



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad -500 043

COMPUTER SCIENCE AND ENGINEERING

TUTORIAL QUESTION BANK

Course Name	:	MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE
Course Code	:	A30504
Class	:	II B. Tech I Semester
Branch	:	CSE
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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			
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	Apply the converse, inverse and contra positive of the following propositions: $P \rightarrow (Q \rightarrow R)$	Apply	1
5	Interpret that $P \vee [P \wedge (P \vee Q)]$ and P is a logically equivalent without using truth table ?	Apply	2
6	Explain $P \uparrow Q$ in terms of " \downarrow " ?	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: $P \leftrightarrow Q$?	Knowledge	2
12	Describe the value of: $P \leftrightarrow Q$ in terms of $\{\sim, \vee\}$ 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?	Apply	2

15	Demonstrate the truth table for conjunction and conditional statements?	Understand	1
16	Construct the truth table for $p \rightarrow (q \rightarrow r)$?	Apply	1
17	Show that $\sim(p \rightarrow q) \rightarrow p$?	Apply	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	Apply	2
19	Construct the following statement in symbolic form: "the crop will be destroyed if there is a flood".	Apply	1
20	Show that $R \rightarrow S$ can be derived from the premises $P \rightarrow (Q \rightarrow S)$, $\sim R \vee P$ and Q	Apply	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 $[(p \rightarrow q) \rightarrow r] \rightarrow [(p \rightarrow q) \rightarrow (p \rightarrow r)]$ is a tautology or not ? (b) Define the converse, inverse and contra positive of the following propositions: i. $P \rightarrow (Q \rightarrow R)$ ii. $(P \wedge (P \rightarrow Q)) \rightarrow Q$.	Knowledge	2
3	Show that $S \vee R$ is a tautologically implied by $(p \vee q) \wedge (p \rightarrow r) \wedge (q \rightarrow s)$ With reference to automatic theorem proving.	Apply	2
4	Show that RVS is valid conclusion from the premises: $C \vee D, (C \vee D) \rightarrow \sim H, \sim H \rightarrow (A \wedge \sim B), (A \wedge \sim B) \rightarrow RVS$	Apply	1
5	Show that i) $\sim(P \uparrow Q) \leftrightarrow \sim P \downarrow \sim Q$ ii) $\sim(P \downarrow Q) \leftrightarrow \sim P \uparrow \sim Q$ without using truth table ? Express $p \rightarrow (\sim p \rightarrow q)$ i) in terms of ' \uparrow ' only ii) in terms of ' \downarrow '	Apply	1
6	(a) Describe the proposition $(p \wedge q) \sim (p \vee q)$ 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: $P \leftrightarrow Q$? (b) Construct the value of: $P \leftrightarrow Q$ in terms of $\{\sim, \vee\}$ only ?	Apply	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	Apply	2
10	Construct tautology? Show that $[(p \rightarrow q) \rightarrow r] \rightarrow [(p \rightarrow q) \rightarrow (p \rightarrow r)]$ is a tautology or not ?	Apply	1
PART-C (Problem solving and 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	Apply	1
2	Construct the pdnf of $(p \wedge q) \vee (\sim p \vee r) \vee (q \vee r)$ using truth table.	Apply	2
3	Show that: a) $R \wedge (P \vee Q)$ is a valid conclusion from premises $P \vee Q, Q \rightarrow R, P \rightarrow M$ and $\sim M$. b) Show that: $R \rightarrow S$ can be derived from the premises, $P \rightarrow (Q \rightarrow S), \sim R \vee P$ and Q	Apply	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	Apply	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) $p \rightarrow q$ (ii) $\sim p \rightarrow r$ (iii) $q \rightarrow \sim r$ (iv) $p \vee q \vee r$ (v) $(p \rightarrow \sim v) \vee (q \rightarrow \sim r)$ (vi) $(p \wedge q) \vee (\sim q \wedge r)$.	Knowledge	2
6	Write the following statement in symbolic form “If anyone is good than Ranjani is good”.	Knowledge	2
7	Find truth value of following statements if p is true and q is false i. $(p \vee q) \rightarrow (p \leftrightarrow q)$ ii. $(p \leftrightarrow q) \wedge [p \rightarrow (q \wedge p)]$	Apply	1
8	Show the following statements using automatic theorem i. $p \Rightarrow (\neg p \rightarrow q)$ ii. $p \wedge \neg p \wedge q \Rightarrow r$ iii. $r \Rightarrow p \vee \neg p \wedge q$	Apply	1
9	Show that $\neg p(a, b)$ follows logically from $(x)(y)[p(x, y) \rightarrow w(x, y)]$ and $\neg w(a, b)$.	Apply	1
10	Symbolize the expression “All women love flowers”.	Apply	1

