K1 Level

Unit-I

1. Which of the following propositions is tautology?

A.(p v q)→q

B.p v (q→p)

C.p v (p→q)

D.Both (b) & (c)

2. Which of the proposition is p^ (~ p v q) is

A.A tautulogy
B.A contradiction
C.Logically equivalent to p ^ q
D.All of above

3. Which of the following is/are tautology?

A.a v b → b ^ c
B.a ^ b → b v c
C.a v b → (b → c)
D.None of these

4. Which of the following is a declarative statement?

A.It's right
B.He says
C.Two may not be an even integer
D.I like you

5. **P → (Q → R) is equivalent to**

A.(P ^ Q) → R
B.(P v Q) → R
C.(P v Q) → ⅂R
D.None of these

6. The following formula, (p ∨ ¬q) ∧ (¬p ∨ ¬q), is

a. in term form
b. in disjunctive normal form
c. in conjunctive normal form
d. None of the above

7. The CNF form for the following formula, ¬p, is
a. ¬p ∧¬p
b. (¬p∨ ¬p) ∧ (¬p ∨¬p)
c. p
d. ¬p
8. What is a procedure that returns a value that signals true or false?
a) List
b) Predicates
c) Data
d) None of the mentioned
9. What is meant by keyword argument?
a) Arguments that follows a keyword
b) Lists
c) Data
d) Procedure

10. Let L(x, y) be the statement "x loves y," where the domain for both x and y consists of all people in the world.
Use quantifiers to express , "Joy is loved by everyone."
a) ∀x L(x, Joy)
b) ∀y L(Joy,y)
c) ∃y∀x L(x, y)
d) ∃x ¬L(Joy, x)

Unit-II

11. A relation R in {1,2,3,4,5,6} is given by {(1,2),(2,3),(3,4),(4,4),(4,5)}. This relation is:

A. reflexive

B. symmetric

C. transitive

D. not reflexive, not symmetric and not transitive

12.. Set consisting of all first elements of each ordered pair in relation is called

A. subset
B. domain of relation
C. range of relation
D. complement of a set

13. Range of R = {(0, 2), (2, 4), (3, 4), (4, 5)} is

A. {0, 2, 4, 5}
B. {0, 2, 3, 4}
C. {2, 4, 5}
D. {3, 4, 5}

13. A function from A to B is called onto function if its range is

A. B
B. A
C. Neither A nor B
D. Both A and B

14. A subset f of A x B is said to be a function from A to B if domain of f is A and first element of order pairs of f

A. do not repeat
B. do not exist
C. repeat
D. members of B

15. A function in which second element of order pair are distinct is called

A. onto function
B. one-one function
C. identity function
D. inverse function

16. For f(x) = 2x + 3 and g(x) = $-x^2 + 1$, find the composite function defined by $(f \circ g)(x)$

A. $-2x^2 + 5$
B. $-3x^2 + 5$
C. $-4x^2 + 6$
D. $-2x^2 + 6$

17. The truth values of traditional set theory is _____ and that of fuzzy set is _____

a) Either 0 or 1, between 0 & 1
b) Between 0 & 1, either 0 or 1
c) Between 0 & 1, between 0 & 1
d) Either 0 or 1, either 0 or 1

18. Fuzzy Set theory defines fuzzy operators. Choose the fuzzy operators from the following.
a) AND
b) OR
c) NOT
d) All of the mentioned

19. The room temperature is hot. Here the hot (use of linguistic variable is used) can be represented by _____
a) Fuzzy Set
b) Crisp Set
c) Fuzzy & Crisp Set
d) None of the mentioned

20. Fuzzy logic is a form of
a) Two-valued logic
b) Crisp set logic
c) Many-valued logic
d) Binary set logic

Unit-III

21. A function is said to be _____ if and only if f(a) = f(b) implies that a = b for all a and b in the domain of f.
a) One-to-many
b) One-to-one
c) Many-to-many
d) Many-to-one

22. The value of ⌊1/2.5/2⌋⌋is _____
a) 1
b) 2
c) 3
d) 0.5

23. Which of the following function f: Z X Z → Z is not onto?
a) f(a, b) = a + b
b) f(a, b) = a
c) f(a, b) = |b|
d) f(a, b) = a – b

