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II Semester B.C.A. Examination, September/October 2021 (CBCS) (2014 – 15 and Onwards) (F+R) COMPUTER SCIENCE BCA 205 : Numerical and Statistical Methods

Time : 3 Hours

Instruction : Answer all Sections.



Max. Marks : 100

 $(10 \times 2 = 20)$

SECTION – A

- I. Answer any ten of the following.
 - 1) Find the sum of 0.245×10^3 and 0.456×10^2 and write the result in three digit mantissa form.
 - 2) Define relative and absolute error.
 - 3) Write the formula for Secant method.
 - 4) Construct the forward difference table for the following data :

Х	0	1	2	3	4
Υ	8	11	9	15	6

- 5) Write the Lagrange Interpolation formula.
- 6) Explain Gauss-Seidal method for solving the system of linear equations.
- 7) Write Simpson's $(3/8)^{\text{th}}$ rule formula.
- 8) Find the positive root of the equation $x^3 3x 5 = 0$ between the interval [2, 2.5] by Bisection method (solve upto one approximation).
- 9) Find the median of the following :

X: 15 10 5 19 17 2 25

- 10) A target is hit by 2 men M_1 and M_2 independently. The probability that M_1 hits the target is $\frac{3}{4}$ and that of M_2 is $\frac{1}{2}$. What is the probability that both can hit the target.
- 11) If E(X) = 5 and $E(X^2) = 74$, Find the SD of X.
- 12) Write the formula to calculate Karl Pearson's coefficient of correlation.

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SECTION - B

- II. Answer any six of the following.
 - 13) Determine the single-precision machine representation of the decimal number 52.234375.
 - 14) Find a real root of the equation $x^3 7x + 5 = 0$ by Bisection method upto 6 stages.
 - 15) Find a polynomial of degree two, which takes the values.

Х	0	1	2	3	4	5	6	7
Y	1	2	4	7	11	16	22	29

Also find f(9).

16) Using Lagrange's formula find f(10) from the following data :

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

17) Calculate $\int_{0}^{1} \frac{dx}{(1+x)}$ using Trapezoidal rule by dividing into 6 equal parts.

- 18) Evaluate $\int_{0}^{6} \frac{dx}{1+x^{2}}$ using Simpson's $\left(\frac{1}{3}\right)^{rd}$ rule.
- 19) Solve the system of equations by Gauss-Jacobi iterative method : 10x + y + z = 12; 2x + 10y + z = 13; 2x + 2y + 10z = 14.
- 20) Solve the system of equations by Doolittle's method 5x 2y + z = 4; 7x + y 5z = 8; 3x + 7y + 4z = 10.

SECTION - C

- III. Answer any six of the following :
 - 21) Use Gauss-elimination method to solve the system of equations : x + y + z = 9; 2x + y z = 0; 2x + 5y + 7z = 52.
 - 22) Solve the system of equations by Gauss-Seidal method :
 5x + 2y + z = 12; x + 4y + 5z = 15; x + 2y + 5z = 20. Calculate upto 3 iterations by taking initial approximation as (1, 0, 3).
 - 23) Find the largest Eigen value and the corresponding Eigen vector of the matrix by using power method $A = \begin{bmatrix} 5 & 4 \\ 1 & 2 \end{bmatrix}$.

(6×5=30)

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24) Using Picard's method, solve $\frac{dy}{dx} = -xy$ with $x_0 = 0$, $y_0 = 1$ upto third approximation.

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- 25) Find by Taylor's series method the value of y at x = 0.1 and x = 0.2 to five places of decimals from $\frac{dy}{dx} = x^2y 1$, y(0) = 1.
- 26) Solve by Runge-Kutta method for y = 1 when x = 0 for x = 0.2 given $\frac{dy}{dx} = x + y^2$.
- 27) Calculate the mean by step-deviation method

Class	1 – 10	11 – 20	21 – 30	31 – 40	41 – 50	51 – 60
Frequency	3	16	26	31	16	8

28) Compute the Standard Deviation (SD) for the following data:

C.I	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 - 60	60 - 70
f	1	4	17	45	26 📿	5	2

SECTION - D

IV. Answer any four of the following.

(4×5=20)

29) Find Karl Pearson's Co-efficient of skewness for the following data :

Year (x)	10	20	30	40	50	60
No. of Kids (f)	15	32	51	28	17	109

30) Find the rank correlation coefficient for a group of students between their internal and external marks.

Internal	110	100	140	120	80	90
External	70	60	80	90	10	20

31) State and prove Baye's theorem.

- 32) If A and B are independent events, show that \overline{A} and \overline{B} are also independent.
- 33) If A and B are events with $P(A) = \frac{1}{2}$, $P(A \cup B) = \frac{3}{4}$ and $P(\overline{B}) = \frac{5}{8}$ find the following : a) $P(A \cap B)$ b) $P(\overline{A} \cap \overline{B})$ c) $P(\overline{A} \cap B)$
- 34) The probability density function of a variate X is

X	0	1	2	3	4	5	6
P(X)	К	ЗK	5K	7K	9K	11K	13K
Find K.	P(X < 4)	$P(X \ge 5)$).				