimal places taking six intervals using Trapezoidal rule.

18) Solve the system of Equations by Gauss Elimination method.
$x + y + z = 9$; $x - 2y + 3z = 8$; $2x + y - z = 3$.

19) Solve the system of Linear Equations using 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 52.234375 in both single precision and double precision.

SECTION – C

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

21) Solve using Gauss-Seidal method
$10x + y + z = 12$; $x + 10y + z = 12$; $x + y + 10z = 12$.

22) Solve using Gauss – Jacobi method
$5x + 2y + z = 12; x + 4y + 2z = 15; x + 2y + 5z = 0.$

23) Using Power method, find the largest eigen value and the corresponding eigen vector of the matrix
$A = \begin{bmatrix} 5 & 4 \\ 1 & 2 \end{bmatrix}$.

24) Find y(0.2) correct to four decimal places using Taylor's series method if y(x) satisfies equation
$\frac{dy}{dx} = x^2 + y^2; y(0) = 1.$

25) Solve $\frac{dy}{dx} = xy; y(1) = 2$, using Runge-Kutta 4[th] order method and hence find the approximate solution at y(1.2) with h = 0.2.

26) Using Picard's method, solve
$\frac{dy}{dx} = y - x^2$, $y(0) = 1$ upto 3[rd] approximation and find y(0.1).

27) Calculate Harmonic mean from the following data.

Marks	30 – 40	40 – 50	50 – 60	60 – 70	70 – 80	80 – 90	90 – 100
Frequency	15	13	8	6	15	7	6

28) State and prove Baye's Theorem.

SECTION – D

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

29) Find the median for the following distribution.

Marks	5 – 10	10 – 15	15 – 20	20 – 25	25 – 30	30 – 35	35 – 40	40 – 45	45 – 50
No. of Students	7	15	24	31	42	30	26	15	10

30) Find the coefficient of variation for the following data.

x	32	28	47	63	71	39	10	60	96	14

31) Compute the rank correlation coefficient for the data.

x	78	36	98	25	75	82	90	62	65	39
y	84	51	91	60	68	62	86	58	53	47

32) A bag contains 30 balls numbered 1 to 30. One ball is drawn at random. Find the probability that the number of the ball drawn will be a multiple of :

i) 5 (or) 7

ii) 3 (or) 7.

33) If A and B are two events then prove that

$$P(A\,|\,\bar{B}) = \frac{P(A) - P(A \cap B)}{1 - P(B)}, \text{ where } P(B) \neq 1.$$

34) Obtain the function of the normal probability curve to the following data.

x_i :	5	6	7	8	9	10	11
f_i :	2	5	8	12	7	4	3
