INSTITUTE OF AERONAUTICAL ENGINEERING

Dundigal, Hyderabad - 500 043

INFORMATION TECHNOLOGY

TUTORIAL QUESTION BANK

Course Title	**DISCRETE MATHEMATICAL STRUCTURES**			
Course Code	**AHS013**			
Regulation	**R16**			
Course Structure	Lectures	Tutorials	Practicals	Credits
	3..	1	-	4
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OBJECTIVES

To meet the challenge of ensuring excellence in engineering education, the issue of quality needs to be addressed, debated and taken forward in a systematic manner. Accreditation is the principal means of quality assurance in higher education. The major emphasis of accreditation process is to measure the outcomes of the program that is being accredited.

In line with this, Faculty of Institute of Aeronautical Engineering, Hyderabad has taken a lead in incorporating philosophy of outcome based education in the process of problem solving and career development. So, all students of the institute should understand the depth and approach of course to be taught through this question bank, which will enhance learner's learning process.

S. No	Question	Blooms Taxonomy Level	Course Outcome
	UNIT – I **Mathematical Logic and Predicates**		
	PART - A (Short Answer Questions)		
1	**Define** statement and atomic statement?	Knowledge	1
2	**Explain** logical equivalence with an example?	Understand	2
3	**Describe** the tautology?	Understand	2
4	**Remember** the converse, inverse and contra positive of the following propositions: **P -> (Q -> R)**	Remember	1
5	**Interpret** that **Pv[P^(PvQ)]** and P is a logically equivalent without using truth table ?	Remember	2
6	**Explain** P↑Q in terms of "↓" ?	Understand	1
7	**Define** predicate and predicate logic?	Knowledge	2
8	**Define** contradiction and provide a proof by contradiction of the following statements for every integer 'n' ,if n^2 is odd then 'n' is odd.	Knowledge	2
9	**Define** converse, contra positive and inverse of implication?	Knowledge	1
10	**Analyze** and symbolize the following statements: a) all men are good b) no men are good	Analyze	1
11	**Examine** the disjunctive normal form of the formula: P↔Q?	Knowledge	2
12	**Describe** the value of: P↔Q in terms of {~,v} only ?	Understand	1

13	**Explain** about the free and bound variables?	Understand	2
14	**Illustrate** that if 'm' is an even integer then m+7 is an odd integer?	Remember	2
15	**Demonstrate** the truth table for conjunction and conditional statements?	Understand	1
16	**Construct** the truth table for p->(q->r)?	Remember	1
17	**Show** that ~(p->q)->p?	Remember	2
18	**Construct** the statements R: Mark is rich. H:Mark is happy write the following statements in symbolic form a) mark is poor but happy b)mark is poor but happy	Remember	2
19	**Construct** the following statement in symbolic form: "the crop will be destroyed if there is a flood".	Remember	1
20	**Show** that R→S can be derived from the premises P→(Q→S), ~R v P and Q	Remember	1

PART-B (Long Answer Questions)

1	a) **Explain** conditional proposition with a suitable example. b) **Explain** logical equivalence with an example.	Understand	1
2	**(a) Define** tautology? Show that **[(p->q)->r]->[(p->q)->(p->r)]**is a tautology or not ? (b) **Define** the converse, inverse and contra positive of the following propositions: **i. P -> (Q -> R)** **ii. (P ^ (P -> Q)) -> Q.**	Knowledge	2
3	**Show** that S v R is a tautologically implied by (p v q) ^ (p → r) ^ (q → s) With reference to automatic theorem proving.	Remember	2
4	**Show** that RVS is valid conclusion from the premises: CVD,(CvD)→~H),~H→(A^~B),(A^~B)→RVS	Remember	1
5	**Show** that **i)~(P↑Q)↔~P↓~Q ii)~(P↓Q)↔~P↑~Q** without using truth table ? Express p->(~p->q) i)in terms of '↑' only ii)in terms of '↓'	Remember	1
6	(a) **Describe** the proposition (p ^ q) ~ (p v q) is a contradiction. (b) Symbolize the following statements: all men are good no men are good some men are good some men are not good	Understand	2
7	(a)**Construct** the disjunctive normal form of the formula: P↔Q? (b) **Construct** the value of: P↔Q in terms of {~,v} only ?	Remem	2
8	**Explain** about the free and bound variables. With an examples?	Understand	1
9	**Show** that if 'm' is an even integer then m+7 is an odd integer? ii)**write** each of the following in symbolic form a)all monkeys have tails b)no monkey have tail c)some monkey have tails d)some monkey have no tails	Remember	2
10	**Construct** tautology? Show that **[(p->q)->r]->[(p->q)->(p->r)]** is a tautology or not ?	Remember	1

PART-C (Analytical Questions)

