

**S.E (I.T. & Comp.) (First Semester) EXAMINATION, 2010**

**DISCRETE STRUCTURES**

(2008 Course)

**Time : Three Hours**

**Maximum Marks : 100**

**N.B. :—** (i) Attempt from Section I Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6. Attempt from Section II Q. 7 or Q. 8, Q. 9 or Q. 10, Q. 11 or Q. 12.

(ii) Answers to the two Sections should be written in separate answer-books.

(iii) Neat diagrams must be drawn wherever necessary.

(iv) Assume suitable data, if necessary.

**SECTION I**

1. (a) Prove by induction for  $n \geq 0$  [6]

$$1 + a + a^2 + \dots + a^n = \frac{1 - a^{n+1}}{1 - a}$$

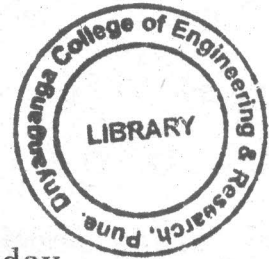
(b) In a survey of 60 people it was found that : [6]

25 read Business India

26 read India Today

26 read Times of India

11 read both Business India and India Today



9 read both Business India and Times of India

8 read both India Today and Times of India

8 read none of these.

(i) How many read all three ?

(ii) How many read exactly one ?

(c) Prove that  $[(p \rightarrow q) \wedge (r \rightarrow s) \wedge (p \vee r)] \rightarrow (q \vee s)$  is a tautology. [4]

Or

2. (a) Let P and Q be 2 multisets.

$P = \{a, a, a, c, d, d\}$  and  $Q = \{a, a, b, c, c\}$ . Find : [4]

(i)  $P \cup Q$

(ii)  $P \cap Q$

(iii)  $P - Q$

(iv)  $P + Q$

(b)  $P(x) : x$  is even. [6]

$Q(x) : x$  is a prime number.

$R(x, y) : x + y$  is even.

(1) Using above write an English sentence for each of the symbolic statement given below :

(i)  $\forall x (\sim Q(x))$

(ii)  $\exists y (\sim P(y))$

(iii)  $\sim (\exists x (P(x) \wedge Q(x)))$



