Code No.: DS402PC	R20	H.T.No.			8	R						

CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS
II–B.TECH–II–Semester End Examinations (Supply) -June- 2025
DISCRETE MATHEMATICS
(Common to CSC, CSD)

[Time: 3 Hours] **[Max. Marks: 70]**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 20 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-A **(20 Marks)**

1.	a)	Write a note on Tautology with an example.	[2M]
	b)	Write the converse and contrapositive of the statement: "If P is a square, then P is a rectangle".	[2M]
	c)	Give suitable examples for a relation which is not equivalence relation.	[2M]
	d)	Consider a relation R = {(1, 1), (2, 3)} on X = {1, 2, 3}. What are the properties satisfied by above relation?	[2M]
	e)	Define algorithm.	[2M]
	f)	What is a well formed Formula? Write an example.	[2M]
	g)	State Bayes theorem.	[2M]
	h)	Solve the recurrence relation U_n-7U_{n-1} =0 if U_0=2.	[2M]
	i)	Define Bipartite Graph with an example.	[2M]
	j)	What is Chromatic Number? Find the Chromatic Number for K_5 Graph.	[2M]

PART-B **(50 Marks)**

2. Construct a truth table for each of these compound propositions. [10M]
   i) *p*-+-,*p*
   ii) *p* +-+-,*p*
   iii) *p*A*q*-+*p*V*q*
   iv) *(q*-+-,*p)*+-+*(p*+-+q)

OR

3.a) Show that (p∧q) →(p∨q) is a tautology. [5M]
b) Obtain the PCNF for (¬p∨ ¬q)→(p↔ ¬q). [5M]

4. Define a bijective function. Explain with reasons whether the following functions are bijective or not. Find also the inverse of each of the functions. [10M]
   i) f(x) = 4x+2, A=set of real numbers.
   ii) f(x) = 3+ 1/x, A=set of non-zero real numbers.
   iii) f(x) = (2x+3) mod7, A=N7.

OR

5. How many relations are there on a set with 'n' elements? If a set A has 'm' elements and a set B has 'n' elements, how many relations are there from A to B? If a set A = {1, 2}, determine all relations from A to A. [10M]

6. Write about Bubble sort and insertion sort with examples of each. [10M]

OR

7. Use Mathematical Induction to Show that 1+2+.....n=n(n+1)/2. [10M]

8.a) Find a generating function for the recurrence relation [5M]
$a_n - a_{n-1} + 6a_{n-2} = 0$ For $n \geq 2$.

b) State and explain the properties of the pigeon hole principle. [5M]

OR

9. Apply is pigeon hole principle show that of any 14 integer are selected from the set S={1, 2, 3.....25} there are at least two where sum is 26. Also write a statement that generalizes this result. [10M]

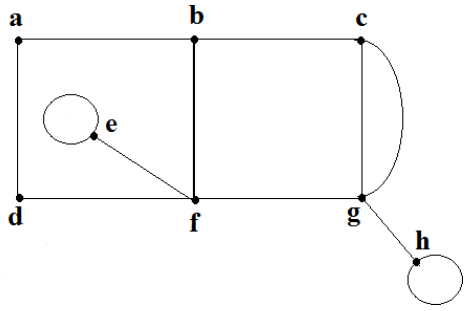
10.a) Prove that a tree with n vertices has exactly n-1 edges. [5M]

b) How many vertices will the following graph contain 16 edges and all vertices of degree 2. [5M]

OR

11.a) What are the steps involved in prim's algorithm for finding a minimum spanning tree. [5M]

b) Describe the procedure to obtain all possible spanning trees in a given graph. Find the degree of each region in the following planar graph [5M]



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