1	**Construct** the negations of the following statements, a) Jan will take a job in industry or go to graduate school b) James will bicycle or run tomorrow c) If the processor is fast then the printer is slow	Remember	1
2	**Construct** the pdnf of (p^q)V(~pVr)V(qVr) using truth table.	Remember	2
3	**Show** that: a) R^(PvQ) is a valid conclusion from premises PvQ, Q→R,P→M and ~M. b) Show that: R→S can be derived from the premises, P→(Q→S), ~RvP and Q	Remember	2

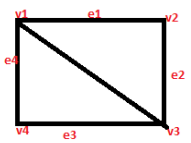
4	**Show** that the following premises are inconsistent. (a) If jack misses many classes through illness, then he fails high school (b) If jack fails high school, then he is uneducated. (c) If jack reads lot of books, then he is not uneducated.. (d) Jack misses many classes through illness and lot of books	Remember	1
5	**Select** p,q and r be the propositions P: you have the flee Q: you miss the final examination R: you pass the course. Write the following propositions into statement form. (i) p→q (ii) ~p→r (iii) q→~r (iv) pVqVr (v) (p→~v)V(q→~r) (vi) (p^q)V(~q^r).	Knowledge	2
	UNIT – II **Relations, Functions and Lattices**		
	PART - A (Short Answer Questions)		
1	**Describe** a relation?	Understand	4
2	**Illustrate** the operations on relations?	Remember	5
3	**Define** Reflexive relation?	Knowledge	5
4	**Define** Symmetric relation?	Knowledge	5
5	**Define** Tranisitive relation?	Knowledge	5
6	**Define** Indegree and Outdegree for diagraph	Knowledge	5
7	**Define** bounded lattice and distributive lattice?	Knowledge	5
8	**Explain** is a partial order relation?	Understand	3
9	**Construct** the Hasse diagram represented with positive divisors of 36?	Remember	3
10	**Define** a) onto function b) one to one function	Knowledge	4
11	**Define** bijective function?	Knowledge	4
12	**Explain** constant function?	Understand	4
13	**Define** Identity function?	Knowledge	4
14	**Define** Inverse function?	Knowledge	4
15	If A = {1,2,3}, B={4,5}.**Find** A X B and B X A ?	Knowledge	4
16	**Prove** that A – (B ∩ C) = (A-B) ∪ (A-C)?	Remember	4
17	**Define** lattice ? If A is finite set and P(A) us power set then prove that (P(A),<=) is a lattice for i) A={a }	Knowledge	4
18	**Describe** the properties of lattice?	Understand	5
19	**Show** that the function $f(x)=x^3$ and $g(x)=x^{1/3}$ for x€R are inverse of each other ?	Remember	3
20	**Solve** the functions f:A→B,g:B→C, h:C→D,then prove that ho(gof)=(hog)of ?	Remember	4
21	**Show** that $(gof)^{-1}=f^{-1}og^{-1}$ where f and g are one to one, onto functions.	Remember	5
22	**Design** the Hasse diagram of (P(S),≥), where P(S) is power set of the set S = {a, b, c}?	Create	2
23	Let R be the Relation R= {(x,y)/ x divides y)} . **Design** the Hasse diagram?	Create	2
24	Let R be the Relation R= {(x,y)/ x is a factor of y)} . **Design** the Hasse diagram?	Create	2
	PART-B (Long Answer Questions)		
1	**Define** a relation? Explain the properties of relations and the operations on relations?	Knowledge	3
2	**Define** the transitive closure of relation R={(a,a) (a,b) (a,d) (b,a) (c,b) (a,c) (d,b) (d,c) (d,d) } by using warshal algorithm?	Knowledge	4

