

देवी अहिल्या विश्वविद्यालय इन्दौर
(Regular) छात्रों के लिए

Class: BCA V semester

Paper: Discrete Mathematics & Linear algebra

Attempt all the questions. Each question carry equal marks.

Q.1 (a) Show that $(P \Leftrightarrow Q \wedge R) \Rightarrow (\sim R \Rightarrow \sim P)$ is tautology
(b) Show that $(P \vee Q) \wedge (\sim P) \wedge (\sim Q)$ is contradiction.

Q.2 (a) Convert $f(x, y) = x \cdot y' + x' \cdot y + x' \cdot y'$ into conjunctive normal form.
(b) Change $F(x, y, z) = \{x + (x' + y)\} [x + (y' \cdot z)']$ into disjunctive normal form.

Q.3 (a) If A, B, C are three sets, prove that
 $(A - C) \cap (B - C) = (A \cap B) - C$.
(b) State and prove first theorem of homomorphism of a group.

Q.4 Define Vector Space with example, prove that vector space of all ordered n -tuples over field 'F' of real numbers, where $V = \{(a_1, a_2, \dots, a_n) : a_1, a_2, a_3 \in F\}$
 $\alpha = (a_1, a_2, \dots, a_n)$
 $\beta = (b_1, b_2, b_3, \dots, b_n)$

Q.5. Show that the matrix A satisfies Cayley-Hamilton theorem & hence find A^{-1} where

$$A = \begin{bmatrix} 1 & 2 & 1 \\ 0 & 1 & -1 \\ 3 & -1 & 1 \end{bmatrix}$$