TDC (CBCS) Odd Semester Exam., 2020
held in March, 2021

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

SECTION—A

Answer any *fifteen* of the following questions as directed : 1×15=15

1. What is rounding error?

2. What do you mean by truncation error?

3. What is relative error?

4. Mention the types of numerical methods.

5. Newton-Raphson method is also called as _____.

(Fill in the blank)

6. Write the fundamental formula of Newton-Raphson method.

7. What is interpolation?

8. When to use Newton's forward and backward interpolation formula?

9. Is Gauss elimination an iterative method?

10. What is the main difference between Gauss-Jordan and Gauss elimination method?

11. How does Lagrange's interpolation formula differ from Newton's interpolation formula?

12. What is Gauss elimination method?

13. Write the trapezoidal formula for integration.

14. What is numerical integration?

15. Write down the Simpson's $\frac{1}{3}$rd rule for integration.

16. What is the order of Euler's method?

17. In Runge-Kutta method, we don't need to calculate higher order derivatives for higher accuracy.

(Write True or False)

18. Write down the uses of trapezoidal rule.

19. Write down the formula for calculating mathematical expectation.

20. What is random variable?

21. What do you mean by normal distribution?

22. How does Poisson distribution differ from binomial distribution?

23. What do you mean by covariance?

24. What is recurrence relation?

25. What is correlation?

26. What is regression?

27. What are regression lines?

28. Write two properties of correlation coefficient.

29. How does regression differ from correlation?

30. Two independent variables are correlated.

(Write True or False)

SECTION—B

Answer any *five* of the following questions : 2×5=10

31. Write the steps to solve an equation using bisection method.

32. The actual length of a field is 500 feet. A measuring instrument shows the length to be 508 feet. Find out relative error in the measured length of the field.

33. Derive Simpson's $\frac{1}{3}$rd rule.

34. Write Lagrange's formula for interpolation. When is it useful?

35. Discuss the method of false position in brief.

36. What is the difference between Simpson's $\frac{1}{3}$rd and $\frac{3}{8}$th rule?

37. Let X be a random variable with the following probabilities :

X	:	0	1	2	3
$P(X = x_i)$	:	$\frac{1}{3}$	$\frac{1}{2}$	$\frac{1}{24}$	$\frac{1}{8}$

Calculate $E(x)$.

38. What are different types of random variable?

39. Explain why there are two lines of regression.

40. Write the properties of regression coefficient.

SECTION—C

Answer any *five* of the following questions : 5×5=25

41. Find the root of the given equation by bisection method :

$$x^3 - 2x - 5 = 0$$

42. By using Newton-Raphson method, find the root of $x^4 - x - 10 = 0$.

43. Weight of a student corresponding to different years are as follows :

Age	:	0	5	10	15	20
Weight (in kg)	:	2·25	9·90	17	33·5	41·375

Estimate the weight at the age of *(a)* 7·5 years and *(b)* 16·25 years.

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

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

45. Compute the value of the definite integral $\int_{0 \cdot 2}^{1 \cdot 4} (\sin x - \log_e x + e^x) dx$ by *(a)* Simpson's $\frac{1}{3}$rd rule and *(b)* Simpson's $\frac{3}{8}$th rule.

46. Given the equation $\frac{dy}{dx} = 3x^2 + 1$, $y_1 = 2$, estimate y_2 by Euler's method using *(a)* $h = 0 \cdot 5$ and *(b)* $h = 0 \cdot 25$.

47. Let X be a random variable with the following probability distribution :

X	:	−3	6	9
$P(X = x_i)$	:	$\frac{1}{6}$	$\frac{1}{2}$	$\frac{1}{3}$

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

(*Continued*)

48. Prove that expected value of the product of the two independent random variables is equal to the product of their expected value, i.e.,

$$E(X \cdot Y) = E(X)E(Y)$$

49. Prove that correlation coefficient lies between −1 and +1.

50. Calculate the coefficient of correlation between the following values :

X	:	1	3	5	7	8	10
Y	:	8	12	15	17	18	20

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