**2022/TDC/ODD/SEM/
BCADSE–501T/023**

TDC (CBCS) Odd Semester Exam., 2022

COMPUTER APPLICATION

(5th Semester)

Course No. : BCADSE–501T

(**Numerical and Statistical Methods**)

Full Marks : 50
Pass Marks : 20

Time : 3 hours

*The figures in the margin indicate full marks
for the questions*

UNIT—I

1. Answer any *three* of the following : 1×3=3

   a) What is floating-point representation?

   (b) How do you define error?

   (c) What is significant digit?

   (d) Write transcendental equation

J23/378 (*Turn Over*)

(2)

2. Answer any *one* of the following : 2

   (a) What is taxonomy of errors?

   (b) What is the difference between accuracy and precision?

3. Answer any *one* of the following : 5

   (a) Explain in brief the types of errors one might encounter in performing numerical calculations.

   (b) Using the method of false position, find the root of equation $x^6 - x^4 - x^3 - 1 = 0$ up to fourth decimal places.

UNIT—II

4. Answer any *three* of the following : 1×3=3

   (a) Is Gauss elimination an iterative method?

   (b) What is the main difference between Gauss-Jordan method and Gaussian elimination?

   (c) What is interpolation method?

   (d) Write the Newton's forward formula.

(Continued)

(3)

5. Answer any *one* of the following : 2

   (a) If $f(1) = 2$, $f(3) = 4$ and $f(4) = 16$, what is the value of $f(9)$ using Lagrange's interpolation formula?

   (b) Write the Gauss-Jordan method.

6. Answer any *one* of the following : 5

   (a) Derive Newton's forward interpolation formula.

   (b) Calculate $f(35 \cdot 5)$ from the following table :

x	35	36	39	41
$f(x)$	42875	46656	59319	68921

UNIT—III

7. Answer any *three* of the following as directed : 1×3=3

   (a) Why is numerical integration needed?

   (b) What is the order of Euler's method?

   (c) Second-order Runge-Kutta method is also known as ____.

   (Fill in the blank)

   (d) What is modified Euler method?

(Turn Over)

(4)

8. Answer any *one* of the following : 2

(a) Derive Simpson's 1/3rd rule.

(b) Write the applications of trapezoidal rule.

9. Answer any *one* of the following : 5

(a) Derive Simpson's 3/8th rule.

(b) Evaluate

$$\int_0^1 \frac{1}{1 \times x} dx$$

correct up to 3 decimal places using trapezoidal rule and Simpson's 1/3rd rule and compute the value of $\log_e 2$.

UNIT—IV

10. Answer any *three* of the following : 1×3=3

(a) Define mathematical expectation.

(b) What is random variable?

(c) What do you mean by normal distribution?

(d) Write down the different Poisson distributions and binomial distributions.

(*Continued*)

(5)

11. Answer any *one* of the following : 2

(a) What are different types of random variables?

(b) Write the formula of $E(x)$.

12. Answer any *one* of the following : 5

(a) Let X be a random variable with the probability distribution

$$X : -3 \quad 6 \quad 9$$
$$P(X - X_i) : \quad \frac{1}{6} \quad \frac{1}{2} \quad \frac{1}{3}$$

Find $E(X)$ and $E(X^2)$.

(b) If X and Y are random variables, then prove that

$$E(X + Y) = E(X) + E(Y)$$

provided all the expectations exist.

UNIT—V

13. Answer any *three* of the following : 1×3=3

(a) Write the simplified forms of covariance.

(b) Define regression coefficient.

(c) Define coefficient of correlation.

(d) What are regression lines?

(*Turn Over*)

(**6**)

14. Answer any *one* of the following :   **2**

(a) Write the formula of Karl Pearson's correlation coefficient.

(b) Write the importance of regression lines.

15. Answer any *one* of the following :   **5**

(a) Prove that two independent variables are uncorrelated.

(b) Prove that the coefficient of correlation r is independent of a change of origin and scale of the variables.

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