

13. Perform following conversions:

- a)  $(39.625)_{10} = (?)_2$
- b)  $(100.01)_2 = (?)_2$
- c)  $(101101.01)_8 = (?)_{10}$
- d)  $(347.12)_{16} = (?)_{10}$
- e)  $(567)_{10} = (?)_8$
- f)  $(110010)_2 = (?)_8$
- g)  $(43215)_8 = (?)_2$
- h)  $(111011)_{16} = (?)_2$
- i)  $(111011)_2 = (?)_{16}$

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## BCA-02

### B.C.A. Examination, June-2015

#### Discrete Mathematics

## BCA-02

Time : Three Hours]

[Max. Marks : 100

**Note:** The question paper is divided into three sections A, B and C. Write answers as per given instructions.

#### Section-A

(Very Short Answer Questions)

**Note:** Answer all questions. As per the nature of the question delimit your answer in one word, one sentence or maximum upto 30 words. Each question carries 2 marks.  $2 \times 10 = 20$

1. (i) Convert  $(ABCD)_{16} = (?)_2$
- (ii) Prove that  $A - B = A \cap B = Q$
- (iii) Define Poset.
- (iv) Which logic gate is also called inverter?
- (v) Name the universal gates.

(1)

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(4)

(vi) Explain UNICODE.

(vii) What is Ring?

(viii) Specify the condition, when a group  $G$  is said to be Simple group.

(ix) If  $a' + b = 1$  then, what is value of  $ab'$ ?

(x) Prove that in a ring, an invertible element cannot be a divisor of zero.

### Section-B

(Short Answer Questions)

**Note:** Answer any four questions. Each answer should not exceed 200 words. Each question carries 10 marks.  
 $10 \times 4 = 40$

2. Consider the set of ordered pair of natural 3 numbers  $N \times N$  defined by :

(a, b)  $R$  (c, d)  $\leftrightarrow a + d = b + c$ . Prove that  $R$  is an equivalence relation.

3. Show that  $(p \wedge q) = (p \vee q)$  is a tautology.

4. Explain duality principle with the help of example

5. Verify that the proposition  $p \wedge (q \wedge \sim p)$  is a contradiction.

6. Differentiate between reflexive and non-reflexive relation, with suitable example.

7. What is a function in Discrete Mathematics? Explain its types with example.

8. Minimize the given function  $f(a,b,c) = abc + ab'c + abc'$  and draw the logic circuit of the minimized Boolean expression

9. Discuss the meaning of the existential quantifier ( $\exists$ ) and universal quantifier ( $\forall$ ).

### Section-C

(Long Answer Questions)

**Note:** Answer any two questions. You have to delimit your answer maximum upto 500 words. Each question carries 20 marks.  
 $20 \times 2 = 40$

10. Define a group. Describe the properties of a group. Show that the set  $\{1, 2, 3, 4, S\}$  is not a group under addition modulo 6.

11. Explain in brief about POS and SOP forms to represent Boolean expressions, with suitable example.

12. Prove the following:

(a) If  $f(x) = 3x + 1$  and  $g(x) = 7x$  then show that  $(f \circ g)(x) \neq (g \circ f)(x)$ .

(b) Let  $R$  be the relation on Integers defined by  $6x$  is related to  $y$  under  $R$  if and only if 12 divides  $x - y$ , where  $x$  and  $y$  are integers', then  $R$  is an equivalence relation.