UNIT – II
Relations

PART - A (Short Answer Questions)

1	Describe a relation?	Understand	4
2	Illustrate the operations on relations?	Apply	5
3	Define bounded lattice and distributive lattice?	Knowledge	5
4	Explain is a partial order relation?	Understand	3
5	Construct the Hasse diagram represented with positive divisors of 36?	Apply	3
6	Define a) onto function b) one to one function	Knowledge	4
7	Define bijective function?	Knowledge	4
8	Explain constant function?	Understand	4
9	Define lattice ? If A is finite set and P(A) us power set then prove that $(P(A), \leq)$ is a lattice for i) $A = \{a\}$	Knowledge	4
10	Define group and semi group?	Knowledge	5
11	Define monoid and sub group?	Knowledge	4
12	Define homomorphism?	Knowledge	4
13	Define isomorphism?	Knowledge	5
14	Describe the properties of lattice?	Understand	5
15	Show that the function $f(x)=x^3$ and $g(x)=x^{1/3}$ for $x \in \mathbb{R}$ are inverse of each other ?	Apply	3
16	Solve the functions $f:A \rightarrow B, g:B \rightarrow C, h:C \rightarrow D$, then prove that $h \circ (g \circ f) = (h \circ g) \circ f$?	Apply	4
17	Illustrate if a, b are elements of M and $a * b = b * a$, then $(a * b) * (a * b) = (a * a) * (b * b)$ where $(M, *)$ is an algebraic system.	Apply	5

18	<p>Explain whether the given table with respect to operation * on the</p> $ \begin{array}{c cc} * & a & b \\ \hline a & a & b \\ b & b & b \end{array} $ <p>set $A=\{a,b\}$ is a semi group or monoid</p>	Understand	3
19	Solve that, Let $(G,*)$ be a group and let $a,b \in G$, then $(a^{-1})^{-1}=a$	Apply	4
20	Show that $(g \circ f)^{-1} = f^{-1} \circ g^{-1}$ where f and g are one to one, onto functions.	Apply	5

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) $A=\{1,2,3,5,6,10,15,30\}$	Apply	5
4	Define lattice ? If A is finite set and $P(A)$ us Power set then prove that $(P(A),\leq)$ 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 $A \cup B = \{1,2,4,5,7,8,9\}$.	Knowledge	4
7	Solve that, Let A be a given finite set and $p(\theta)$ its power set. let \leq be the inclusion relation on the elements $p(\theta)$ draw the hasse diagram of $(p(A),\leq)$ i) $A=\{a\}$ ii) $B=\{a,b\}$ iii) $C=\{a,b,c\}$ iv) $D=\{a,b,c,d\}$	Apply	5
8	Construct the hasse diagram represented with positive divisors of 36?	Apply	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) bejective function d) constant function	Understand	4

PART-C (Problem solving and 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) $f(x) = (2x+3) \text{ mod } 7$, $A=N_7$	Understand	6
2	Solve whether the following algebraic systems satisfy the properties under binary operations * and + (a) Odd integers (b) All the positive integers.	Apply	7
3	Solve that $(Z,*)$ is an abelian group where Z is a set of integers and the binary operations * is defined as $a*b = a+b-3$	Apply	7
4	Show that in a group $(G,*)$ for every $a,b \in G (a*b)^2 = a^2*b^2$ if $(G,*)$ is an abelian.	Apply	6
5	Show that If $A = \{1, -1, I, -I\}$ are the fourth roots of unity. Show that $(A,*)$ forms a group.	Apply	7
6	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
7	Explain If $A= \{a_1, a_2, \dots, a_5\}$ $B= \{b_1, b_2, \dots, b_5\}$ find whether $(A,*)$, (B,o) for the given composition tables are groups . If, no give the reason.	Understand	6

