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Shree Damodar College of Commerce & Economics, Margao-Goa  
FY BCA Semester-II, Semester End Examination, April 2023  
Applied Mathematics (CAC-107)

Duration: 2 Hours

Max Marks: 60

- Instructions: 1) Figures to the right indicate Full Marks.  
2) All Questions are compulsory.  
3) Use of non programmeable calculator is allowed.*

**Q.1A. State whether the following statements are true or false. (5x1= 05 marks)**

- a) The decimal number system has base 2.
- b) The negation of 'this paper is white' is given as 'this paper is black.'
- c) In Boolean Algebra the dual of  $a + 0$  is given as  $a * 1$ .
- d) Let  $A = \{1, 2, 3\}$   $B = \{2, 3, 4\}$ . then  $n(A \cup B) = 4$ .
- e) Let A and B be two sets such that  $A = B$ . Then  $A \times B = B \times A$ .

**Q.1B. Answer the following questions. (5x1= 05 marks)**

- a) Check if the following are statements or not. Justify your answer.
  - i) What is your name?.
  - ii)  $10 \leq 8$ .
- b) Let  $A = \{5, 6, 7\}$ ,  $B = \{1, 2, 3\}$  and  $R = \{(5, 1), (6, 3), (7, 2)\}$  Check if R is one one and onto function.
- c) Find the total number of ways in which 4 people can be arranged in one line.
- d) Convert the decimal number 5 to its Binary form.
- e) Find the value of 'n' if  $C(n, 1) + 3! = 20$ .

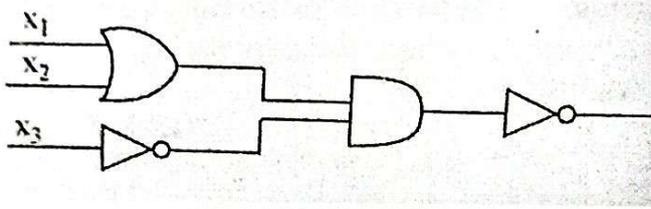
**Q.2. Answer the following. 10 marks**

- a) Convert the Decimal number 200 to its Octal form. (2)
- b) Write the negation of i) Today is Monday.  
Write the contrapositive of i) "If today is Sunday, then it is a holiday." (3)
- c) Prove by the Principle of Mathematical Induction  
 $p(n): 4 + 8 + 12 + \dots + 4n = 2n(n + 1)$  (5)

**Q.3. Answer the following 10 marks**

- a) Use table and find the values of  $f(x, y, z) = \overline{x \cdot y} + z$ . (2)
- b) Convert the Hexadecimal number 4A3F to its Decimal form. (3)

c) Find  $f(x_1, x_2, x_3)$  in the given circuit.



Also find the value of output if the input values are as follows:

$$x_1 = 0 \quad , \quad x_2 = 1 \quad , \quad x_3 = 1$$

(5)

**Q.4. Answer the following.**

**10 marks**

a) Define Universal set.

Let  $X$  be a universal set and  $A$  be subset of  $X$ . let  $n(x) = 100$  and  $n(A) = 80$  then find  $n(A^c)$ .

(2)

b) Construct the truth table for the logical statement  $p \wedge (\sim (p \vee q))$  and check if it is a Tautology.

(3)

c) Let  $X = \{1,2,3,4,5,6\}$   $A = \{2,4,6\}$   $B = \{1,2,3,4\}$  Verify the two De Morgan's Laws for the sets  $A$  and  $B$ .

(5)

**Q.5. Answer the following.**

**10 marks**

a) 
$$F(x) = \begin{cases} 3 & \text{for } -3 \leq x \leq -1 \\ -6x - 3 & \text{for } -1 \leq x \leq 0 \\ 3x - 3 & \text{for } 0 < x \leq 1 \end{cases}$$

Evaluate  $F(-2)$  and  $F(0)$

(2)

b) Let  $A = \{2,4,6\}$  and  $R = \{(x, y) / x \geq y, x \in A, y \in A\}$ .

Check if  $R$  is reflexive, symmetric and Transitive.

(3)

c) Expand  $(x + 2x^2)^4$  using Binomial theorem. Also find the middle term of the expansion  $(x + 2x^2)^4$ .

(5)

**Q.6. Answer the following.**

**10 marks**

a) Let  $f(x) = x + 2$  and  $g(x) = 2x^2$ .

Then find i)  $f(g(x))$     ii)  $f(f(x))$

(2)

b) State the Basic Pigeonhole Principle.

Find the minimum number of students that should be present in a class so that three of them are born in the same month?

(3)

c) In how many ways can a man invite 7 of his friends for a party so that 3 or more than 3 of his friends will remain present ?

(5)