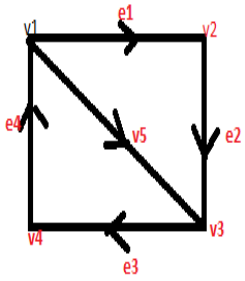
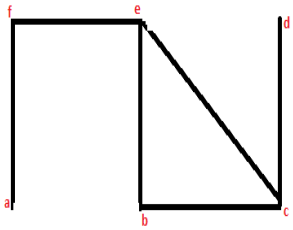
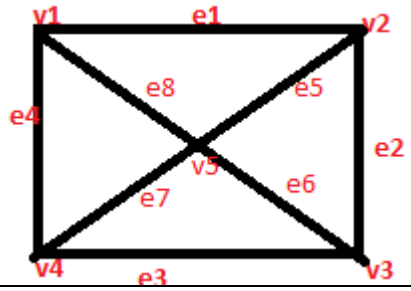
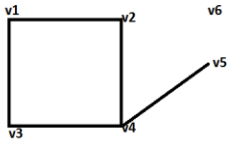
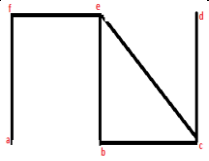
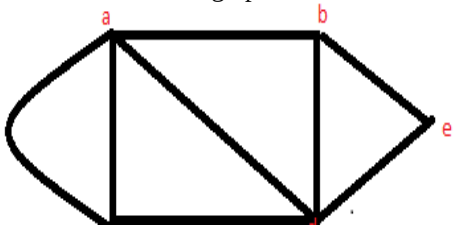
3	**Construct** the hasse diagram for the divisibility relation i)A={3,6,12,36,72} ii)A={1,2,3,5,6,10,15,30}	Remember	5
4	**Define** lattice ? If A is finite set and P(A) us Power set then prove that (P(A),<=) is a lattice for i) A={a } ii)A={a,b}	Knowledge	4
5	**Define** bounded lattice and distributive lattice? What is a partial order relations?	Knowledge	5
6	**Describe** the sets A & B given that A – B = { 1,2,4 } B – A = { 7,8 } and A U B = { 1,2,4,5,7,8,9}.	Knowledge	4
7	**Solve** that, Let A be a given finite set and p(θ) its power set.let <= be the inclusion relation on the elements p(θ) draw the hasse diagram of (p(A),<=) i)A={a} ii)B={a,b} iii)C={a,b,c} iv)D={a,b,c,d}	Remember	5
8	**Construct** the hasse diagram represented with positive divisors of 36?	Remember	5
9	**Describe** the function and find the inverse of the function i) $f(x)=10/5\sqrt{7-3x}$ ii) $4.e^{(6x+2)}$	Understand	5
10	**Describe** a)onto function b)one to one function c) bijective function d)constant function	Understand	4
	PART-C (Analytical Questions)		
1.	**Describe** a bijective function. Explain with reasons whether the following functions are bijective or not. Find also the inverse of each of the functions. (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 , $A=N_7$	Understand	6
2.	Consider sets A={a,b,c} B={1,2,3}, R={ (a,1),(b,1),(c,2),(c,3) } and s={ (a,1),(a,2),(b,1),(b,2) } from A to B. **Determine** (i) $\overline{R}$ (ii) $\overline{S}$ (iii) RUS (iv) R∩S (v) R^c (vi) S^c	Understand	3
3.	Let A={1,2,3,4,6,12) on set A define the relation A to B, iff A divides B.. **Prove** that R is partial order relation and draw the Hasse diagram form this relation.	Remember	4
4.	a) Let the Relation R be R={(2,1),(3,2),(3,3)} on the set A= {1,2,3}. **What** is the Transitive Closure of R? b) **Explain** in brief about Inversive and Recursive functions with examples?	Understand	3
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.	Understand	5
6.	a) A function f(Z X Z) Z is defined by f(x,y)=4x=5y.**Prove** that f is not one-to-one, but on to? b) Let f(x): x2 -3x+2. Find f(x2) and f(x+3)?	Understand	5
	UNIT – III **ALGEBRAIC STRUCTURES AND COMBINATORICS**		