24. The domain of the function that assign to each pair of integers the maximum of these two integers is _____

a) N

b) Z

c) Z^+

d) $Z^+ X Z^+$

25. Let f and g be the function from the set of integers to itself, defined by f(x) = 2x + 1 and g(x) = 3x + 4. Then the composition of f and g is _____

a) 6x + 9

b) 6x + 7

c) 6x + 6

d) 6x + 8

26. The inverse of function $f(x) = x^3 + 2$ is _____

a) $f^{-1}(y) = (y - 2)^{1/2}$

b) $f^{-1}(y) = (y - 2)^{1/3}$

c) $f^{-1}(y) = (y)^{1/3}$

d) $f^{-1}(y) = (y - 2)$

27. **Let D_{30} = {1, 2, 3, 4, 5, 6, 10, 15, 30} and relation I be partial ordering on D_{30}. The all lower bounds of 10 and 15 respectively are**

A.1,3
B.1,5
C.1,3,5
D.None of these

28. **Hasse diagrams are drawn for**

A.partially ordered sets
B.lattices
C.boolean Algebra
D.none of these

29. **Let X = {2, 3, 6, 12, 24}, and ≤ be the partial order defined by X ≤ Y if X divides Y. Number of edges in the Hasse diagram of (X, ≤) is**

A.3
B.4
C.5
D.None of these

30. **Let L be a set with a relation R which is transitive, antisymmetric and reflexive and for any two elements a, b ∈ L. Let least upper bound lub (a, b) and the greatest lower bound glb (a, b) exist. Which of the following is/are TRUE ?**

A. L is a Poset
B. L is a boolean algebra
C. L is a lattice

D. none of these

Unit-IV

31. Let C and D be two sets then which of the following statements are true?
1) C U D = D U C
2) C ∩ D = D ∩ C
a) Both of the statements
b) Only 1st statement
c) Only 2nd statement
d) None of the statements

32. If set C is {1, 2, 3, 4} and C – D = Φ then set D can be
a) {1, 2, 4, 5}
b) {1, 2, 3}
c) {1, 2, 3, 4, 5}
d) None of the mentioned

33. { - 3 n : n ε Z } IS an abelian group under

A. subtraction
B. division
C. multiplication
D. addition

34. If G = { 1, -1, ι, - ι } is group under multiplication, then inverse of - ι is

A. 1
B. −1
C. ι
D. None of Above

35. A monoid is always a

A. A group
B. a commutative group
C. a non abelian group
D. groupoid

36. If a, b are elements of a group G, then $(ba)^{-1}$ =

A. $\mathbf{a^{-1} b^{-1}}$

B. $b^{-1}\ a^{-1}$
C. $a^{-1}\ b$
D. $b^{-1}\ a$

37. A monoid is always a

A. A group
B. a commutative group
C. a non abelian group
D. semi - group

38. All the regular languages can have one or more of the following descriptions:
i) DFA ii) NFA iii) e-NFA iv) Regular Expressions
Which of the following are correct?
a) i, ii, iv
b) i, ii, iii
c) i, iv
d) i, ii, iii, iv

39. Regular grammar is
a) context free grammar
b) non context free grammar
c) english grammar
d) none of the mentioned

40. Production Rule: aAb->agb belongs to which of the following category?
a) Regular Language
b) Context free Language
c) Context Sensitive Language
d) Recursively Ennumerable Language

Unit-V

41.A graph is a collection of _____

A. Rows and columns
B. Vertices and edges
C. Equations
D. None of these

42. The degree of any vertex of graph is _____

A. The number of edges incident with vertex
B. Number of vertex in a graph
C. Number of vertices adjacent to that vertex

D. Number of edges in a graph

43. The number of edges in a complete graph with ‘n’ vertices is equal to:

A. n(n-1)

B. n(n-1)/2

C. n^2

D. 2n-1

44. Which of the following statements for a simple graph is correct?

a) Every path is a trail

b) Every trail is a path

c) Every trail is a path as well as every path is a trail

d) None of the mentioned

45. A connected planar graph having 6 vertices, 7 edges contains _____ regions.

a) 15

b) 3

c) 1

d) 11

46. If a simple graph G, contains n vertices and m edges, the number of edges in the Graph G'(Complement of G) is _____

a) (n*n-n-2*m)/2

b) (n*n+n+2*m)/2

c) (n*n-n-2*m)/2

d) (n*n-n+2*m)/2

47. Which of the following properties does a simple graph not hold?

a) Must be connected

b) Must be unweighted

c) Must have no loops or multiple edges

d) All of the mentioned

48. What is the maximum number of edges in a bipartite graph having 10 vertices?

a) 24

b) 21

c) 25

d) 16

49. For which of the following combinations of the degrees of vertices would the connected graph be eulerian?

a) 1,2,3
b) 2,3,4
c) 2,4,5
d) 1,3,5

50. A graph with all vertices having equal degree is known as a _____
a) Multi Graph
b) Regular Graph
c) Simple Graph
d) Complete Graph

K2 Level

Unit-I

1. "Match will be played only if it is not a humid day." The negation of this statement is_____

   Answer: Match will be played but it is a humid day
2. List the types of Normal Forms.

