Q.P. Code : 15223

Second Semester B.C.A. Degree Examination, May/June 2019

(CBCS – Freshers & Repeaters – 2014-15 onwards)

Computer Applications

Paper 205 — NUMERICAL AND STATISTICAL METHODS

Time : 3 Hours] *[Max. Marks : 100*

Instructions to Candidates : Answers all Sections.

SECTION – A

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

1. Define relative error and absolute error.

2. Write the formula for Newton-Raphson method.

3. Write the 'Lagrange's interpolation formula'.

4. Write the formula for secant method.

5. Construct the difference table for the following data :

X:	0	1	2	3	4	5	6	7
$f(X)$:	1	2	4	7	11	16	22	29

6. Write the Simpson's $\left(\frac{1}{3}\right)^{rd}$ rule formula.

7. Explain Gauss-Jacobi method for solving system of linear equations.

8. Find the Harmonic Mean (HM) of the following series :
   5, 10, 15, 20, 25

9. Define correlation.

10. Write the formula for Spearman's rank correlation coefficient.

11. Find the coefficient of variation given that mean is 1.2 and S.D. is 1.378.

12. Define Conditional probability.

SECTION – B

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

13. Find the root of the equation $x^3 - 4x - 9 = 0$ lies between 2 and 3 by using Bisection method in 4 stages.

14. Find $f(1.4)$ from the following table :

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

15. Estimate $f(6)$ using Lagrange's interpolation formula from the following data :

X :	3	7	9	10
$f(X)$:	168	120	72	63

16. Evaluate : $\int_0^1 \frac{dx}{1+x}$ using Simpson's $\left(\frac{3}{8}\right)^{\text{th}}$ rule.

17. Find the value of $\int_1^5 \log_{10}^x \, dx$ taking 8 sub intervals correct to four decimal places by Trapezoidal rule.

18. Solve by Gauss Elimination method.

$$\begin{aligned} x + y + z &= 9 \\ 2x - 3y + 4z &= 13 \\ 3x + 4y + 5z &= 40 \end{aligned}$$

19. Solve using Crout's LV decomposition method.

$$\begin{aligned} x_1 + x_2 + x_3 &= 1 \\ 4x_1 + 3x_2 - x_3 &= 6 \\ 3x_1 + 5x_2 + 3x_3 &= 4 \end{aligned}$$

20. Solve the system of linear equation by Cholesky method.

$$\begin{aligned} X_1 + 2X_2 + 3X_3 &= 5 \\ 2X_1 + 8X_2 + 22X_3 &= 6 \\ 3X_1 + 22X_2 + 82X_3 &= -10 \end{aligned}$$

SECTION – C

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

21. Solve the Gauss-Jacobi method

$10X + 2Y + Z = 9$, $X + 10Y - Z = -22$, $2X - 3Y - 10Z = -22$.

22. Solve by Gauss-Seidel iterative method

$x + y + 54z = 110$, $27x + 6y - z = 85$, $6x + 15y + 2z = 72$.

23. Find the largest eigen value and the corresponding eigen vector of the matrix by using power method $A = \begin{bmatrix} 5 & 4 \\ 1 & 2 \end{bmatrix}$.

24. Solve $\frac{dy}{dx} = x + y^2$, $y(0) = 1$ by using Picard's method upto the second approximation hence find the value of $y(0,1)$.

25. Using Taylor's series method to find y at $X = 1.1$ and 1.2 considering terms upto third degree given that $\frac{dY}{dX} = X + Y$, $y(1) = 0$.

26. Using Runge-Kutta method of IV order, solve $\frac{dy}{dx} = xy$ with $y(1) = 2$, find the approximate solution at $x_1 = 1.2$.

27. Find the Geometric mean from the following data :

CI :	4–8	8–12	12–16	16–20	20–24	24–28	28–32	32–36	36–40
f:	6	10	18	30	15	12	10	6	2

28. If A and B are events with $P(A) = \frac{5}{8}$, $P(B) = \frac{3}{8}$ and $P(A \cup B)\frac{3}{4}$ find $P(A/B)$ and $P(B/A)$.

SECTION – D

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

29. Find mean and standard deviation from the following data :

X:	45	50	55	60	65	70	75	80
f:	3	5	8	7	9	7	4	7

30. Find the coefficient of correlation for the following data :

X:	10	14	18	22	26	30
f:	18	12	24	6	30	36

31. Compute the rank correlation coefficient for the following data :

X:	78	36	98	25	75	82	90	62	65	39
Y:	84	51	91	60	68	62	86	58	53	47

32. Two cards are drawn from well-shuffled pack of 52 cards. Find the probability that they are both aces if the first card is (a) replaced (b) not replaced.

33. Show that the following distribution represents a discrete probability distribution. Find mean and variance.

X:	10	20	30	40
$f(X)$:	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{1}{8}$

34. Find the probability that in a family of 4 children there will be

    (a) Atleast one boy

    (b) Atleast one boy and atleast one girl

    Assume that the probability of male birth is $\frac{1}{2}$.