8	Draw the Hasse diagram of relation R. $A = \{1,2,3,4,5\}$ whose matrix is given below $M_R = \begin{matrix} 1 & 0 & 1 & 1 & 1 \\ 0 & 1 & 1 & 1 & 1 \\ 0 & 0 & 1 & 1 & 1 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{matrix}$	Apply	7
9	Let $(S,*)$ be semigroup if $a*c = c*a$ and $b*c=c*b$ then show that $(a*b)*c = c*(a*b) \forall (a,b,c) \in S$.	Understand	6
10	Prove that $(\{1,-1\},X)$ where X is the multiplication operation is an abelian group or not.	Apply	7

UNIT – III
Elementary Combinatorics

PART - A (Short Answer Questions)

1	Describe sum rule and product rule?	Understand	6
2	Illustrate the no of ways we can select the counting rules from the class Which having 6 boys and 5 girls	Apply	6
3	Solve that, if a person having 4 trousers and 3 shirts then find the no of ways of selecting a pair?	Apply	7
4	Solve that, the no of ways of forming three digit number from 5 elements?	Apply	6
5	Solve that, the no of ways of selecting 9 committees with 7 persons?	Apply	6
6	Solve that, the no of ways forming a 4 letter word from the word MIXTURE in which at least one letter is repeated?	Apply	6
7	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
8	Solve the co-efficient of x, y, z^2 in the expansion of $(2x-y-z)^4$ using multinomial theorem ?	Apply	7
9	Explain pigeon-hole principle?	Understand	6
10	Prove that if there are 8 cars and 26 passengers at least one car has 4 or more passengers?	Evaluate	6
11	A library contains 30 books whose total number of pages is 2560. Show that one of the books must have at least 86 pages?	Apply	7
12	Describe , the co-efficient of $a^2b^3c^3d^5$ in the expansion of $(a+2b-3c+2d+5)^{16}$?	Knowledge	6
13	Describe how many words of three distinct letters can be formed from the letters of the word MAST?	Knowledge	7
14	Describe , that in how many different outcomes are possible by tossing 10 similar coins?	Knowledge	7
15	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
16	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
17	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
18	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
19	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
20	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)

1	Explain sum rule and product rule?	Understand	7
2	Solve that the no of ways we can select the counting rules from the class which having 6 boys and 5 girls?	Apply	6
3	Solve , if a person having 4 trousers and 3 shirts then find the no of ways of selecting a pair?	Apply	7
4	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 ?	Apply	7
5	a) Solve that the no of ways of forming three digit number from 5 elements? b) Solve that the no of ways of selecting 9 committee with 7 persons?	Apply	6
6	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?	Apply	7
7	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 committee?	Apply	6
8	Solve that the no of ways forming a 4 letter word from the word MIXTURE in which at least one letter is repeated?	Apply	6
9	Solve that in How many ways we can distribute 12 identical pencils to 4 children such that every children get at least one pencil?	Apply	6
10	Construct the co-efficient of x,y,z^2 in the expansion of $(2x-y-z)^4$ using multinomial theorem ?	Apply	7
11	Construct the co-efficient of $a^2b^3c^3d^5$ in the expansion of $(a+2b-3c+2d+5)^{16}$?	Apply	6
12	Show that inclusion-exclusion principle? I) $n(T_1 \cup T_2) = n(T_1) + n(T_2) - n(T_1 \cap T_2)$?	Apply	7
13	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
14	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 (Problem solving and Analytical Questions)			
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		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	Find the number of integers between 1 and 150 that are divisible by 2,3 and 7.		

7	How many intergers between 1 and 10^4 contain exactly one 8 and one 9.	Knowledge	10
8	In a class of 52 students, 30 are studying C++, 28 are studying PASCAL and 13 are studying both languages i. How many in this class are studying atleast one of these language? ii. How many are studying neither of these languages.	Knowledge	10
9	In how many ways 5 number of A's, 4 number of B's and 3 number C's be arranged so that all the identical letters are not in a single block.	Knowledge	10
10	Find the coefficient of $x_1 x_3^2 x_4^3 x_5^4$ in the expression of $[x_1+x_2+x_3+x_4+x_5]^{10}$	Knowledge	10

