

**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  $\left(\frac{1}{3}\right)^{\text{rd}}$  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.

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**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  $\left(\frac{3}{8}\right)$ 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

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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  $\frac{1}{2}$ .

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