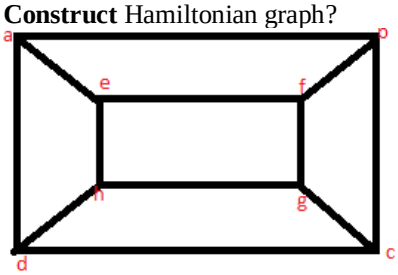
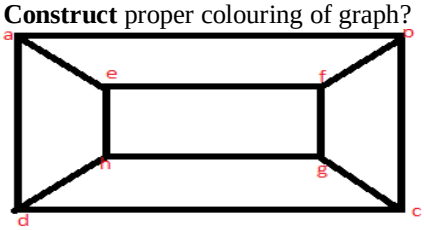
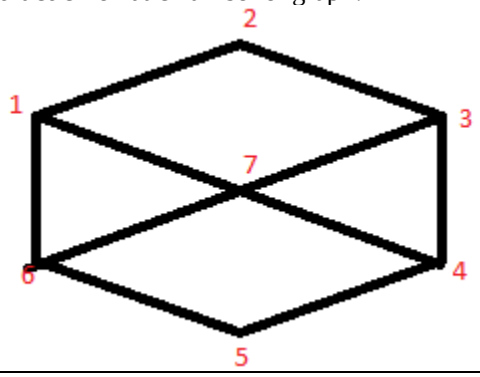
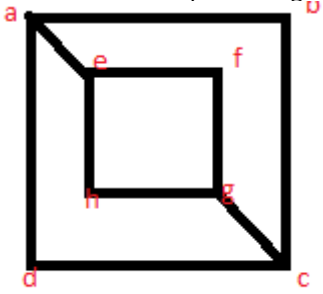
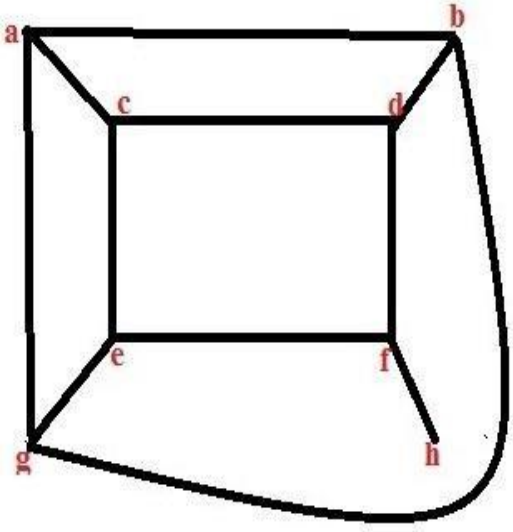
PART - A (Short Answer Questions)			
CIE-I			
1	**Define** group and semi group?	Knowledge	5
2	**Define** monoid and sub group?	Knowledge	4
3	**Define** homomorphism?	Knowledge	4
4	**Define** isomorphism?	Knowledge	5
5	**Illustrate** if a, b are elements of M and a*b=b*a, then	Remember	5
6	**Explain** whether the given table with respect to operation * on the set	Understand	3
7	**Solve** that, Let(G.*) be a group and let a,b € G, then $(a^{-1})^{-1}$=a	Remember	4
8	**Describe** sum rule and product rule?	Understand	6
9	**Describe,** the co-efficient of $a^2b^3c^3d^5$ in the expansion of $(a+2b-3c+2d+5)^{16}$?	Knowledge	6
10	Let G be a group. **Show** that φ : G → G defined by φ(g) = g −1 is an isomorphism if and only if G is Abelian.	Remember	5
11	Let G be a group with |G| = pq, where p, q are primes. **Prove** that every proper subgroup of G is cyclic. But the whole group may not be cyclic.	Evaluate	6
12	Let G be a group of order p 2 for a prime p. **Show** that G is cyclic or g p = e for all g ∈ G.	Remember	5
13	Can a group of order 55 have exactly 20 elements of order 11? **Illustrate** a reason for your answer	Remember	5
14	Let R1 and R2 be rings, and φ: R1 → R2 be a ring homomorphism. **Show** that if A is an ideal of R1, then φ(A) is an ideal of φ(R1).	Remember	6
15	Let R1 and R2 be rings, and φ: R1 → R2 be a ring homomorphism. Give an example to **show** that φ(A) may not be an ideal of R2.	Remember	
16	Let R1 and R2 be rings, and φ : R1 → R2 be a ring homomorphism such that φ(R) 6= {0 0}. **Show** that if R1 has unity and R2 has no zero-divisors, then φ(1) is a unity of R2.	Remember	6
CIE-II			
1	**Illustrate** the no of ways we can select the counting rules from the class Which having 6 boys and 5 girls	Remember	6
2	**Solve** that, if a person having 4 trousers and 3 shirts then find the no of ways of selecting a pair?	Remember	7
3	**Solve** that, the no of ways of forming three digit number from 5 elements?	Remember	6
4	**Solve** that, the no of ways of selecting 9 committees with 7	Remember	6
5	**Solve** that, the no of ways forming a 4 letter word from the word MIXTURE in which at least one letter is repeated?	Remember	6
6	**Explain** pigeon-hole principle?	Understand	6
7	**Prove** that if there are 8 cars and 26 passengers at least one car has 4 or more passengers?	Evaluate	6
8	A library contains 30 books whose total number of pages is 2560. **Show** that one of the books must have at least 86 pages?	Remember	7
9	**Describe h**ow many words of three distinct letters can be formed from the letters of the word MAST?	Knowledge	7
10	**Describe,** that in how many different outcomes are possible by tossing 10 similar coins?	Knowledge	7
11	**Describe,** that in how many different 8 digit numbers can be formed by arranged digits 1, 1,1,1,2,3,3,3.	Knowledge	6
12	**Describe,** that in how many numbers can be formed using the digits 1, 3, 4,5,6,8 and 9 if no repetitions are allowed?	Knowledge	7
13	**Describe,** that in how many ways are there to seat 10 boys and 10 girls around a circular table, if boys and girls seat alternatively?	Knowledge	6
14	**Describe,** that in how many ways can the digits 0,1,2,3,4,5,6,7,8,and 9 be arranged so that 0 and 1 are adjacent and in the order of 01?	Knowledge	7