   Answer: Principle disjunctive normal form (PDNF), Principle conjunctive normal form (PCNF)
3. v Let P and Q be statements, then P<->Q is logically equivalent to_____

   Answer: ~P<->~Q
4. List the types of Normal Forms.

   Answer: Principle disjunctive normal form (PDNF), Principle conjunctive normal form (PCNF)
5. Give truth table for ¬p → q

6. p	a. q	b. ¬p	7. ¬p→ q
a. T	b. T	c. F	d. T
e. T	f. F	g. F	h. T
i. F	j. T	k. T	l. T
m. F	n. F	o. T	p. F

6.List the types of quantifiers.

Answer: Existential quantifier and Universal quantifier

7. Let the set A is {1, 2, 3} and B is {2, 3, 4}. Then number of elements in A U B is _____

   Answer: 4

8.Let the set A is {1, 2, 3} and B is { 2, 3, 4}. Then number of elements in A ∩ B is_____ Answer: 2

9. Let the set A is {1, 2, 3} and B is {2, 3, 4}. Then the set A – B is_____

   Answer: {1

10.The union of the sets {1, 2, 5} and {1, 2, 6} is the set _____

   Answer: {1, 2, 5, 6}

Unit-II

11.The intersection of the sets {1, 2, 5} and {1, 2, 6} is the set _____

Answer: {1, 2}

12.Write the definition of Equivalence Relation

Answer: A relation on a set that satisfies the three properties of reflexivity, symmetry, and transitivity is called an equivalence relation.

13. Set consisting of all first elements of each ordered pair in relation is Called_____

Answer: domain of relation

14.Range of R = {(0, 2), (2, 4), (3, 4), (4, 5)} is_____

Answer: {2, 4, 5}

15.Number of subsets of a set of order three is_____

Answer:8

16.Power set of empty set has exactly _____ subset.

Answer: One

17.List the operations on relations.

Answer: union, intersection, difference and complement

18 . Define fuzzy set

In fuzzy sets, each elements is mapped to [0,1] by membership function. $[0, 1] \rightarrow A : X \mu$ Where [0,1] means real numbers between 0 and 1 (including 0 and 1)

19 . List the operations on fuzzy set

Union, Intersection and Complement

20 . List the some properties of fuzzy set

Commutative, associative, distributive and identity

21 A function is said to be _____ if and only if f(a) = f(b) implies that a = b for all a and b in the domain of f.

Answer: One-to-one

19.Let f and g be the function from the set of integers to itself, defined by f(x) = 2x + 1 and g(x) = 3x + 4. Then the composition of f and g is _____

Answer: 6x + 9

20.For an inverse to exist it is necessary that a function should be_____

Answer: bijection

Unit-III

21.If f(x) = y then $f^{-1}(y)$ is equal to_____

Answer: x

22.A function f(x) is defined from A to B then f^{-1} is defined _____

Answer: from B to A

23.List the ordered pairs in the relation R from A={0,1,2,3,,4} to B={0,1,2,3} where (a,b)€R if ans only if a=b.

Answer: R={(0,0), (1,1), (2,2), (3,3)}.

24.List the elements of R, the relation R on the set A={1,2,3,,4,5} is defined by the rule (a,b)€R, if 3 divides a-b.

Answer: R={(1,1),(1,4),(2,2),(2,5),(3,3),(4,1),(4,4),(5,2),(5,5)}

25.A partial ordered relation is transitive, reflexive and_____

Answer: Antisymmetric

26.Write some applications of poset.

Answer: Modern algebra, abstract algebra and probability theory

27.Give an one example of complete lattice.

Answer: A lattice (L, ≤)is said to be a complete lattice if, and only if every non-empty subset S of L has a greatest lower bound and a least upper bound. Let A be set of all real numbers in [1, 5] and ≤ is relation of "less than equal to". Then, lattice (A,≤) is a complete lattice.

28. What is the definition of lattice.

Answer: A lattice is a poset (L,≤)(L,≤) for which every pair {a,b}∈L{a,b}∈L has a least upper bound (denoted by a∨ba∨b) and a greatest lower bound (denoted by a∧ba∧b).

