

Vidya Vikas Mandal's  
Shree Damodar College Of Commerce & Economics Margao, Goa

F.Y.BCA , Semester II, End Semester Examination, *June 2016 (supplementary)*

**DISCRETE MATHEMATICS (BCA 204)**

**Duration: 2 hours**

**Max. Marks: 50**

**Instructions: Figures to the right indicate maximum marks.**

**Non Scientific calculator is allowed.**

**Q I. Solve ANY 2 :**

**(2 X 5 marks)**

1. Using Mathematical Induction, Prove that  $1 \times 3 + 2 \times 4 + \dots + n(n+2) = \frac{n}{6}(n+1)(2n+7)$ .
2. Using Binomial theorem and without expanding, find  $10^{\text{th}}$  term and middle term of  $(x + \frac{1}{x})^{15}$ .
3. Using Mathematical Induction, Prove that  $1^2 + 2^2 + 3^2 + \dots + n^2 = \frac{n}{6}(n+1)(2n+1)$ .

**Q II. Solve ANY 2 :**

**(2 X 5 marks)**

1. There are 3 economists, 4 engineers, 2 statisticians and 1 doctor. Committee of 4 from among them is to be formed. In how many ways a committee of 4 is formed if,
  - a) committee consists of one professional of each kind
  - b) has at least one economist
  - c) at least one engineer but no economist.
2. In how many ways can the letter of the word "COURAGE" be arranged so that,
  - a) The vowels are never together
  - b) The vowels are always together
3. Find  $r$  ; if  $11({}^{10}P_{r-1}) = 30({}^{11}P_{r-2})$ .

**Q III. Solve ANY 2 :**

**(2 X 5 marks)**

1. Is the following statements Contradiction or Tautology :  
 $[(p \rightarrow q) \vee (q \rightarrow \sim p)] \wedge (p \rightarrow \sim q)$
2. A town has a total population of 40,000 out of which 400 people own cars, 10,000 people own bicycles and 300 own both cars and bicycles.
  - a) How many in the town do not own either?
  - b) How many in the town own only cars?
  - c) How many in the town own only bicycle?



3. If  $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$ ,  $A = \{2, 4, 6, 8\}$  and  $B = \{2, 3, 5, 7\}$ . Verify that

- $(A \cup B)^c = A^c \cap B^c$
- $(A \cap B)^c = A^c \cup B^c$

**Q IV. Solve ANY 2 :**

**(2 X 5 marks)**

- If  $f(x) = 4x + 5$  and  $g(x) = x + 8$ , find
  - $f$  inverse, if it exists.
  - $g$  inverse, if it exists.
  - $f[g(f(x))]$

- Let  $A = \{1, 2, 3\}$  and a relation on  $A$  is defined as  $R = A \times A$ .

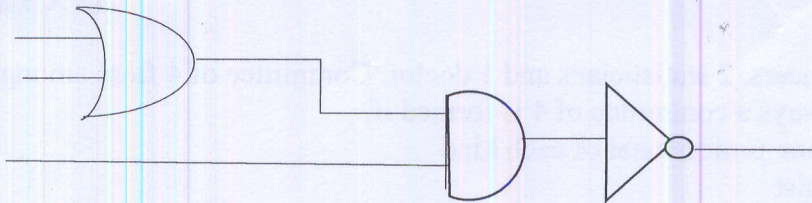
Write the relation  $R$  as a set of ordered pair. Is  $R$  (a) Reflexive, (b) not symmetric (c) not transitive.

- Is the following statement equivalent?  
 $\{(p \wedge q) \wedge (p \vee q)\}$  and  $\{(p \wedge q) \oplus (p \vee q)\}$

**Q V. Answer the following:**

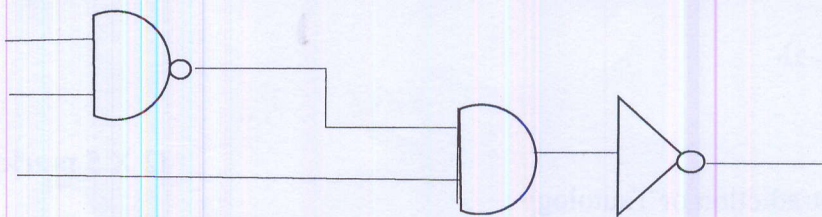
**(5 X 2 marks)**

- If Inputs are  $x_1 = 1, x_2 = 0, x_3 = 1$ . Find output for the given circuit.



- Convert  $(45237)_8 = (\dots)_{16}$

- If Inputs are  $x_1 = 1, x_2 = 0, x_3 = 0$  Find output for the given circuit.



- Convert  $(11100110101)_2 = (\dots)_{16}$

- Prove any one Idempotent Law in Boolean Algebra.

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