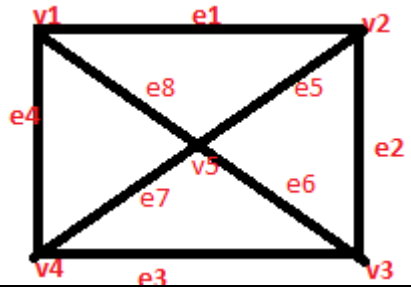
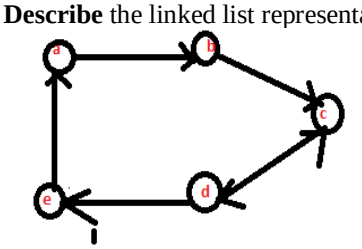
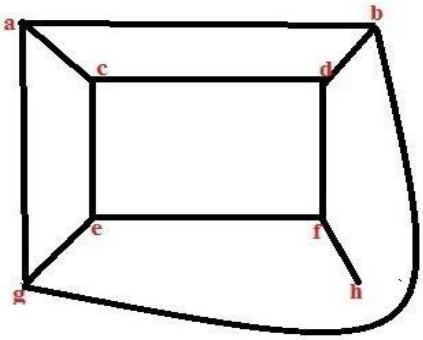
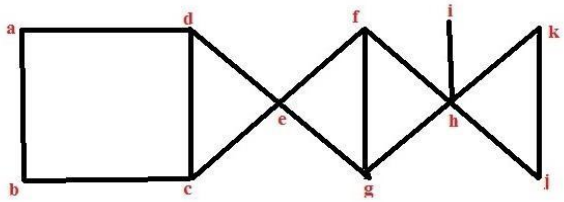
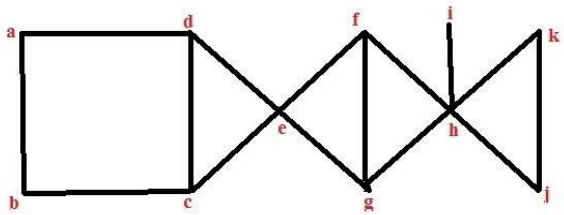
15	**Describe** that in how many ways two slices of pizza can be chosen from a plate containing one slice each of pepperoni, sausage, mushroom, and cheese pizza?	Knowledge	7
16	**Describe,** that in how many five letter passwords can be generated using first three letters as any of the English alphabets and last two being any digit from 0 to 9 ?(repetition is allowed)	Knowledge	6
	PART-B (Long Answer Questions)		
	CIE-I		
1	**Explain** sum rule and product rule?	Understand	7
2	**Solve** the co-efficient of x, y, z^2 in the expansion of $(2x-y-z)^4$ using multinomial theorem ?	Remember	7
3	**Construct** the co-efficient of x,y,z^2 in the expansion of $(2x-y-z)^4$ using multinomial theorem ?	Remember	7
4	**Construct** the co-efficient of $a^2b^3c^3d^5$ in the expansion of $(a+2b-3c+2d+5)^{16}$?	Remember	6
5	**Show** that inclusion-exclusion principle? I) $n(T_1 \cup T_2)=n(T_1)+n(T_2)-n(T_1 \cap T_2)$?	Remember	7
	CIE-II		
1	**Solve** that the no of ways we can select the counting rules from the class which having 6 boys and 5 girls?	Remember	6
2	**Solve**, if a person having 4 trousers and 3 shirts then find the no of ways of selecting a pair?	Remember	7
3	**Illustrate** the following a) the person has four transport modems for a travelling from(hyd to Chennai) and three transport modems travelling from(Chennai to Bangalore) then find the no of ways of the person travelling from (hyd-banglore) via Chennai b) expand inclusion-exclusion principle ?	Remember	7
4	a)**Solve** that the no of ways of forming three digit number from 5 elements?	Remember	6
5	**Solve** that the **no** of ways of arranging 5 boys and 4 girls in a line and the line can start with boy and end with boy also?	Remember	7
6	**Solve** that the **no** of ways of forming committee of 5 persons from a group of 5 indians 4 russians such that three are at least 3 Indians	Remember	6
7	**Solve** that the **no** of ways forming a 4 letter word from the word MIXTURE in which at least one letter is repeated?	Remember	6
8	**Solve** that in How many ways we can distribute 12 identical pencils to 4 children such that every children get at least one pencil?	Remember	6
9	**Define** pigeon hole principle? in a group of 13 children there must be least two children who were born in the same month?	Knowledge	6
10	i) **Describe** that if 8 cars 26 passengers at least one car has 4 or more passengers? ii)A library contain 30 books whose total no of pages are 2560 show that one of the book must have at least 86 pages?	Knowledge	7
	PART-C (Analytical Questions)		
	CIE-I		
1	**Solve** whether the following algebraic systems satisfy the properties under binary operations * and + (a) Odd integers (b) All the positive integers.	Remember	7
2	**Solve** that (Z,*) is an abelian group where Z is a set of integers and the binary operations * is defined as a*b = a+b-3	Remember	7
3	**Show** that in a group (G,*) for every a,b € $G(a*b)^2 = a^2*b^2$ if (G,*) is an abelian.	Remember	6

