



A-2934

First Year B. Sc. (Comp. Sci.) (Sem. I) Examination
March/April – 2015

Discrete Mathematics - I : Paper - I
(Mathematics for Computer Science - I)

Time : 3 Hours]

[Total Marks : 70

Instructions :

(1)

નીચે દર્શાવેલ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી. Fillup strictly the details of signs on your answer book.	Seat No. :
Name of the Examination :	<input type="text"/>
<input type="text" value="F.Y. B. SC. (COMP. SCI.) (SEM. 1)"/>	<input type="text"/>
Name of the Subject :	<input type="text"/>
<input type="text" value="DISCRETE MATHEMATICS - I - 1"/>	<input type="text"/>
Subject Code No. : <input type="text" value="2"/> <input type="text" value="9"/> <input type="text" value="3"/> <input type="text" value="4"/>	Section No. (1, 2,.....) : <input type="text" value="Nil"/>
Student's Signature	

- (2) All questions are compulsory.
(3) Digits shown in right hand side indicate full marks of the question.
(4) Symbols have usual meaning.

1 Do as directed : 10

- (1) Determine the truth value of the following statement
“If $6 \times 7 = 42$ then Vadodara is not in Gujarat”.
- (2) Using truth table find Principal Disjunctive normal form of $\sim(p \wedge q)$.
- (3) Using truth table show that $\sim(p \Rightarrow q)$ is equivalent to $(p \wedge \sim q)$.
- (4) Suppose $p(x)$ denote the statement $x > 7$ then what are the truth values of $p(5)$ and $p(8)$?
- (5) Find the truth table of $p \wedge (q \vee r)$.

- 2 (a) Prove that the following proposition is a tautology. 5

$$[(p \Rightarrow q) \wedge (q \Rightarrow r)] \Rightarrow (p \Rightarrow r)$$

OR

- (a) Using rules of algebra of propositions simplify 5

$$\sim((\sim p \wedge q) \vee (\sim p \wedge \sim q)) \vee (p \wedge q)$$

- (b) Attempt any **two** : 10

- (1) Show that $t \Rightarrow s$ is a valid conclusion from the given premises

$$(p \wedge q) \vee (r \Rightarrow s), t \Rightarrow r, \sim(p \wedge q)$$

- (2) Construct the truth table of

$$(p \vee q) \wedge ((p \Rightarrow r) \wedge (q \Rightarrow r))$$

- (3) Determine whether the following is a tautology or contradiction

$$(q \Rightarrow p) \wedge (\sim p \wedge q)$$

- (4) Using truth table, prove that following

$$((p \Rightarrow q) \Rightarrow q) \Rightarrow p \vee q$$

- 3 (a) Prove that $(p \Rightarrow (q \Rightarrow r)) \Leftrightarrow ((p \wedge q) \Rightarrow r)$. 5

OR

- (a) Using truth table determine whether the following is tautology, contradiction or contingency 5

$$((p \wedge \sim q) \Rightarrow r) \Rightarrow (p \Rightarrow q \vee r)$$

- (b) Attempt any **two** : 10

- (1) Given that the truth value of p is true q is false, determine the truth value of

$$[(p \Rightarrow q) \wedge (p \Rightarrow \sim q)] \Leftrightarrow \sim p$$

- (2) For any propositions, p , q and r ; prove that

$$[(p \vee q) \Rightarrow r] \Leftrightarrow [(p \Rightarrow r) \wedge (q \Rightarrow r)].$$

(3) Prove the logical equivalence between $(p \Rightarrow q) \wedge [\sim q \wedge (r \vee \sim q)]$ and $\sim(q \vee p)$ by using truth table.

(4) Construct truth table of the following proposition $(p \vee q) \wedge (\sim p \wedge (\sim q \wedge \sim r))$

4 (a) Show that t is a valid conclusion from the given premises $p \Rightarrow q, q \Rightarrow r, r \Rightarrow s \wedge t, p$ 5

OR

(a) Construct a truth table of the following $(p \Rightarrow (q \Rightarrow r)) \Rightarrow ((p \Rightarrow q) \Rightarrow (p \Rightarrow r))$ 5

(b) Attempt any two : 10

(1) Determine whether the conclusion C is valid from the following premises $p \Rightarrow (q \Rightarrow r), p \wedge q$ conclusion C is r .

(2) Prove the following without using truth table $((p \vee \sim p) \Rightarrow q) \Rightarrow ((q \vee \sim q) \Rightarrow r) \Rightarrow (q \Rightarrow r)$

(3) Find the conjunctive normal form of $(p \wedge \sim(q \wedge r)) \vee (p \Rightarrow q)$.

(4) Prove that $p \wedge (p \vee q)$ is p .

5 (a) Obtain disjunctive normal form of $p \Rightarrow ((p \Rightarrow a) \wedge \sim(\sim q \vee \sim p))$ 5

OR

(a) Prove the following equivalence using rules of inferences $((q \Rightarrow (p \wedge \sim p)) \Rightarrow (r \Rightarrow (q \wedge \sim q))) \Rightarrow (r \Rightarrow q)$ 5

(b) Attempt any two : 10

- (1) Show that $(t \wedge s)$ can be derived from the premises $p \Rightarrow q$, $q \Rightarrow \sim r$, r , $p \vee (t \wedge s)$.
 - (2) Prove the following implication, using truth table $((p \vee \sim (q \wedge r) \wedge r \sim p) \Rightarrow (\sim q \vee \sim r))$.
 - (3) Find Principle disjunctive normal form by using truth table of $(q \Rightarrow p) \wedge (\sim p \wedge q)$.
 - (4) State and prove distributive rule using truth table.
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