



# 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

21C205.1C

## END TERM EXAMINATION MARCH 2022 BCA - I SEMESTER GC205.1C: DISCRETE STRUCTURES - DSC

Duration: 2 Hours

Max Marks: 60

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

### PART- A

I Answer any **EIGHT** questions.

(8x2=16)

1. Let  $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$ ,  $A = \{3, 4, 5, 6\}$ ,  $B = \{1, 2, 3, 6\}$ ,  $C = \{5, 6, 4, 7\}$  Find  
i)  $(A \cup C)^1$   
ii)  $(A \cap C)^1$

2. Define an equivalence relation.

3. Define Tautology.

4. Evaluate  $\frac{n!}{(n-r)!}$ , when  $n=6$ ,  $r=2$

5. Find the ordered pair in the relation on  $\{1, 2, 3, 4\}$

$$M_R = \begin{bmatrix} 1 & 0 & 0 & 1 \\ 0 & 1 & 1 & 0 \\ 0 & 0 & 1 & 1 \\ 1 & 0 & 1 & 0 \end{bmatrix}$$

6. Find the distance between the point  $A = (-7, 4)$  and  $B = (-5, -1)$

7. Find the co-ordinates of the point which divides the line joining the points  $(5, 4)$  and  $(4, 5)$  in the ratio 4:3 externally.

8. If the slope of line joining the points  $(6, 3)$  and  $(4, \lambda)$  is  $-1$ , find the value of  $\lambda$ .

9. Define the order of graph.

10. Define complete graph and regular graph.

### PART-B

Answer any **FOUR** questions. Each question carries **SIX** marks.

(4 X 6=24)

1. If  $A = \{1, 4\}$ ,  $B = \{2, 3, 6\}$  and  $C = \{2, 3, 7\}$ , then  
verify that  $A \times (B - C) = (A \times B) - (A \times C)$

2. Write the converse, inverse and contrapositive of "If two integers are



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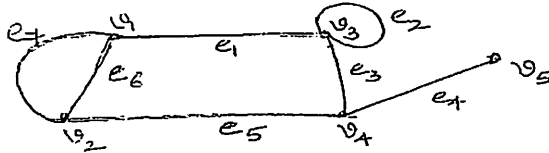
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equal then their squares are equal”.

3. Find the number of 4- digits numbers that can be formed using the digits 1,2,3,4,5, if no digit is repeated. How many of these will be even?
4. Show that the points (2,1) (3,4) (-2,3) and (-3,-2) form a Rhombus.
5. Find the acute angle between the lines  $9x+3y-5=0$  and  $2x+4y+3=0$
6. For the graph shown in below figure, verify  $\sum \deg_G(V_i) = 2(E)$ .  
E is number of edges.



## PART-C

Answer any TWO questions. Each question carries TEN marks.

(2 X 10=20)

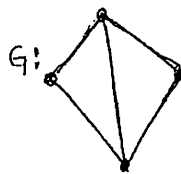
1. a) If  $f: \mathbb{R} \rightarrow \mathbb{R}$  is defined by  $f(x)=2x+5$ . Prove that  $f$  is one-one and onto.  
b) Prove that  $(p \rightarrow q) \leftrightarrow (\sim q \rightarrow \sim p)$  is a tautology.
2. a) Find the co-efficient of  $x^6 y^3$  in the expansion of  $(x+2y)^9$   
b) Write the recurrence relation for the factorial of a number  $n=0,1,2,3,4$
3. a) Find the ratio in which  $P(2,7)$  divides the line joining the points  $A(8,9)$  and  $B(-7,4)$   
b) Find the value of  $k$  such that the line  $(k-2)x + (k+3)y - 5=0$  is perpendicular to the line  $2x-y+7=0$ .
4. a) Write down all possible non-isomorphic subgraphs of the following graph  $G$ . How many of them are spanning subgraphs?

(5+5)

(6+4)

(5+5)

(6+4)



- b) Define spanning tree and write the properties of spanning tree.