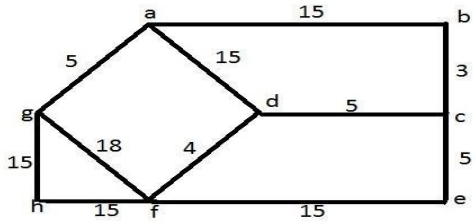
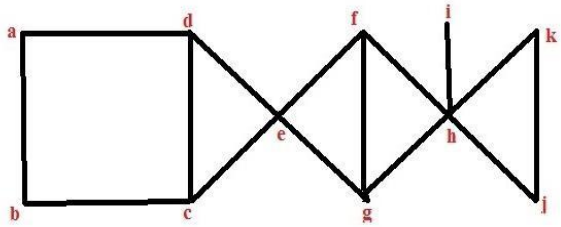
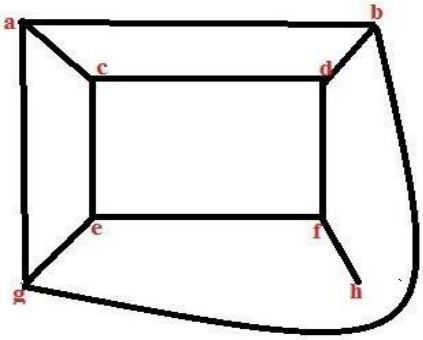
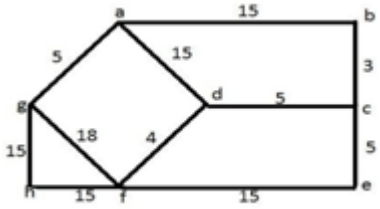
4	**Show** that If A ={1,-1,I,-1} are the fourth roots of unity. Show that (A,*) forms a group.	Remember	7
5	**Explain** The set, S, of all ordered pairs (a,b) of real numbers for which $a \neq 0$ w.r.t the operation * defined by (a,b)*(c,d)=(ac,bc+d) is a group. Find,The identity of (G,o) and a) Inverse of each element of G	Understand	6
6	**Explain** If A= {a1,a2,…..a5} B= {b1,b2…b5} find whether (A,*), (B,o) for the given composition tables are groups . If, no give the reason	Understand	6
	CIE-II		
1	**Select** the number of rows of 6 Americans, 7 Mexicans and 10 Canadians in which an American invariably stands between a Mexican and a Canadian never stand side by side.	Knowledge	10
2	**Solve** the words. (a) TALLAHASSEE (b) MISSISSIPPI How many arrangements can be made such that, (i) No two letters A of TALLAHASSEE appear together (ii) Number of 4 letter words for both the given words.	Remember	10
3	**Select** in How many integers between 1 and 10^4 contain exactly one 8 and one 9.	Knowledge	10
4	**Select** in How many integers between 10^5 and 10^6, (i) Have no digit other than 2,5 or 8 (ii) Have no digit other than 0,2,5 or 8.	Knowledge	10
5	**Select** in How many arrangements are there for the word `MISSISSIPPI` with no two pair of consecutive same letters?	Knowledge	10
6	**Describe,** in how many ways we can distribute 12 identical pencils to 4 children such that every children get at least one pencil?	Understand	7
	UNIT – IV **Recurrence Relation**		
	PART - A (Short Answer Questions)		
1	**Solve** the generating functions for the following sequences 1,2,3,4	Remember	9
2	**Solve** the generating functions for the following sequences 1,-2,3,- 4	Remember	8
3	**Solve** the generating functions for the following sequences 0,1,2,3	Remember	8
4	**Solve** the generating functions for the following sequences 0 ,1,-2,3,-4	Remember	8
5	**Solve** the co-efficient of x^{12} of $x^3(1-2x)^{10}$?	Remember	7
6	**Solve** the co-efficient fo x^5 of $(1-2x)^{-7}$?	Remember	8
7	**Solve** the co-efficient of x^{27} of i)$(x^4+x^5+x^6\ldots\ldots\ldots\ldots)^5$	Remember	9
8	**Solve** the generating functions for the following sequences $1^2,2^2,3^2$,…….	Remember	8
9	**Solve** the generating functions for the following sequences 0^2, $1^2,2^2,3^2$,……	Remember	9
10	**Solve** the co-efficient of x^{27} of $(x^4+2x^5+3x^6\ldots\ldots\ldots\ldots)^5$	Remember	9
11	**Solve** the generating functions for the following sequences $1^3,2^3,3^3$,……	Remember	8
12	**Solve** the recurrence relation $a_n=a_{n-1}+n^3$,n>=1 where $a_0=5$ by using substitution method ?	Remember	8
13	**Solve** the recurrence relation $a_n=a_{n-1}+3n^2+3n+1$,n>=1 where $a_0=5$ by using substitution method ?	Remember	9
14	**Solve** the generating functions for the following sequences 0^2, $1^3,2^3,3^3$,----------	Remember	8
15	**Solve** the recurrence relation $a_{n+1}=8a_n$,n>=0 where $a_0=4$	Remember	9
16	**Solve** the recurrence relation $a_{n+1}=8a_n$,n>=0 where $a_0=6$	Remember	9

