

Vidya Vikas Mandal's
Shree Damodar College of Commerce and Economics, Margao-Goa
FY BCA, Semester-II, Supplementary Examination August 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
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Q1 A. Attempt the following

[5x1=5 Marks]

- i. Subtract 1101 from 11111.
- ii. Write the contrapositive of the statement, 'if I am sick then I won't be going to college'.
- iii. Simplify $[(\bar{x} \cap \bar{y}) \cup z] \cap \overline{(x \cup y)}$
- iv. Write the set $A = \{2, 3, 5, 7, 11, 13\}$ in set builder form.
- v. Find the inverse of $f(x) = 3x + 2$.

Q1 B. Attempt the following

[5x1=5 Marks]

- i. Express $(\sim p \wedge \sim q)$ in sentences where,
p- Harish is hardworking
q- Harish is intelligent
- ii. Give an example of a relation that is anti-symmetric.
- iii. Convert $(258)_{10}$ to octal form.
- iv. What is the cardinal number of the set $\{a, b, c, d, e\}$?
- v. Draw the circuit diagram of NOR and XOR gates.

Q2A. Identify the following set as null set or singleton set

[2 Marks]

$P = \{\text{point of intersection of two lines}\}$

$Q = \{x/x^2=9, x \text{ is even}\}$

B. check whether $(p \rightarrow q) \rightarrow (p \wedge q)$ is a contingency.

[3 Marks]

C. In a town of 130 people; 85 people speak Tamil, 40 speak English and 20 speak Hindi. Also 32 speak Tamil and English, 13 speak Tamil and Hindi and 10 speak English and Hindi, find the number of people who can speak all the three languages.

[5

Marks]

Q3 A. Find all arrangements of the word MISSISSIPPI. Also find the possible number of arrangements when vowels are kept together.

[2 Marks]

B. Convert (101010) in decimal, octal and hexadecimal form

[3 Marks]

C. Prove by Principle of mathematical induction, the sum of 'n' natural numbers is $\frac{n(n+1)}{2}$

[5 Marks]

Q4A. verify the distributive laws in set theory for the sets **[2 Marks]**
 $A=\{1,2,3,4\}$, $B=\{3,4,5,6\}$ and $C=\{1,5,6,7,8\}$

B. Prove that the relation R on the set of integers defined as **[3 Marks]**
 $R = \{(x,y)/x-y \text{ is divisible by } 7; x \in \mathbb{Z} \text{ and } y \in \mathbb{Z}\}$ is an equivalence relation.

C. Find the domain of the function $f(x) = \frac{1}{x^2-5x-14}$ and range of the function $g(x) = 5-4x$. **[5 Marks]**

Q5A. If $X=\{x/ x \in \mathbb{N}; x \leq 10\}$, $A=\{1,4,7,10\}$ $B=\{2,5,8\}$, find $A' \cap B'$. **[2 Marks]**

B. In how many ways can the letters of the word CORPORATION be arranged among themselves? In how many ways can it be arranged without altering the relative positions of vowels and consonants? **[3 Marks]**

C. verify if $\sim(p \rightarrow q)$ and $p \leftrightarrow q$ are logically equivalent. **[5 Marks]**

Q6 A. If $A=\{1,2,3\}$ $B=\{2,4,5\}$, find $A \times (A-B)$ **[2 Marks]**

B. Find $f[g(x)]$, $g[f(x)]$ and $f[f(x)]$ if $f(x) = x+3$ and $g(x) = x^2+2x+1$ **[3 Marks]**

C. From a group of 6 men and 4 women, a committee of 5 has to be formed. How many committees are possible if **[5 Marks]**

i. there are no restrictions

ii. 3 men and 2 women are to be selected

iii. at most 1 woman is to be selected