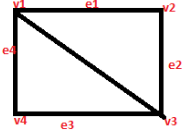
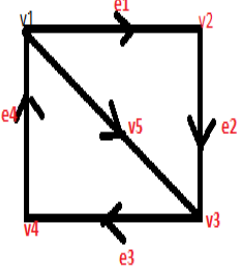
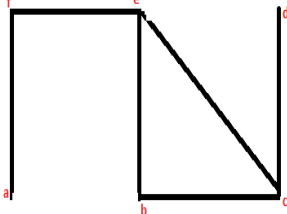
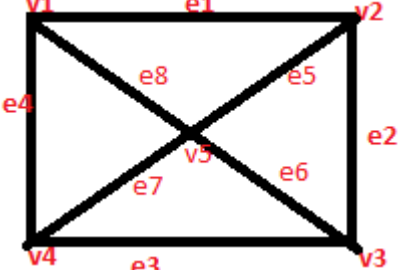
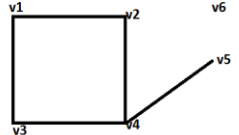
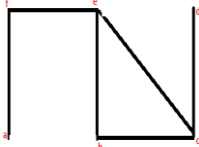
UNIT – IV
Recurrence Relation

PART - A (Short Answer Questions)

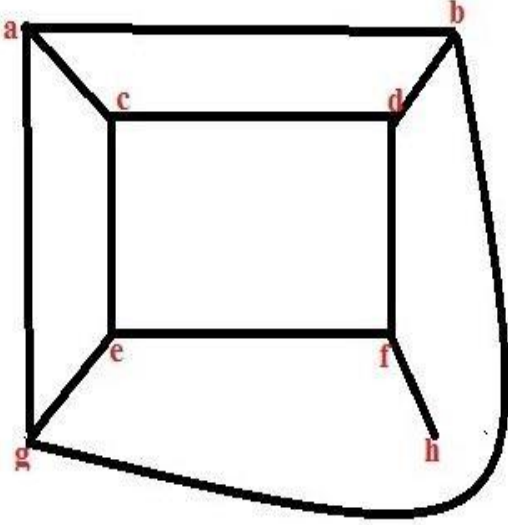
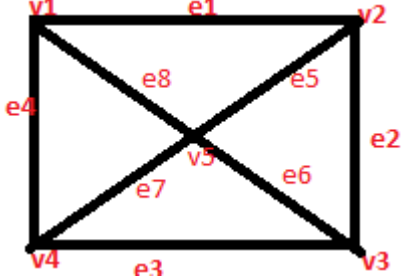
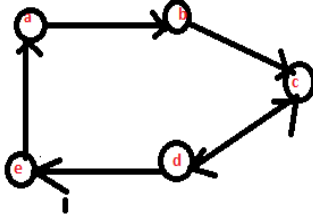
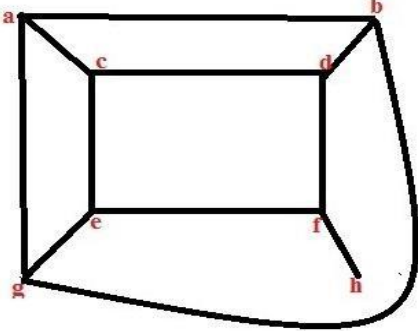
1	Solve the generating functions for the following sequences 1,2,3,4	Apply	9
2	Solve the generating functions for the following sequences 1,-2,3,-4	Apply	8
3	Solve the generating functions for the following sequences 0,1,2,3	Apply	8
4	Solve the generating functions for the following sequences 0 ,1,-2,3,-4	Apply	8
5	Solve the co-efficient of x^{12} of $x^3(1-2x)^{10}$?	Apply	7
6	Solve the co-efficient fo x^5 of $(1-2x)^{-7}$?	Apply	8
7	Solve the co-efficient of x^{27} of $i)(x^4+x^5+x^6\dots\dots\dots)^5$	Apply	9
8	Solve the generating functions for the following sequences $1^2,2^2,3^2$,.....	Apply	8
9	Solve the generating functions for the following sequences $0^2, 1^2,2^2,3^2$,.....	Apply	9
10	Solve the co-efficient of x^{27} of $(x^4+2x^5+3x^6\dots\dots\dots)^5$	Apply	9
11	Solve the generating functions for the following sequences $1^3,2^3,3^3$,.....	Apply	8
12	Solve the recurrence relation $a_n=a_{n-1}+n^3$, $n \geq 1$ where $a_0=5$ by using substitution method ?	Apply	8
13	Solve the recurrence relation $a_n=a_{n-1}+3n^2+3n+1$, $n \geq 1$ where $a_0=5$ by using substitution method ?	Apply	9
14	Solve the generating functions for the following sequences $0^2, 1^3,2^3,3^3$,-----	Apply	8
15	Solve the recurrence relation $a_{n+1}=8a_n$, $n \geq 0$ where $a_0=4$	Apply	9
16	Solve the recurrence relation $a_{n+1}=8a_n$, $n \geq 0$ where $a_0=6$	Apply	9
17	Solve the generating functions for the following sequences 1,1,0,1,1,1	Apply	9
18	Solve the co-efficient of x^{27} of $(x^4+x^5+x^6\dots\dots\dots)^5$	Apply	8

