



**II Semester B.C.A. Degree Examination, May 2016
(CBCS) (2014 – 15 and Onwards) (F+R)**

COMPUTER SCIENCE

BCA – 205 : Numerical and Statistical Methods

Time : 3 Hours

Max. Marks : 100

Instruction : Answer all Sections.

SECTION – A

I. Answer **any ten** of the following :

(10×2=20)

- 1) Multiply $+.5543E12 \times .4111E-15$.
- 2) Define relative error and absolute error.
- 3) Write the formula for Secant method.
- 4) Write the Lagrange interpolation formula.
- 5) Construct the forward difference table for the following data :

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

- 6) Write the Newton's Backward interpolation formula.
- 7) Write the Simpson's $\frac{3^{\text{th}}}{8}$ rule formula.
- 8) Explain Gauss-Elimination method for solving system of linear equations.
- 9) Find the Harmonic Mean (HM) of the following series : 5, 10, 15, 20, 25.
- 10) Define correlation.
- 11) Write the alternate formula for Karl Pearson's coefficient of correlation.
- 12) Define the conditional probability.

P.T.O.



SECTION - B

II. Answer **any six** of the following :

(6×5=30)

13) Find a root of the equation $x^3 - 2x - 5 = 0$ lies between 2 and 3 by using Bisection method in five stages.

14) Estimate $f(7.5)$ from the following table :

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

15) Using Lagrange's interpolation formula find $f(10)$ from the following data :

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

16) Find the approximate value of $\int_0^{\pi/2} \sqrt{\cos\theta} d\theta$ by Simpson's $\frac{1}{3}$ rd rule by dividing $\left[0, \frac{\pi}{2}\right]$ into 6 equal parts.

17) Evaluate $\int_0^3 \frac{dx}{(1+x)^2}$ by Simpson's $\frac{3}{8}$ th rule by taking $h = 1$.

18) Solve following system of linear equations using Crout's LU decomposition method. $2x + 3y + z = -1$, $5x + y + z = 9$, $3x + 2y + 4z = 11$.

19) Solve the system of linear equations by Cholesky method.

$$x_1 + 2x_2 + 3x_3 = 5, \quad 2x_1 + 8x_2 + 22x_3 = 6, \quad 3x_1 + 22x_2 + 82x_3 = -10.$$

20) Determine the single-precision 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 the Gauss-Jacobi method. $10x + 2y + z = 9$, $x + 10y - z = -22$,
 $2x - 3y - 10z = -22$.

22) Solve by Gauss-Seidel iterative method.

$$10x + y + z = 12, x + 10y + z = 12, x + y + 10z = 12$$

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 $\frac{dy}{dx} = y - x^2$, $y(0) = 1$ by Picard's method upto the third 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 $\frac{dy}{dx} = 3x + \frac{y}{2}$ with $y(0) = 1$,

find $y(0.2)$ by taking $h = 0.2$.

27) From the following data calculate Arithmetic Mean (AM) by step deviation method.

Marks	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60
Number of students	10	5	30	25	10	20

28) It 'A' and 'B' are two events such that $P(A) = \frac{1}{4}$, $P(B) = \frac{1}{2}$ and $P(A \cap B) = \frac{1}{8}$,

Find

i) $P(A \text{ or } B)$

ii) $P(\text{not } A \text{ and not } B)$.



SECTION - D

IV. Answer **any four** of the following :

(4×5=20)

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

Marks	10	20	30	40	50	60
Frequency	8	12	20	10	7	3

30) Calculate Karl - Pearson's co-efficient of skewness for the following data :
25, 15, 23, 40, 27, 25, 23, 25, 20.

31) If 'A' and 'B' are two events, prove that $P(A/\bar{B}) = \frac{P(A) - P(A \cap B)}{1 - P(B)}$ where $P(B) \neq 1$.

32) A man is known to speak truth 3 out of 4 times. He throws a die and reports that it is a six. Find the probability that it is actually a six.

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

x_i	10	20	30	40
$P(x_i)$	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{1}{8}$

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

- Atleast one boy.
- Atleast one boy and atleast one girl.

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