29.List out the De Morgan's Law. $A\cup B)'=A'\cap B'(A\cup B)'=A'\cap B'$

$(A\cap B)'=A'\cup B'$

30. Define Hasse diagram

A visual representation of a partial ordering.

Unit-IV

31. List the out the conditions of Semigroup.

Answer: Closure, Associative

32.Define Monoid.

A monoid is a semigroup with an identity element.

33. Define context-free grammar .

A context-free grammar is a set of recursive rules used to generate patterns of strings.

34.List out the type of grammer.

There are four types of grammars − Type 0, Type 1, Type 2, and Type 3

35.Write down the proper definition of Type 3 grammer.

Type-3 grammars must have a single non-terminal on the left-hand side and a right-hand side consisting of a single terminal or single terminal followed by a single non-terminal.

36.List out any two examples of type-3 grammer.

Ans:

$X \rightarrow \varepsilon$

$X \rightarrow a \mid aY$

$Y \rightarrow b$

37. Define Type - 1 Grammar.

Type-1 grammars generate context-sensitive languages. The productions must be in the form $\alpha A \beta \rightarrow \alpha \gamma \beta$,where $A \in N$ (Non-terminal),and $\alpha, \beta, \gamma \in (T \cup N)^*$ (Strings of terminals and non-terminals)

38. Give examples of Type - 0 Grammar

Ans:

$S \rightarrow ACaB$

$Bc \rightarrow acB$

$CB \rightarrow DB$

$aD \rightarrow Db$

39. List the out the properties of Semigroup.

Closure, Associative, Identity element.

40. Define Phrase structure grammar

A phrase-structure grammar, G = (V, T, S, P) with vocabulary V = {A, 1, 0, S}, T = {0, 1}, and a start symbol S, has productions S -> 1S0, S -> 0A, A -> 0.

Unit-V

41. A graph is a collection of _____

Answer: Vertices and edges

42.Write the definition of degree of a vertex.

Answer: The degree of a vertex is the number of edges connecting it

43.The number of edges in a complete graph with 'n' vertices is equal to_____

Answer: n(n-1)/2

44..List the applications of graph theory.

Answer: Large scale problems in graphs, Similarity of nodes in large graphs, Telephony problems and graphs, Ranking in large graphs, Clustering of large graphs.

45.Write the definition of a vertex.

Answer: Objects of the graph known as vertex

46.Write the definition of a edges

Answer: The Objects correspond to a graph known as edges.

47.Write the definition of complete graph.

A complete graph having exactly one edge between each pair of vertices

48. Define Bipartite Graph

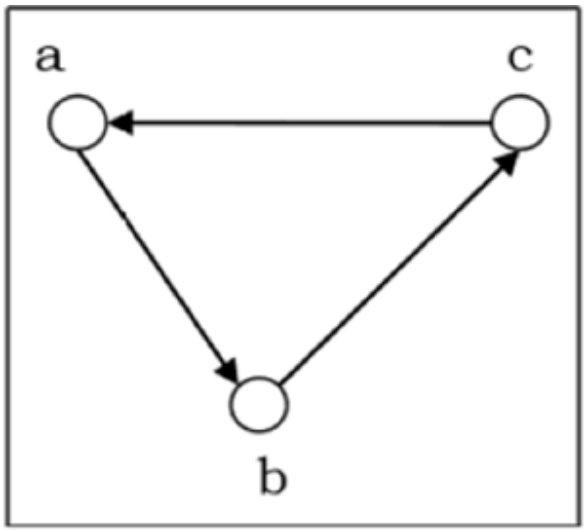
If the vertex-set of a graph G can be split into two disjoint sets, V1V1 and V2V2, in such a way that each edge in the graph joins a vertex in V1V1 to a vertex in V2V2, and there are no edges in G that connect two vertices in V1V1 or two vertices in V2V2, then the graph GG is called a bipartite graph

49. List out the Representation of Graphs

Answer.Adjacency Matrix ,Adjacency List

50. Define **Cycle Graph**

If a graph consists of a single cycle, it is called cycle graph. The cycle graph with n vertices is denoted by Cn


a
c
b

K3 Level

Unit-I

1. **Explain the Importance of Mathematical Logic and proposition with example**
2. Examine a truth table for the following
   i) (┐ p ←→ ┐ q) ←→(p←→q)
   ii) ((p→(q→r))→((p→q)→(p→r))
3. Examine a truth table for the following
   i) (p→q) →(q→p)

   ii) (p V q) → (p Λ q)

4. Analyze, whether the following compound proposition is tautology or contradiction
   i) ((p→q) Λ (q→r)) → (p→r)
5. Compare PDNF and PCNF.
6. Prove (A∨B)∧[(¬A)∧(¬B)] is a contradiction
7. Prove ¬(A∨B)and[(¬A)∧(¬B)] are equivalent
8. When is a set premises said to be inconsistent?
9. What do you mean by predicate and predicate logic?
10. Define universal and existential quantifiers.