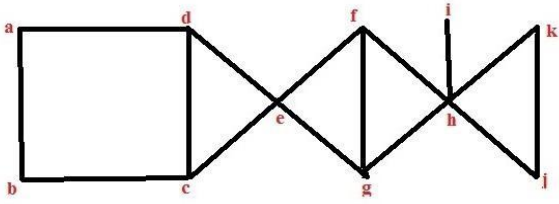
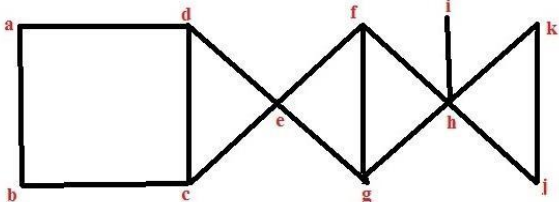
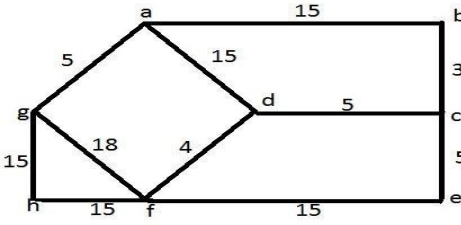
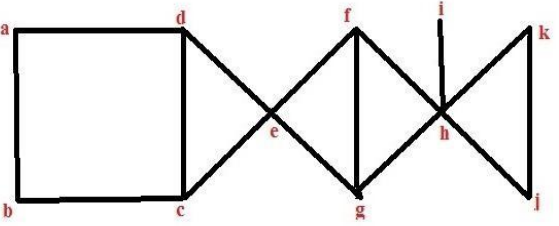
19	Solve recurrence relation $a_n = a_{n-1} + n^3, n \geq 1$ where $a_0 = 5$ by using substitution method ?	Apply	9
20	Solve recurrence relation $a_n = a_{n-1} + n, n \geq 1$ where $a_0 = 2$ by using substitution method ?	Apply	9
PART-B (Long Answer Questions)			
1	Identify the generating functions for 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)($x^4 + x^5 + x^6 + \dots$) ⁵ ii) ($x^4 + 2x^5 + 3x^6 + \dots$) ⁵	Knowledge	8
8	Solve the recurrence relation $a_n = a_{n-1} + n^3, n \geq 1$ where $a_0 = 5$ by using substitution method ?	Apply	9
9	Solve the recurrence relation $a_n = a_{n-1} + 3n^2 + 3n + 1, n \geq 1$ where $a_0 = 5$ by using substitution method ?	Apply	8
10	Solve the recurrence relation $a_{n+1} = 8a_n, n \geq 0$ where $a_0 = 4$	Apply	9
11	Solve the recurrence relation $a_n - 7a_{n-1} + 10a_{n-2} = 0, n \geq 2, a_0 = 10, a_1 = 41$	Apply	8
12	Solve the recurrence relation $a_n - 9a_{n-1} + 26a_{n-2} + 24a_{n-3} = 0, n \geq 3, a_0 = 0, a_1 = 1, a_2 = 10$	Apply	9
13	Solve the recurrence relation $a_n = 3a_{n-1} + 2n, a_1 = 3$	Apply	8
14	Solve the recurrence relation $a_n - 3a_{n-1} = n, n \geq 1, a_0 = 1$ by using generating function ?	Apply g	9
15	Solve the recurrence relation $a_{n+1} - a_n = 3^n, n \geq 0, a_0 = 1$ by using generating function ?	Apply	11
PART-C (Problem solving and Analytical Questions)			
1	Solve the recurrence relation $a_n - 3a_{n-1} = n, n \geq 1, a_0 = 1$ by using generating function ?	Apply	12
2	Solve the recurrence relation $a_{n+1} - a_n = 3^n, n \geq 0, a_0 = 1$ by using generating function ?	Apply	12
3	Solve the recurrence relation $a_{n+2} - 2a_{n+1} + a_n = 2^n, n \geq 0, a_0 = 1, a_1 = 2$ using generating function ?	Apply	11
4	Solve the co-efficient of x^{27} of i)($x^4 + x^5 + x^6 + \dots$) ⁵ ii) ($x^4 + 2x^5 + 3x^6 + \dots$) ⁵	Apply	11
5	Solve the recurrence relation $a_n - 4a_{n-1} + 4a_{n-2} = 0, n \geq 2, a_0 = 5/2, a_1 = 8$.	Apply	11
6	Solve the recurrence relation $a_{n+2} - 4a_{n+1} + 3a_n = -200$ where $n \geq 0$ and $a_0 = 3000, a_1 = 3300$.	Apply	11
7	Solve the recurrence relation $a_{n+2}^2 - 5a_{n+1}^2 + 4a_n^2 = 0$ for $n \geq 0, a_0 = 4, a_1 = 13$.	Apply	12
8	Solve the recurrence relation $a_n = 2(a_{n-1} - a_{n-2}),$ for $n \geq 2$ when $a_0 = 1, a_1 = 2$.	Apply	12
9	Solve the recurrence relation $a_{n+2} - 2a_{n+1} + a_n = 2^n, n \geq 0, a_0 = 1, a_1 = 2$ using generating function ?	Apply	11
10	Solve the recurrence relation $y_{n+2} - 4y_{n+1} + 3y_n = 0$ when $y_0 = 2, y_1 = 4$ by using generating function.	Apply	12
UNIT - V			
Graph Theory			

