EI-50

B.E. (IInd Sem.) (CGPA) CSE Examination-2015

DISCRETE STRUCTURE

Paper - CS-205

Time Allowed : Three Hours

Maximum Marks : 60

Note : Attempt all six questions. All questions carry equal marks. Symbols have their usual meanings.

Q.I Answer any five of the following :

(i) If A, B, C be sets. Under what conditions is each of the following true?

(a) $(A - B) \cup (A - C) = \phi$

(b) $(A - B) \cap (A - C) = \phi$

(ii) Prove the validity of following by deduction method :

(1) $A \rightarrow B$

(2) $B \rightarrow \sim C$

(3) $\sim C \wedge D$

(4) $A \rightarrow D$ $\therefore B$

(iii) Let $P(S)$ be the power set of the set $S = \{1, 2, 3\}$. Construct the Hasse diagram of the partial order induced on $P(S)$ by the lattice $(P(S), \wedge \vee)$

(iv) Show that $a(-b) = (-a)\, b = -ab$ for all $a, b \in R$, where R is a Ring.

(v) Write properties of Planar Graph.

(vi) Determine the number of permutations that can be made out of the letters of the word 'PROGRAMMING'.

Unit-I

Q.II Define Composition of functions. If $f, g, h : R \rightarrow R$ be defined as

$f(x) = 3x - 4$,

$g(x) = x^2$ and

$h(x) = e^x$.

Find *fof, goh, hog* and *gof.*

Or

Define Equivalence Relation. The relation on R^3 defiend as $(x_1, y_1, z_1)\ R\ (x_2, y_2, z_2)$ if $(x_2 - x_1) + (y_2 - y_1) + (z_2 - z_1) = 0$ then show that R is an equivalence relation.

Unit-II

Q.III Explain the meaning of Syntax and Semantics in propositional logic with suitable example and write the difference between them.

Or

State and Prove Cantor's diagonal argument and power set theorem.

Unit-III

Q.IV Define Distributive Lattice. If $(L, \leq)$ be a distributive lattice. Show that, if for some $a \in L, a \wedge x = a \wedge y$ and $a \vee x = a \vee y$, then $x = y$.

Or

Define following terms with suitable example :

(i) Monotone map
(ii) Morphisms
(iii) Quotient Structures
(iv) Pseudo-Boolean Lattices
(v) Complete Partial Ordering

Unit-IV

Q.V Define Group with suitable example and show that $(R^2, +)$ is an abelian group where '+' is defined as $(x, y) + (a, b) = (x + a, y + b)$.

Or

Define Boolean Algebra. State and Prove Demorgan's Law of Boolean Algebra.

Unit-V

Q.VI (a) In how many ways can five letters be chosen out of the 26 English letters, if the choice must contain either *A* or *I*?

(b) State and Prove Pigeon-Hole Principle.

Or

(a) Define Graph and Prove that "A Graph has an even number of vertices of odd degree".

(b) Define Eulerian and Hamiltonian walk with the help of suitable example.

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