Unit-II

11. List the types of relations with example

12. Explain about some operations of relations

13. List the ordered pairs in the relation R from A={0,1,2,3,4} to B={0,1,2,3} where (a,b)Σ R if and only if (i) a=b (ii) a+b=4 (iii) a>b

14. Examine the composition of relations with an example.

15. Simplify the relation R on set A={1,2,3,4,5} is defined by rule(a,b) €R,if 3 divides a-b

   i) domain and range of R ii)domain and range of R^{-1}

16. Define universal and void relations with example.

17. If R and S be relations on a set A represented by the matrices

$$M_R = \begin{bmatrix} 1 & 0 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \end{bmatrix} \qquad M_S = \begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 0 & 1 & 0 \end{bmatrix}$$

Find the matrices that represent

(a)R U S (b) R ∩ S

18. Examine about fuzzy union and intersection

19. Analyze about crisp sets.

20. List the properties of fuzzy set

Unit-III

21. Explain about representation of a function

22. Define a function, domain, co domain and range of a function.

23. when ia a function said to be injective, surjective and bijective?

24. Show that the function f from NXN to N given by f(m,n)=m+n is onto but not one-to-one.

25. State the closure property of a binary relation with example

26. Prove that $f^{-1} \circ f = I$ where I is the identity function

27. Let $A = \{1,2,3,9,18\}$ and for any $a,b \in A$, $a \preceq b$ iff $a \mid b$. Draw the Hasse diagram of the relation.

28. Let set A be given by $A=\{3, 4, 5, 6, 10, 12\}$ and a binary relation R on A be defined by $(x, y) \in R$ iff $x \mid y$, i.e. $(x,y) \in R$ if and only if x divides y. Give explicitly R in terms of its elements and draw the corresponding Hasse diagram

29. Discuss about lattices and list its properties, ,

30. Compare LUB and GLB

Unit-IV

31. Examine homomorphism and its types with examples.

32. Analyze the properties of algebraic system with an example(any five properties)

33. Examine semigroups and monoids.

34. Discover the language generated by the following grammar:

G={(S,A,B),(a,b),(S,P)}, where P is the set of production
{S→AB, S→AA, A→aB,A→ab,B→b}

35. Discuss about groups with example
36. List the properties of groups
37. Explain Groups, Subgroups and Normal Subgroups
38. Construct the language generated by grammar S→aSb/€
39. Discuss about types of grammar with example.
40. Find the language of the grammar G={(S,A), (a,b),S,P}, where P={S→aA, S→b A→aa}.

Unit-V

41. Show that a connected graph with n vertices has at least (n-1) edges.

42. Define K- regular graph. Give examples of 2-regular, 3-regular graphs.

43.Show that a Hamiltonian path is a spanning tree.

44. Given the adjacency matrix of a connected graph, how do you determine the diameter of the graph.

45. Prove the handshaking theorem

46. Prove that the number of vertices of odd degree in an undirected graph is even

47. Discuss about incidence matrix with example

48. discuss about connectedness in undirected graphs

49. Explain about connectedness in directed graph

50. Define path and length of a path

K4 Level

Unit-I

1. Determine the truth table for the following compound propositions

i) $((P \rightarrow Q) \rightarrow R) \rightarrow S$ ii) $((PVQ) \Lambda (P \rightarrow Q) \Lambda (Q \rightarrow R)) \rightarrow R$

2. Find the conjuctive normal forms of the following:

(i) $(p \Lambda \neg (q \Lambda r)) V (p \rightarrow q)$

(ii) $(qV(p \Lambda q)) \Lambda \neg ((pVr) \Lambda q)$

3. Discuss the laws of duality.

4. Define tautology and contradiction with example.

5. what are free and bound variables in predicate logic?

Unit-II

1. Discuss about composition of relations

2. If R= {(1,2), (2,4), (3,3)} and S={(1,3), (2,4), (4,2)}, find (i) R U S (ii) $R \cap S$ (III) R - S

(iv) S – R. Also verify that dom(R U S) = dom(R) U dom(S)

3. If R is the relation from A={1,2,3,4} to B={2,3,4,5}, list the elements in R, defined by aRb, if a and b are both odd. Write also the domain and range of R.

