PRESIDENCY COLLEGE
(AUTONOMOUS)
AFFILIATED TO BENGALURU CITY UNIVERSITY, APPROVED BY AICTE, DELHI & RECOGNISED BY THE GOVT. OF KARNATAKA
RE-ACCREDITED BY NAAC WITH 'A+' GRADE
GAIN MORE KNOWLEDGE REACH GREATER HEIGHTS

21C205.1C

REG NO: | | | | | | | | |

END TERM EXAMINATION DECEMBER 2022
BCA - I SEMESTER
GC205.1C: DISCRETE STRUCTURES

Duration: 2 Hours **Max Marks: 60**

Instruction: *Answers should be written in* ***English*** *only.*

PART-A

Answer **any EIGHT** questions. **Each** question carries **TWO** marks. **(8 X 2 = 16)**

1. Define Power Set with an example.
2. If A = {2,3,7}, B = {2,4,6}, C = {3,6} then find A X (B-C).
3. Construct truth table for the proposition $p \wedge \sim q$.
4. Define Equivalence relation with an example.
5. Define Combination.
6. Find the distance between the points A = (-7, 4), B = (-5,-1).
7. Define Slope of a line.
8. Find the equation of a line passing through (-1, 2) and having slope 3.
9. Define Binary tree with an example.
10. Define Complete Graph with an example.

PART-B

Answer **any FOUR** questions. **Each** question carries **SIX** marks. **(4 X 6 = 24)**

1. In a class consisting of 120 students, 30 are studying C++, 40 are studying Python and 45 are studying Java, 15 are studying both C++ and Python, 20 are studying both Python and Java, 12 are studying both C++ and Java, 8 are studying all the three.
   How many do not take any of these subjects? How many take only one language?
2. Define.
   a) One to One function
   b) Onto function
   c) Bijective functions with examples.
3. Show that the points A (3, 2), B (0, 5), C (-3, 2) and D (0, -1) are the vertices of square. Also find area of square ABCD.

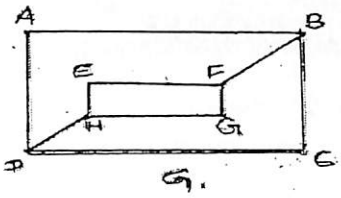
4. (a) In how many ways can the letters of the word ASSASSINATION be arranged so that all the S's are together? 3

   (b) In how many ways can a team of 3 boys and 3 girls be selected from 5 boys and 6 girls. 3

5. (a) Derive the equation of the line whose X-intercept is "a" and Y-intercept is "b". 4

   (b) Find the equation of line whose X-intercept is 3 and Y-intercept is 4. 2

6. Examine whether the following graphs are isomorphic or not.



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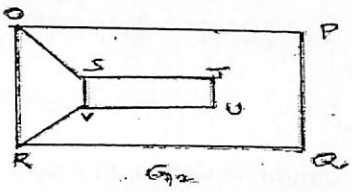

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PART-C

Answer **any TWO** questions. **Each** question carries **TEN** marks. **(2 X 10 = 20)**

1. (a) Show that $(p \rightarrow q) \leftrightarrow (\sim q \rightarrow \sim p)$ is a Tautology. 5

   (b) Prove by Mathematical Induction $1^2 + 2^2 + 3^2 + \cdots \ldots \ldots \ldots \ldots + n^2 = \frac{n(n+1)(2n+1)}{6}$ for all positive integers 'n' 5

2. (a) State Pigeonhole Principle. 2

   (b) Let $A = \{1,2,3,4,6\}$. Define a relation R on set A defined by

   $R = \{(a,b): a,b \epsilon A \text{ "} a \leq b \text{"}\}$.

   (i). Write down elements of R

   (ii). Domain, Range and Co-domain of R

   (iii) Matrix representation of R

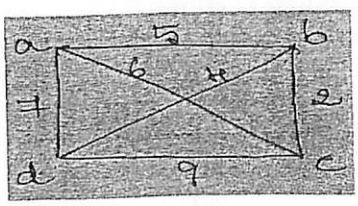
   (iv) Digraph of R 8

3. (a) Find the equation of locus of the point which moves such that its distance from (0 , 3) is twice its distance from (0 , -3) 5

   (b) Find k for which the lines $2x - ky + 1 = 0$ *and* $x + (k+1)y - 1 = 0$ are Perpendicular. 5

4. (a) Prove that in any undirected graph, the number of odd degree vertices is even.

   (b) Define Hamiltonian cycle. Find two distinct Hamiltonian cycles in the below graph also find their weight.



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