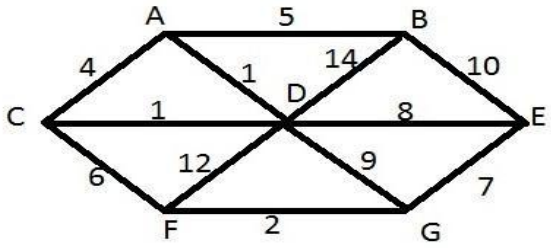
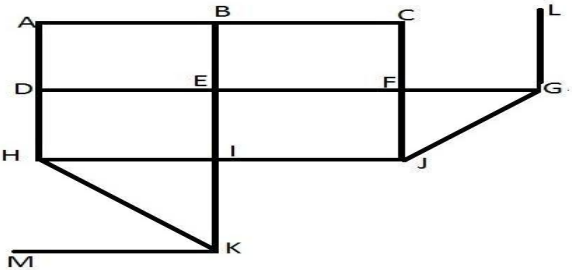
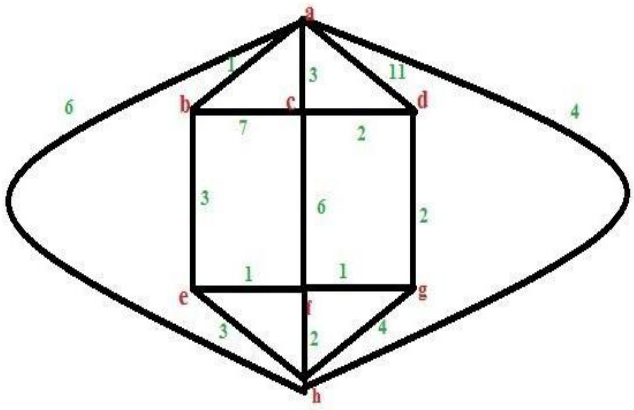
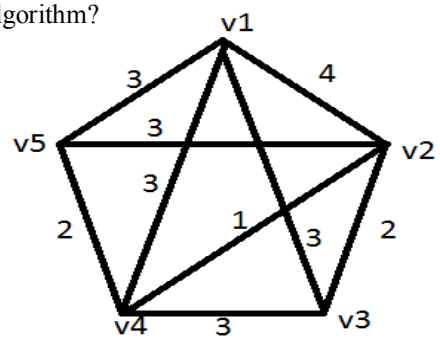
17	**Solve** the generating functions for the following sequences 1,1,0,1,1,1	Remember	9
18	**Solve** the co-efficient of x^{27} of $(x^4+x^5+x^6\ldots\ldots\ldots\ldots)^5$	Remember	8
19	**Solve** recurrence relation $a_n=a_{n-1}+n^3$,n≥1 where $a_0=5$ by using substitution method ?	Remember	9
20	**Solve** recurrence relation $a_n=a_{n-1}+n$,n≥1 where $a_0=2$ by using substitution method ?	Remember	9
	PART-B (Long Answer Questions)		
1	**Identify** the generating functions for the following sequences i)1,2,3,4 ii)1,-2,3,-4 iii)0,1,2,3 iv)0 ,1,-2,3,-4	Knowledge	8
2	**Identify** the generating function for the following sequence i)$1^2,2^2,3^2$,---------- ii)0^2, $1^2,2^2,3^2$,----------	Knowledge	9
3	**Identify** the generating function for the following sequence i)$1^3,2^3,3^3$,----------ii)0^2, $1^3,2^3,3^3$,----------	Knowledge	9
4	**Identify** the generating function for the following sequence 1,1,0,1,1,1	Knowledge	8
5	**Identify** the co-efficient of x^{12} of $x^3(1-2x)^{10}$?	Knowledge	8
6	**Identify** the co-efficient of x^5 of $(1-2x)^{-7}$?	Knowledge	9
7	**Identify** the co-efficient of x^{27} of i)$(x^4+x^5+x^6\ldots\ldots\ldots\ldots)^5$ ii) $(x^4+2x^5+3x^6\ldots\ldots\ldots\ldots)^5$	Knowledge	8
8	**Solve** the recurrence relation $a_n=a_{n-1}+n^3$,n>=1 where $a_0=5$ by using substitution method ?	Remember	9
9	**Solve** the recurrence relation $a_n=a_{n-1}+3n^2+3n+1$,n>=1 where $a_0=5$ by using substitution method ?	Remember	8
10	**Solve** the recurrence relation $a_{n+1}=8a_n$,n>=0 where $a_0=4$	Remember	9
11	**Solve** the recurrence relation $a_n-7a_{n-1}+10a_{n-2}=0$ n>=2 ,$a_0=10$ $a_1=41$	Remember	8
12	**Solve** the recurrence relation $a_n-9a_{n-1}+26a_{n-2}+24a_{n-3}=0$ n>=3 ,$a_0=0$ $a_1=1$ $a_2=10$	Remember	9
13	**Solve** the recurrence relation $a_n=3a_{n-1}+2n$ $a_1=3$	Remember	8
14	**Solve** the recurrence relation $a_n-3a_{n-1}=n$, n>=1 $a_0=1$ by using generating function ?	Remember	9
15	**Solve** the recurrence relation $a_{n+1}-a_n=3^n$, n>=0 $a_0=1$ by using generating function ?	Remember	11
	PART-C (Analytical Questions)		
1	**Solve** the recurrence relation $a_n-3a_{n-1}=n$, n>=1 $a_0=1$ by using generating function ?	Remember	12
2	**Solve** the recurrence relation $a_{n+1}-a_n=3^n$, n>=0 $a_0=1$ by using generating function ?	Remember	12
3	**Solve** the recurrence relation$a_{n+2}-2a_{n+1}+a_n=2^n$,n>=0 $a_0=1$,$a_1=2$ using generating function ?	Remember	11
4	**Solve** the co-efficient of x^{27} of i)$(x^4+x^5+x^6\ldots\ldots\ldots\ldots)^5$ ii) $(x^4+2x^5+3x^6\ldots\ldots\ldots\ldots)^5$	Remember	11
	UNIT – V **Graphs and Trees**		
	PART - A (Short Answer Questions)		
1	 **Define** graph? Write the matrix representation of the above graph.	Knowledge	11

