Avinashilingam Institute for Home Science and Higher Education for Women
(Deemed to be University), Coimbatore-641 043
Bachelor's Degree Examination – NOVEMBER 2018

I Semester

Class : I UG **Time : 3 hours**
Major : COMPUTER SCIENCE / COMPUTER APPLICATIONS **Max. Marks: 100**

18BCS101/18BCAI01- DSE-1-ESSENTIAL MATHEMATICS FOR COMPUTER SCIENCE

Part-A **10 x 1=10**
Choose the correct answer

1. For which value of x will the matrix given below become singular $\begin{bmatrix} 8 & x & 0 \\ 4 & 0 & 2 \\ 12 & 6 & 8 \end{bmatrix}$

a. 4 b. 6 c. 8 d. 12

2. If $f(x) = x^2 - 5x + 6$ and $A = \begin{bmatrix} 2 & 0 & 1 \\ 2 & 1 & 3 \\ 1 & -1 & 0 \end{bmatrix}$ then $f(A)$ is equal to

a. $\begin{bmatrix} 1 & -1 & -3 \\ -1 & -1 & -10 \\ -5 & 4 & 4 \end{bmatrix}$ b. $\begin{bmatrix} 1 & -1 & -5 \\ -1 & -1 & 4 \\ -3 & -10 & 4 \end{bmatrix}$ c. $\begin{bmatrix} 1 & -1 & 4 \\ -1 & 4 & -10 \\ 4 & -3 & -5 \end{bmatrix}$ d. None of these

3. If $n(A) = 115, n(B) = 326, n(A \cap B) = 68$ then what is $n(A \cup B)$ equal to
a. 370 b. 165 c. 373 d. 394

4. A set is
a. a collection of objects b. a collection of well defined objects
c. A non -empty collection of objects d. empty set

5. What is the relation between Δ and E
a. $\Delta = E$ b. $\Delta = 1$ c. $\Delta = E + 1$ d. $\Delta = E - 1$

6. Whether Lagrange's interpolation formula can be used for equal and unequal intervals.
a. True b. False c. None of these

7. In Gauss Elimination method, the co-efficient matrix is transferred into
a. Lower Triangular matrix b. Upper Triangular matrix c. Unit Matrix
d. Non Singular Matrix

8. The Gauss Seidel method gives results faster when the pivotal elements are
a. Smaller than coefficients b. Larger than other coefficients
c. Equal to other coefficients d. None of the above

9. Simpson's one-third rule for evaluation of $\int_a^b f(x)dx$ requires the interval $[a, b]$ to be divided into
a. an even number of sub intervals of equal width
b. an odd number of sub intervals of equal width
c. any number of sub intervals of equal width
d. any number of sub intervals

10. The error in trapezoidal rule is of order
a. h b. 1 c. $\frac{h}{2}$ d. h^2

PART - B

Answer all the Questions **5 x 6 =30**

11.a. Find the characteristic equation and characteristic roots of $A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$

(or)

b. Verify whether the given matrix is Singular or Non singular $A = \begin{bmatrix} 1 & 1 & 3 \\ 5 & 2 & 6 \\ -2 & -1 & -3 \end{bmatrix}$

12.a. Illustrate by the help of Venn Diagram $A \cap (B \cap C) = (A \cap B) \cap C$

(or)

b. If A = $\{-3,-1,0,1,3\}$ and $f : A \to R$ be defined by $f(x) = x^2 + 2$, find the range of f.

13.a. Form a difference table and interpolate the value of $f(x)$ when x=4. Given

x	3	5	7	9
$f(x)$	180	150	120	90

(or)

b. Find $f(5)$ from the following: f(3) = 4, f(4) = 13, f(6) = 43

14.a. Solve the system of equation by Gauss Elimination method.

$x + 2y + z = 3, 2x + 3y + 3z = 10, 3x - y + 2z = 13$

(or)

b. Solve the system of equation by Gauss -Seidel method.

$8x - 3y + 2z = 20, 4x + 11y - z = 33, 6x + 3y + 12z = 35$

15.a. Evaluate $\int_0^1 \frac{dx}{1+x^2}$ by Trapezoidal rule with h=0.2

(or)

b. Evaluate $\int_0^1 e^x dx$ by Simpson's one-third rule correct to three decimal places with h=0.1

PART - C

Answer all the Questions **5 x 12 =60**

16.a. Verify Cayley-Hamilton theorem for $A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$

(or)

b. If $A = \begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix}$ find A^{-1}.

17.a. Explain (i) Function ,(ii) Injective ,(iii) Surjective ,(iv) Bijective (v) Composite Function.

(or)

b. State and prove: De Morgan's Law.

18.a. Find the value of y at x=21 from the following data

x	20	23	26	29
y	0.3420	0.3907	0.4384	0.4848

(or)

b. Find a polynomial which takes the following values using Newton's backward interpolation formula.

x	1	3	5	7	9	11
y	3	14	19	21	23	28

19.a. Using Gauss Elimination method solve

$3x + 4y + 5z = 18, 2x - y + 8z = 13, 5x - 2y + 7z = 20$

(or)

b. Solve the system of equations

$10x - 2y - z - w = 3, -2x + 10y - z - w = 15, -x - y + 10z - 2w = 27,$

$-x - y - 2z + 10w = -9$ using Gauss-Seidel method.

20.a. By dividing the range into ten equal parts, evaluate $\int_0^{\pi} sinx\, dx$ by Trapezoidal and Simpson's one-third rule. Verify your answer with integration.

(or)

b. Evaluate $\int_{-3}^{3} x^4 dx$ using Simpson's one-third rule and Simpson's three-eighth rule.

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Name and Signature of the Examiner

A. MURUGANANDAM