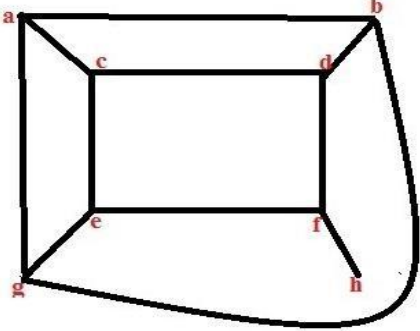
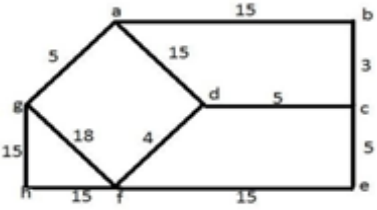
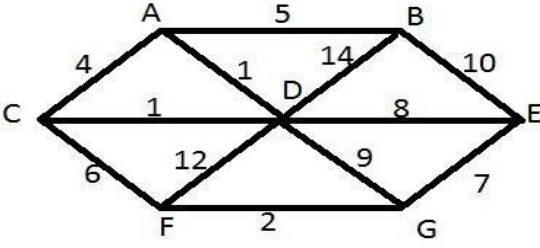
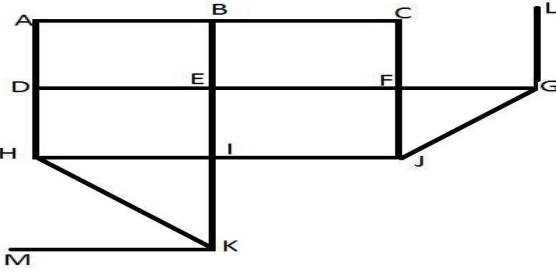
PART - A (Short Answer Questions)

