II Semester B.C.A. Examination, May 2017
(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) Subtract 0.9432 E – 4 from 0.5452E – 3.

2) Define Round off error.

3) Write the formula for Newton-Raphson method.

4) Write the 'Lagrange's interpolation formula'.

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 $\left(3/8\right)^{th}$ rule formula.

7) Define power method.

8) Write the formula to calculate the standard deviation by actual mean method.

9) Find the median of the following data.

x	10	15	9	25	19

10) Write the alternative formula to calculate Karl Pearson's coefficient of correlation.

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

12) If $P(B) = \frac{1}{5}$ and $P(A \cap B) = \frac{1}{4}$ then find $P(A|B)$.

P.T.O.

SECTION – B

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

13) Find a real root of the equation $x^3 - 2x - 5 = 0$ lies in the interval (2, 3) using bisection method in five stages.

14) Use Newton-Backward interpolation formula find f(84) from the following data.

x	40	50	60	70	80	90
f(x)	184	204	226	250	276	304

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 $\int_0^6 \frac{dx}{1+x^2}$, using Trapezoidal rule. Divide (0, 6) into six parts.

17) Evaluate $\int_0^1 e^x \, dx$, using Simpson's $\left(\frac{1}{3}\right)^{rd}$ rule. Divide (0, 1) into five equal parts.

18) Solve by Gauss-Seidal method

$10x + 2y + z = 9, x + 10y - z = -22, -2x + 3y + 10z = 22.$

19) Solve using Crout's LU decomposition method.

$2x_1 + 3x_2 + x_3 = -1$

$5x_1 + x_2 + x_3 = 9$

$3x_1 + 2x_2 + 4x_3 = 11$

20) Determine the machine representation of the decimal number 492.234375 in both single precision and double precision.

SECTION – C

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

21) Solve by Gauss-Jacobi's method

$10x + 2y + z = 9, x + 10y - z = -22, -2x + 3y + 10z = 22$ (only five approximations).

22) Use power method to find the largest eigen value and corresponding eigen vector of the matrix $A = \begin{bmatrix} 4 & 2 \\ 1 & 3 \end{bmatrix}$.

23) Solve by Gauss elimination method
$x + y + z = 3,\ 2x + 3y + 3z = 10,\ 3x - y + 2z = 13.$

24) Solve by Taylor's series method the value of $x = 0.2$ correct to four decimal places. If $y(x)$ satisfies $\frac{dy}{dx} = x - y^2$ and $y(0) = 1$ (upto third degree).

25) Use Picard's method, solve $\frac{dy}{dx} = x^2 + y^2,\ y(0) = 1$ upto the second approximation. Hence find the value of $y(1)$.

26) Using Runge-Kutta method of IV-order, solve $\frac{dy}{dx} = x + y^2$; $y(0) = 1$ for $x = 0.2$.

27) Find geometric mean from the following data.

C.I.	20-30	30-40	40-50	50-60	60-70
f	5	13	7	11	4

28) If A and B are two events such that $P(A) = \frac{1}{3}$, $P(B) = \frac{1}{9}$ and $P(A \cup B) = \frac{1}{27}$ find $P(A|B)$, P(not A) and P(not A OR not B).

SECTION – D

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

29) Find median for the following data.

C.I.	0-10	10-20	20-30	30-40	40-50	50-60	60-70
f	7	18	34	50	35	20	6

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

x	10	14	18	22	26	30
y	18	12	24	6	30	36

31) Calculate the rank correlation from the following data :

x	42	68	92	48	81	52	39	78	22	11
y	32	52	82	62	72	94	22	92	12	14

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

33) State and prove Bayes theorem.

34) Obtain the function of the normal probability curve that may be fitted to the following data.

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

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