2	**Define** tree and spanning tree?	Knowledge	10
3	**Illustrate** the adjacency matrix of directed graph? 	Remember	10
4	**Describe** the spanning trees of graph? 	Understand	11
5	**Describe** simple graph AND degree of each vertex? 	Understand	10
6	**Define** i. Null graph? ii. Isolated vertex?	Knowledge	11
7	**Define** i) pendent vertex ii) self-loop  What are the pendent vertexes in the above graph?	Knowledge	10
8	 **Define** order, size AND regular graph?	Knowledge	1 1
9	**Define** complete graph?	Knowledge	1
10	**Construct** eulerian graph? And write eulerian path 	Remember	1 1

11	**Construct** Hamiltonian graph? 	Remember	10
12	**Construct** proper colouring of graph?  Assign the proper coloring in the above graph?	Remember	12
13	**Construct** chromatic number of graph? 	Remember	12
14	**Construct** isomorphism of graph? 	Remember	12
1	**Construct** multigraph?	Remember	1
16	**Construct** an algorithm of breadth first search? 	Remember	12

17	**Construct** planar graph? Count the orders and sizes of that graph? 	Remember	11
1	**Illustrate** the matrix representation of graph?	Remember	12
1	**Illustrate** the incidence matrix of graph?	Remember	11
20	**Describe** the linked list representation of graph? 	Knowledge	12
2	**Construct** depth first search algorithm?	Remember	13
	PART-B (Long Answer Questions)		
1.	**Examine** graph? explain i) matrix representation ii) incidence matrix iii) linked list representation of graph?	Knowledge	12
2.	**Examine** tree and spanning tree, find all spanning trees of 	Knowledge	12
3.	**Discuss** Breadth first search algorithm with an example? 	Understand	12
4.	**Discuss** depth first search algorithm? Explain with an example? 	Understand	12
5.	**Discuss** prim's algorithm with an example?	Understand	1

6.	**Discuss** krushkal's algorithm with an example? 	Understand	12
7.	**Name** graph and explain eulerian graph? **Name** graph and explain Euler path and Euler circuit?	Knowledge	12
8.	**Enumerate** Hamiltonian graph? **Define** proper colouring and define chromatic number?	Knowledge	12
9.	**Enumerate** isomorphism and explain with an example? **Define** multigraph?	Knowledge	12
10.	**Enumerate** a)graph b)simple graph c)degree of vertex d)null graph		
	PART-C (Analytical Questions)		
1	 **Construct** the spanning tree of graph G by using i) BFS ii)DFS	Remember	10
2	**Construct** the spanning tree of graph G by using BFS 	Remember	12
3	**Construct** the minimal cost spanning tree for the cities shown in above graph using Kruskal's algorithm? 	Remember	12

4	 **Construct** the minimal cost spanning tree for the cities shown in above graph using Prim's algorithm?	Remember	12
5	 **Construct** the spanning tree of the graph G by using DFS with vertex in the ordering "**abcfjihdegl"?**	Remember	12
6	 **Construct** the minimal cost spanning tree for the cities shown in above graph using krushkals algorithm?	Remember	12
	Construct the minimal spanning tree of weighted graph G by using Prim's algorithm? 	Remember	12

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