Q. Code:941507

Reg. No. | | | | | | | | | | | | | |

B.E. / B.TECH. DEGREE EXAMINATIONS, MAY 2024

Third Semester

MA18352 – DISCRETE MATHEMATICS

(Common to CSE and INT)

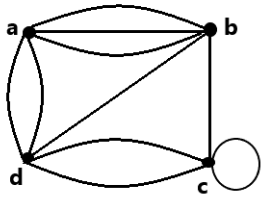
(Regulation 2018/2018A)

TIME: 3 HOURS **MAX. MARKS: 100**

COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO 1	Acquire the concepts of logic to test the lucidity of a program.	**3**
CO 2	Describe and apply the counting principles in computer simulations.	**3**
CO 3	Develop graph theory tools for day-to-day applications.	**3**
CO 4	Expose the concepts and properties of algebraic structures such as groups, rings and fields.	**3**
CO 5	Categorize Boolean algebraic structures on numerous levels, the concepts needed to test the logic of a program.	**3**

PART- A (10 x 2 = 20 Marks)

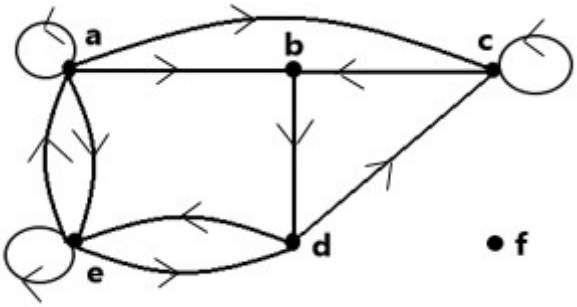
(Answer all Questions)

		CO	RBT LEVEL
1.	Construct a truth table for the compound proposition p ⊕ (p ∨ q).	**1**	**2**
2.	State the converse, inverse and contrapositive of the conditional statement: I go to the beach whenever it is a sunny summer day.	**1**	**2**
3.	Find $\lceil \lfloor \frac{1}{2} \rfloor + \lceil \frac{5}{2} \rceil + \frac{1}{2} \rceil$.	**2**	**2**
4.	What is the generating function for the sequence 1,1,1,1,1,1?	**2**	**2**
5.	Find the adjacency matrix of the following graph: 	**3**	**2**
6.	How many vertices does a 4-regular graph with 10 edges have?	**3**	**2**
7.	Is the union of two subgroups a subgroup? Justify.	**4**	**2**
8.	Find any two cosets of the subgroup $H=\{1,-1\}$ in $G=\{1,-1,i,-i\}$ under the binary operation multiplication.	**4**	**2**
9.	Consider a relation $R=\{(1,1),$¿ defined on a set $X=\{1,2,3\}$. Is it symmetric?	**5**	**2**

10.	Consider the Poset A = {15,5,30} under the relation "less than or equal to". Verify whether $(A, \leq)$ is a totally ordered set.	**5**	**2**	

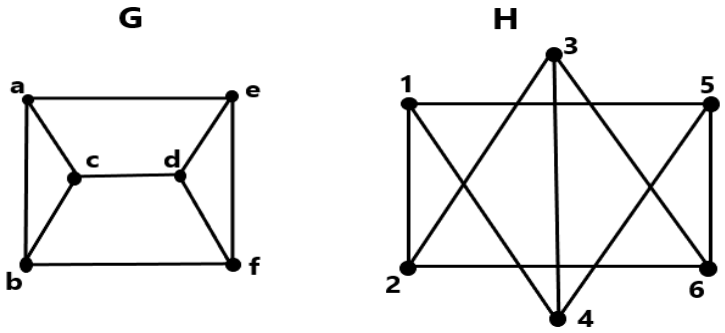
PART- B (5 x 14 = 70 Marks)

		Marks	CO	RBT LEVEL
11. (a)	Find the PDNF and PCNF of the following compound proposition: $[P \rightarrow (Q \wedge R)] \wedge [\neg P \rightarrow (\neg Q \wedge \neg R)]$.	**(14)**	**1**	**3**
	(OR)			
(b)	Let P(x) : x is a baby, Q(x) : x is logical, R(x) : x is able to manage a crocodile, S(x) : x is despised. Suppose that the domain consists of all people. Express the following statements using quantifiers, logical connectives, P(x), Q(x), R(x) and S(x): (i) Babies are illogical. (ii) Nobody is despised who can manage a crocodile. (iii) Illogical persons are despised. (iv) Babies cannot manage crocodiles. (v) Does (iv) follow from (i), (ii) and (iii)?	**(14)**	**1**	**3**
12. (a)	Using mathematical induction, prove that $1^2-2^2+3^2-\ldots+(-1)^{n-1}n^2=(-1)^{n-1}\frac{n(n+1)}{2}$ where 'n' is positive integer.	**(14)**	**2**	**3**
	(OR)			
(b)	How many positive integers not exceeding 1000 are divisible by any of the integers 3,5,7,11?	**(14)**	**2**	**3**
13. (a)	Find the in-degree and out-degree of each vertex in the following digraph and hence verify Handshaking Theorem for digraphs:	**(14)**	**3**	**3**



(OR)

(b)	Verify whether the graphs G and H are isomorphic:	**(14)**	**3**	**3**



14. (a)	Find all the subgroups of ¿	**(14)**	**4**	**3**

(OR)

(b)	Show that ¿ is an abelian group where * is defined by $a*b=\frac{ab}{2}, \forall a,b \in Q^{+¿.¿}$	**(14)**	**4**	**3**

15. (a)	Let $S=\{a,b,c\}$. Draw the Hasse diagram of $(\wp(S), \subseteq)$. Show that it is a poset.	**(14)**	**5**	**3**

(OR)

(b)	Let $D_{30}=\{1,2,3,5,6,10,15,30\}$ and the relation R is "divisor" on D_{30}.	**(14)**	**5**	**3**

(i) Draw the Hasse diagram.

(ii) Find all the lower bounds of 10 1nd 15.

(iii) Find the glb of 10 and 15.

(iv) Find all the upper bounds of 10 and 15.

(v) Find the lub of 10 and 15.

PART- C (1 x 10 = 10 Marks)

(Q.No.16 is compulsory)

		Marks	CO	RBT LEVEL
16.	Construct the truth table for $(P \leftrightarrow Q) \leftrightarrow (R \leftrightarrow S)$.	**(10)**	**1**	**3**

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