Code No.: (R22IT402PC) | R22 | H.T.No. | | | 8 | R | | | | | |

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

[Time: 3 Hours] **[Max. Marks: 60]**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 10 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 **(10 Marks)**

1.	a)	Represent the proposition "If you have the flee then you miss the final examination" into symbolic form and also it negation.	[1M]
	b)	Write about well-formed formulae.	[1M]
	c)	Define binary relation.	[1M]
	d)	Differentiate partial ordering and total ordering relations.	[1M]
	e)	Provide an example of a partially ordered set.	[1M]
	f)	Explain the concept of duality in Boolean algebra.	[1M]
	g)	How many can 10-similar coins fall heads, when they are tossed simultaneously?	[1M]
	h)	Determine the co-efficient of x^{12} in $x^3(1-2x)^{10}$.	[1M]
	i)	Define Bipartite graph and Isomorphic graphs.	[1M]
	j)	Define planar graph. Is $K_{2,3}$ planar graph?	[1M]

PART-B **(50 Marks)**

2.		Obtain PCNF and PDNF for the formula $(\sim p \rightarrow r) \wedge (q \leftrightarrow p)$.	[10M]
		OR	
3.	a)	Show that $R \rightarrow S$ can be drawn from the premises $P \rightarrow (Q \rightarrow S)$, $\neg R \vee P$ and Q.	[5M]
	b)	Prove or disprove the validity of the following arguments using the rules of inference, All men are fallible, All kings are men, Therefore, all kings are fallible.	[5M]
4.		Explain about relations with examples and give suitable examples for equivalence relation.	[10M]
		OR	
5.	a)	Let $f(x) = x+4$, $g(x) = 4x$ for $x \in R$, where R is the set of real numbers. Find f o g and g o f.	[4M]
	b)	Let R ={ (b,c), (b,e), (c,e), (d,a), (c,b), (e,c)} be a relation on the set A ={ a,b,c,d,e}. Find the transitive closure of the relation R.	[6M]
6.		Define the terms: POSET and Hasse diagram. Determine if the set S={2,4,8,16} with the divisibility relation | is a partially ordered set and draw Hasse Diagram.	[10M]
		OR	
7.	a)	Define a semi group and Monoid. Give an example of a Monoid which is not group. Justify your answer.	[6M]
	b)	Let G= {-1, 0, 1}, verify whether G forms a group under usual addition.	[4M]

8. State and prove binomial theorem. [10M]

OR

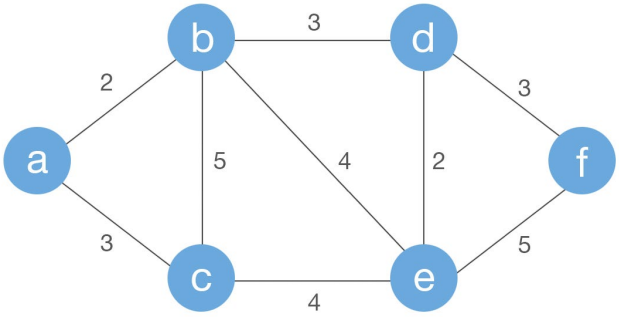
9.a) Express how many ways are there to seat 10 boys and 10 girls around a circular table, if boys and girls seat alternatively? [5M]

b) The letters of the word VICTORY are rearranged in all possible ways and the words thus obtained are arranged as in a dictionary, what is the rank of the given word? [5M]

10. In any planar graph, show that |V|–|E|+R|=2. Prove that complete graph of 5 vertices is non planar. [10M]

OR

11. Apply Krushkal's algorithm and Prim's algorithm to obtain minimal spanning tree and also find minimal cost. [10M]



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