

3702

First Year B.C.A. (Sem -I)(CBCS) Examibnation
March/April 2014
102- Mathematics

Instructions:

1. All questions are compulsory
2. figures to the right indicates full marks

Q.1 Answer the following questions;

[10]

1. Define Proper and Improper sets.
2. Define skew symmetric matrix.
3. When do you say that two functions are equal?
4. Construct the truth table for $P \Rightarrow Q$ and $P \Leftrightarrow Q$.
5. Define Boolean algebra.
6. Define TAUTOLOGY and CONTRADICTION.
7. What is the difference between Minor and Co-factor?

8. If $A = \begin{bmatrix} 1 & 4 \\ -2 & -6 \end{bmatrix}$ and $B = \begin{bmatrix} -1 & 1 \\ 2 & 8 \end{bmatrix}$ then find $2A - B + 4I$

9. If $A = \begin{bmatrix} 1 & 3 & -5 \\ 2 & -2 & 0 \\ 1 & 4 & 6 \end{bmatrix}$ then find $|A|$

10. Define break even point.

Q.2 (A) State and prove distributive law of intersection over union.

[05]

OR

(A) State and prove De Morgan's law for union.

[05]

(B) Attempt any two

[10]

1. If $A = \{2,3,4\}$, $B = \{3,4,5,6\}$ & $C = \{2,4,6,8\}$ then verify that $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$.
2. If $A = \{1,3,4,6\}$, $B = \{2,4,5\}$ & $C = \{3,5,6\}$ then verify that $A \cap (B - C) = (A \cap B) - (A \cap C)$
3. If $U = \{x/x \in \mathbb{N}, x \leq 10\}$, $A = \{x/x \in \mathbb{N}, 0 < x \leq 5\}$, $B = \{x/x \text{ is an odd integer}, x < 10\}$ then verify that $(A \cap B)' = A' \cup B'$.
4. In a town there is a 20-20 match between the team of Sachin and team of Dhoni, the town has total population of 5000 and of them 2800 supports Sachin 2300 support Dhoni while 400 supports both the teams. Find how many supports neither Sachin nor Dhoni.

Q.3 (A) If $f(x)=2x^2 - 2x + 3$ then find $f(1) \cdot f(3) - f(0) \cdot f(-2)$

[05]

OR

(A) If the cost function of a monopolist is $C(x)=5x+9$ then find

[05]

(i) Cost when 26 units are produced

(ii) How many units can be produced from Rs. 219 ?

(B) Attempt any two

[10]

1. If $f(x)=(1-x)^2-x$ then find $\frac{f(1)+f(-1)}{f(-2)}$

2. The supply function of a commodity is $S=7P-2$ then find

(i) supply when price $P=250$ Rs.

(ii) At what price the supply become 3540 units?

3. The cost function of a commodity is $C(x)=28x+215$ and the selling price per unit is Rs. 33 then find Break-even point.

4. If $f(x)=x^2(x-1)^2$ $x \in \mathbb{R}$ then prove that $f(x+1)-f(x)=4x^3$.

Q.4 (A) Show that D_{10} is a Boolean algebra where $\forall a, b \in D_{10}$

[05]

$a+b = \text{L.C.M. of } a, b$

$a \cdot b = \text{G.C.D. of } a, b$ and

$a' = 10/a$

OR

(A) Show that D_{21} is a Boolean algebra where $\forall a, b \in D_{21}$

[05]

$a+b = \text{L.C.M. of } a, b$

$a \cdot b = \text{G.C.D. of } a, b$ and

$a' = 21/a$

(B) Attempt any two

[10]

1. Using TRUTH table prove that $(P \Rightarrow Q) \wedge (Q \Rightarrow R) = P \Rightarrow (Q \wedge R)$.

2. Using TRUTH table prove that $(P \vee Q) \Rightarrow R = (P \Rightarrow R) \wedge (Q \Rightarrow R)$.

3. In a Boolean algebra show that $(XY'Z' + XY'Z + XYZ + XYZ')(X+Y) = X$

4. Simplify the Boolean expression using Boolean algebra $(X+Y+XY)(X+Y)$

Q.5 (A) If $A = \begin{vmatrix} 7 & 3 & 5 \\ 0 & 4 & 2 \\ 1 & 5 & 4 \end{vmatrix}$ and $B=3A$, $C=-B$ then find $2A-B+C$.

[05]

OR

(A) Prove that $\begin{vmatrix} Y+Z & Y+Z & X+Y \\ X+Y & Y+Z & Z+X \\ Z+X & X+Y & Y+Z \end{vmatrix} = 2 \begin{vmatrix} X & Y & Z \\ Z & X & Y \\ Y & Z & X \end{vmatrix}$

[05]

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