4. Define equivalence relation with example

5. Discuss the applications of fuzzy set

Unit-III

1. Explain about Inverse of function with properties

2. Discuss the Composition of function with properties

3. Discuss about types of functions

4. If f is the function from S={0,1,2,3,4,5} to S, defined by f(x)= (4x) (mod 6), write f as a set of ordered pairs. Is the function f one-to-one or onto?

5. Discuss the terminologies related to posets

Unit-IV

1. Explain the properties of Homomorphism.

2. Let (S $*$), be a semi group, then prove that there exists a homomorphism S : $\rightarrow$ SSg where is a semi group of a function from S to S under the operation of the Composition.

3. Show that the set N of natural numbers is a semi group under the operation x * y = max {x, y}. Is it a monoid?

4. Define Phrase-structure grammar with example

5. Construct the language generated by the grammar S$\rightarrow$aCa: C$\rightarrow$aCa/b

Unit-V

1. Prove that a simple graph has a spanning tree, iff it is connected.

2. Define Eulerian graph. Show that a non empty connected graph is Eulerian if and only if all its vertices are of even degree.

3. Prove that a connected graph contains an Euler path, if and only if it has exactly two vertices of odd degree.

4. Compare eulerian and Hamiltonian graphs

5. Define Hamiltonian path and Hamiltonian circuit with an example.

K5 Level

Unit-I

1. Prove the following implication by using truth tables:

   i) $(p \rightarrow (q \rightarrow r)) \Rightarrow (p \rightarrow q) \rightarrow (p \rightarrow r)$ ii) $(p \wedge q) \Rightarrow (p \rightarrow q)$

2. Define normal forms and its types with example

3. Find the disjunctive normal forms of the following:

   (i) $\neg (\neg p \leftrightarrow q)) \wedge r$

   (ii) $pV(\neg p \rightarrow (qV (q \rightarrow \neg r)))$

4. Prove that $(p \leftrightarrow q) \Rightarrow p \rightarrow (p \wedge q)$

5. Discuss about predicate calculus.

Unit-II

1. List the properties of relations with example

2. Explain matrix representation of a relation

3. Solve the following Problem. If R and S be relations on a set A represented by the matrices

$$M_R = \begin{bmatrix} 0 & 1 & 0 \\ 1 & 1 & 1 \\ 1 & 0 & 0 \end{bmatrix} \qquad M_S = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$$

Find the matrices that represent

(a)R U S (b) R ∩ S (c) R • S

4. If R is the relation from A={1,2,3,} to B={4,5} given by R={(1,4),{2,4), (1,5), (3,5)}, find R^{-1} (the inverse of R) and $\overline{R}$ (the complement of R)

5. Discuss about operations on fuzzy set.

Unit-III

1. Simplify the function f and g be two function f:R→R is defined by $f(x)=x^2-2$ and g(x)=x+4. Find fog and gof.

2. Simplify the following problem. If A={1,2,3,4,5} B={1,2,3,8,9} and the functions f:A→B and g:A→A are defined by
f={(1,8),(3,9),(4,3),(2,1),(5,2)} and g={(1,2),(3,1),(2,2),(4,3),(5,2)} find fog, gog and fog.

3. What is Hasse diagram?List out the procedure to draw Hasse diagram?

4. Simplify the Hasse diagram for divisiablity for the relation on{2,4,5,10,12,20,25}

5. Solve the hasse diagram representing the partial ordering P={(a,b)|a divides b} on

{1,2,3,4,6,8,12}, starting from the digraph of P.

Unit-IV

1. Explain the subsemigroups and submonoids

2. discuss about homomorphism of semigroups and monoids

3. Simplify the following.If G={(S,A),(a,b),S,P} where P consists of the productions

{S→aAS, S→a, A→SbA, A→SS, A→ba}, generate the string aabbaa by using
(i) a left most derivation, (ii) a right most derivation

4. Show that the set Z with binary operation * such that x* y = xy is not semi group.

5. Let be a group and let is a centre of the group . Then prove that is a normal subgroup of G

Unit-V

1. Define a planar graph, show that is non-planar.

2. When it can be said that two graphs G1 and G2 are isomorphic?

3. List and explain the some special simple graphs

4. Discuss about matrix representation of graphs

5. Explain the Dijkstra’s Algorithm with example.