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46143

B.C.A. I Semester Degree Examination, March/April - 2023

COMPUTER SCIENCE

Mathematical Foundation

(NEP)

Time : 2 Hours | Maximum Marks : 60

Note : *Answer* ***all*** *the sections.*

SECTION - A

Answer the following sub-questions. Each sub-question carries **one** mark. **10x1=10**

1. (a) Define contradiction.

(b) State De Morgan's laws.

(c) If $A = \begin{bmatrix} 1 & 2 \\ 3 & 0 \end{bmatrix}$, $B = \begin{bmatrix} 5 & 4 \\ 6 & 7 \end{bmatrix}$ find $A+2B$.

(d) If $A = \begin{bmatrix} x & 2 \\ 4 & 8 \end{bmatrix}$ is a singular matrix, find 'x'.

(e) Express 225° (degree) in radians.

(f) Find the numerical value of sin150°.

(g) Differentiate $2x^2+3x+4$ wrt x.

(h) Find $\frac{d^2y}{dx^2}$ for $y=x^3+3x^2+2x+5$.

(i) Evaluate : $\int_0^2 x^3 \, dx$

(j) Evaluate : $\int 2x^3 - 5x + 3 \, dx$

P.T.O.

SECTION - B

Answer **any four** of the following questions. Each question carries **five** marks. **4x5=20**

2. State the converse, inverse and contrapositive for the following proposition. "If a quadrilateral is parallelogram then its diagonal bisects each other".

3. Find the inverse of a matrix $A = \begin{bmatrix} -5 & 6 \\ -9 & 7 \end{bmatrix}$.

4. Show that $\cos 2A = 1 - 2\sin^2 A$.

5. Evaluate : $\lim_{x \to 0} \frac{x}{\sqrt{1+x} - \sqrt{1-x}}$.

6. Evaluate : $\int x \sec^2 x \, dx$.

7. By using properties of determinants show that $\begin{bmatrix} 1 & a & bc \\ 1 & b & ca \\ 1 & c & ab \end{bmatrix} = (a-b)(b-c)(c-a)$.

SECTION - C

Answer **any three** of the following questions. Each question carries **ten** marks. **3x10=30**

8. (a) What is Quantifier ? Explain types of Quantifiers.
(b) Construct the Truth table for the following proposition $(P \wedge \sim q) \leftrightarrow \sim p$.

9. Solve the following by Cramer's rule.
$x + y + z = 7$
$2x + 3y + 2z = 17$
$4x + 9y + z = 37$

10. If $\cot x = 5/12$, where x is in 3rd Quadrant. Then find all the remaining Trigonometric ratios.

11. Show that the function $f(x) = \begin{cases} x^3 - 3, \text{ if } x \leq 2 \\ x^2 + 1, \text{ if } x > 2 \end{cases}$ is continuous at $x = 2$.

12. Evaluate : $\int_0^2 \int_0^1 x^2 y^2 \, dx \, dy$

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