



PRESIDENCY COLLEGE

(AUTONOMOUS)

AFFILIATED TO BANGALURU CITY UNIVERSITY APPROVED BY NICTE, DELHI & RECOGNISED BY THE GOVT. OF KARNATAKA
RE-ACCREDITED BY NAAC WITH 'A+' GRADE

21C205.1C

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END TERM EXAMINATION NOV/DEC 2023
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 a power set with an example.
2. If $A = \{1,2,3\}$ and $B = \{3,4,5,6\}$ then find $A \times B$ and $B \times A$.
3. Construct the truth table for $p \vee \sim q$.
4. Define Combination and write its formula.
5. Find the value of x , if $\log_4 64 = x$.
6. Find the distance between the points $A(3,-1)$ and $B(4,-2)$.
7. Find the slope of the given points $A(4,5)$ and $B(0,-2)$.
8. Find the coordinates of the points which divides the line joining the points $(2,-1)$ and $(3,4)$ in the ratio 1:2 internally.
9. Define Isomorphism
10. Define the terms:
 - (i) Path
 - (ii) Cycle

PART - B

Answer any FOUR questions. Each question carries SIX marks.

(4 X 6 =24)

1. For any three sets A,B and C , prove that $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$
2. Write converse, inverse and contrapositive for the following statement” If two integers are equal then their squares are equal”
3. Let $A = \{1,2,4,6,8\}$ and R be the relation defined on A and is defined by $R = \{(a,b) / a \leq b\}$,
i) write R ii) M_R iii) diagram of R.
4. Find the area of a triangle whose vertices are A(1,3,2), B(-1,4,-1) and C(-2,3,-5).
5. Find the equation of the perpendicular bisector of the line joining the points (-1,5) and (2,4).
6. Draw a connected graph which is Eulerian but not Hamiltonian.

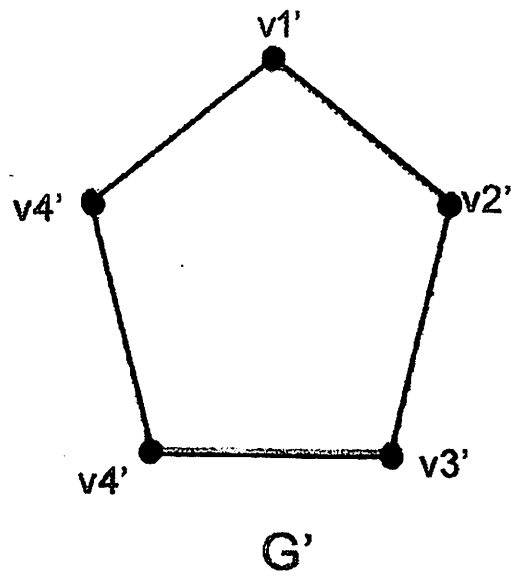
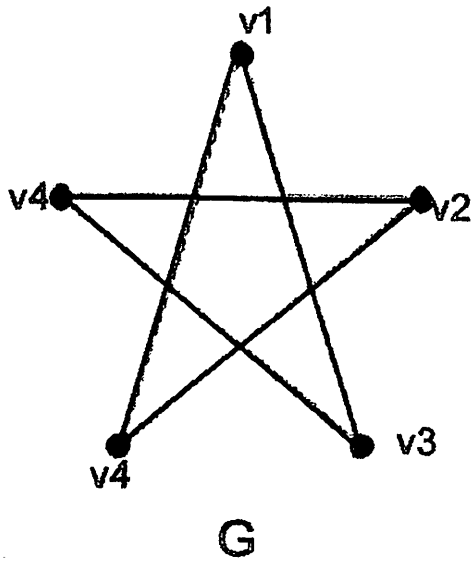
PART - C

Answer any TWO questions. Each question carries TEN marks.

(2 X 10 =20)

1. a. If $f:R \rightarrow R$, $g:R \rightarrow R$ defined by $f(x) = x^3 + 3x + 1$ and $g(x) = 2x - 3$, find fog and gof.
b. Prove that $(p \rightarrow q) \leftrightarrow (\sim q \rightarrow \sim p)$ is a tautology. (5+5)
2. a. Prove by mathematical induction that $1 + 2 + 3 + \dots + n = \frac{n(n+1)}{2}$, $n \in \mathbb{Z}$.
b. If F_0, F_1, F_2, \dots are Fibonacci numbers and prove that $\sum_{i=0}^n F_i^2 = F_n \cdot F_{n+1}$, $\forall n \in \mathbb{Z}^+$. (4+6)
3. a. Show that the line joining the points (2,3) and (4,2) which is perpendicular to the line joining the points (5,3) and (6,5).
b. Find the equation of the locus of the point which moves such that its distance from (-1,2) is equal to 5 units. (4+6)

4.a. Examine whether the two graphs are isomorphic or not.



b. Define Spanning tree with an example.

(6+4).
