

Vidya Vikas Mandal's
Shree Damodar College of Commerce and Economics, Margao-Goa
FY BCA, Semester-II, Semester End Examination, June 2022
CC 107 – Applied Mathematics

Duration: 2hrs

Max Marks: 60

Instructions: i. All questions are compulsory

ii. Figures to the right indicate full marks

iii. Non-scientific, non-programmable calculators are allowed

Q1 A. Attempt the following

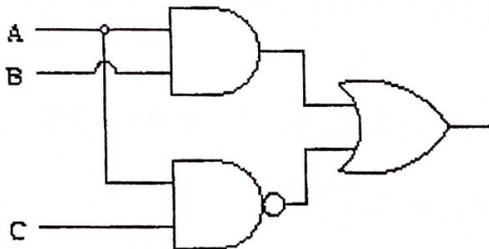
[5x1=5 Marks]

- i. Perform binary addition on 1100011 and 111011.
- ii. 'Shut the door!' Is the given sentence a statement in logic? Justify.
- iii. Simplify $(x \cdot y)(\bar{z} + x\bar{y})$
- iv. Identify the type of the following set. Justify your answer.
 $P = \{x / x \text{ is a composite number less than } 4\}$
- v. Find the inverse of the function $f(x) = 4x - 2$.

Q1 B. Attempt the following

[5x1=5 Marks]

- i. Write the converse of the statement 'If triangle ABC is right angle triangle then $AB^2 + BC^2 = AC^2$.'
- ii. Find the output of the following circuit for the given input $A=1, B=1$ and $C=0$



- iii. Multiply 11111 and 11.
- iv. List the elements of the set $S = \{x / x \text{ is an integer and } x^2 - 9 = 0\}$.
- v. Prove that $(a + b) \cdot (\bar{b} + c) + b(\bar{a} + \bar{c}) = a \cdot \bar{b} + ac + b$

Q2 A. Check whether $f(x) = 2x^2 + 1$ is injective. Justify.

[2 Marks]

B. If statements p, q, r and s are assigned truth values T, F, F, T respectively, find truth value of the following compound statements.

[3 Marks]

i. $(p \wedge q) \rightarrow (\sim q \vee r)$

ii. $(p \wedge s) \leftrightarrow (\sim q \wedge \sim r)$

C. In a survey of university students, 64 had taken mathematics course, 94 had taken chemistry course, 58 had taken Physics course, 28 had taken mathematics and physics, 26 had taken mathematics and chemistry, 22 had taken chemistry and physics course and 14 had taken all 3 courses. Find using Venn diagram how many had taken,

- i. one course only
- ii. Either of the courses

[5 Marks]

Q3 A. Aditi wants to arrange 4 English, 3 Mathematics and 2 computer science books on a shelf. If the books of the same subject are to be arranged together, find all possible arrangements. [2 Marks]

B. Convert the decimal number 659 to binary and hexadecimal form. [3 Marks]

C. Prove by Principle of Mathematical induction $3+7+11+\dots+(4n-1) = n(2n+1)$. [5 Marks]

Q4A. Prove the De Morgan's law in Boolean Algebra. [2 Marks]

B. $A = \{2,3,4,5\}$ and $R = \{(5,5), (5,3), (2,2), (2,4), (3,5), (3,3), (4,2), (4,4)\}$
Check whether R is an equivalence relation on set A. [3 Marks]

C. If $f(x) = x^2 - 1$ and $g(x) = \frac{1}{x+1}$ find $f(3)$, $g(2)$, $f[g(x)]$, $g[f(x)]$, $g[g(x)]$ [5 Marks]

Q5A. Let $A = \{1,2,3,4,5\}$ $B = \{1,3,5,7\}$ Find $A \Delta B$. [2 Marks]

B. Find number of arrangements of the letters of the word 'STATESMAN'. In how many of these arrangements,
i. vowels are always together [3 Marks]

ii. vowels are not together

C. verify whether $[(p \rightarrow q) \wedge (q \rightarrow r)] \rightarrow (p \rightarrow r)$ is a tautology, contradiction or contingency. [5 Marks]

Q6 A. If $A = \{3,4,5,6\}$ $B = \{2,3,4,5\}$ $C = \{1,2,6\}$; verify $(A-B) = A \cap C$. [2 Marks]

B. Find the domain and range of $f(x) = \frac{2x-1}{x+4}$ [3 Marks]

C. what are the number of ways of choosing 4 cards from a pack of 52 cards? How many of them are

i. 4 cards from same suit [5Marks]

ii. face cards

iii. two red and two black cards

iv. Cards of the same color.