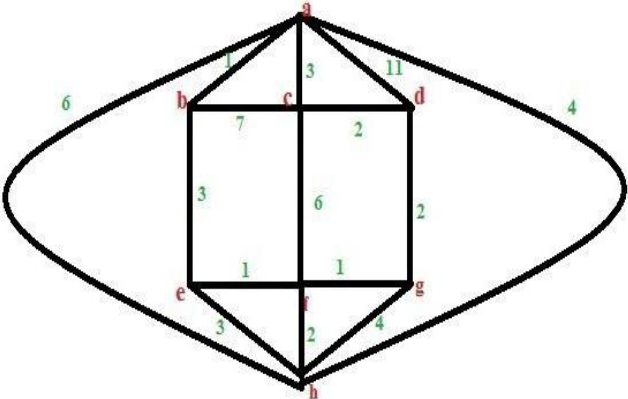
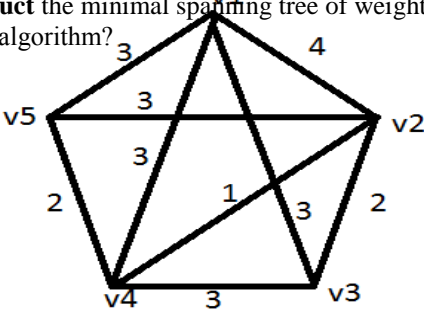
1	<p>Define graph? Write the matrix representation of the above graph.</p> 	Knowledge	11
2	<p>Define tree and spanning tree?</p>	Knowledge	10
3	<p>Illustrate the adjacency matrix of directed graph?</p> 	Apply	10
4	<p>Describe the spanning trees of graph?</p> 	Understand	11
5	<p>Describe simple graph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

		Apply	11
11	<p>Construct Hamiltonian graph?</p>	Apply	10
12	<p>Construct proper colouring of graph?</p> <p>Assign the proper coloring in the above graph?</p>	Apply	12
13	<p>Construct chromatic number of graph?</p>	Apply	12
14	<p>Construct isomorphism of graph?</p>	Apply	12
15	<p>Construct multigraph?</p>	Apply	12

16	<p>Construct an algorithm of breadth first search?</p> 	Apply	12
17	<p>Construct planar graph? Count the orders and sizes of that graph?</p> 	Apply	11
18	<p>Illustrate the matrix representation of graph?</p>	Apply	12
19	<p>Illustrate the incidence matrix of graph?</p>	Apply	11
20	<p>Describe the linked list representation of graph?</p> 	Knowledge	12
21	<p>Construct depth first search algorithm?</p>	Apply	13
PART-B (Long Answer Questions)			
1.	<p>Examine graph? explain i) matrix representation ii) incidence matrix iii) linked list representation of graph?</p>	Knowledge	1 2
2.	<p>Examine tree and spanning tree, find all spanning trees of</p> 	Knowledge	1 2

3.	<p>Discuss Breadth first search algorithm with an example?</p> 	Understand	1 2
4.	<p>Discuss depth first search algorithm? Explain with an example?</p> 	Understand	1 2
5.	<p>Discuss prim's algorithm with an example?</p>	Understand	1
6.	<p>Discuss krushkal's algorithm with an example?</p> 	Understand	12
7.	<p>Name graph and explain eulerian graph? Name graph and explain Euler path and Euler circuit?</p>	Knowledge	12
8.	<p>Enumerate Hamiltonian graph? Define proper colouring and define chromatic number?</p>	Knowledge	12
9.	<p>Enumerate isomorphism and explain with an example? Define multigraph?</p>	Knowledge	12
10.	<p>Enumerate a)graph b)simple graph c)degree of vertex d)null</p>		
PART-C (Problem solving and Analytical Questions)			
1	 <p>Construct the spanning tree of graph G by using i) BFS ii)DFS</p>	Apply	10

2	<p>Construct the spanning tree of graph G by using BFS</p> 	Apply	12
3	<p>Construct the minimal cost spanning tree for the cities shown in above graph using Kruskal's algorithm?</p> 	Apply	12
4	 <p>Construct the minimal cost spanning tree for the cities shown in above graph using Prim's algorithm?</p>	Apply	12
5	 <p>Construct the spanning tree of the graph G by using DFS with vertex in the ordering "abcfjihdegl"?</p>	Apply	12

6	 <p>Construct the minimal cost spanning tree for the cities shown in above graph using krushkals algorithm?</p>	Apply	12
7	<p>Determine the number of edges in Complete graph K_n. Complete bipartite graph $K_{m, n}$. Cycle graph C_n and Path graph P_n.</p>	Apply	12
8	<p>Find the chromatic numbers of A bipartite graph $K_{3, 3}$. A complete graph K_n. A wheel graph $W_{1,n}$.</p>	Apply	12
9	<p>Is there any simple graph with following degree sequence (1, 1, 3, 3, 3, 5, 5, 6) (1, 2, 2, 3, 4, 7)</p>	Apply	12
10	<p>Construct the minimal spanning tree of weighted graph G by using Prim's algorithm?</p> 	Apply	12

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