II

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×.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 $\frac{3}{8}^{th}$ 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.

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 $1/3^{rd}$ rule by dividing $\left[0, \pi/2\right]$ 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.

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

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 $P(A) = 1/4$, $P(B) = \frac{1}{2}$ and $P(A \cap B) = \frac{1}{8}$, Find

i) P(A or B)

ii) P (not A 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 $P(A/\bar{B}) = \dfrac{P(A)-P(A \cap B)}{1-P(B)}$ 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.

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

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

i) Atleast one boy.

ii) Atleast one boy and atleast one girl.

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