ROOM 5 – SUBSETS

1. If a set contains 3 elements then the number of subsets is?

a) 6

b) 3

c) 12

d) 8

Answer: d

Explanation: For elements with n elements the number of subsets are 2n

2. The set containing all the collection of subsets is known as \_\_\_\_\_\_\_\_\_

a) Subset

b) Power set

c) Union set

d) None of the mentioned

Answer: b

Explanation: Power set contains all the subsets as its elements

3. If a set is empty then number of subsets will be \_\_\_\_\_\_\_\_\_

a) 1

b) 2

c) 0

d) 4

Answer: a

Explanation: The set has zero elements so 2o = 1

4. If the number of subsets of a set are 4 then the number of elements in that sets are \_\_\_\_\_\_\_\_\_

a) 1

b) 2

c) 3

d) 4

Answer: b

Explanation: The number of elements be x then x2 = 4 thus x=2.

5. The number of subsets of a set is 5.

a) True

b) False

Answer: b

Explanation: The number of subsets will always be a power of 2.

ROOM 6

1. The number of subsets of a set can be odd or even.

a) True

b) False

Answer: a

Explanation: The number of subsets will be odd in case of empty set otherwise even.

2. Let a set be A={1, 2, 3} then the number of subsets containing two elements will be \_\_\_\_\_\_\_\_\_

a) 4

b) 3

c) 5

d) 8

Answer: b

Explanation: The subsets will be {1, 2}, {2, 3}, {1, 3}.

3. Let the set be A= {a, b, c, {a,b}} then which of the following is false?

a) {a, b} Є A

b) a Є A

c) {a} Є A

d) b, c ЄA

Answer: c

Explanation: Only elements belongs to a set, {a} is a subset of this set.

4. If A={1, 2, 3, 4}, then the number of the subsets of A that contain the element 2 but not 3, is?

a) 16

b) 4

c) 8

d) 24

Answer: b

Explanation: The subsets would be {1, 2, 4},{1, 2}, {2, 3}, {2}.

5. Let A(1), A(2), A(3),…….., A(100) be 100 sets such that number of elements in A(i)=i+1 and A(1) is subset of A(2), A(2)is subset of A(3),….., A(99) is subset of A(100). The number of elements in union of the all the sets are: n(A(1) U A(2) U A(3) …..U A(100)).

a) 99

b) 100

c) 101

d) 102

Answer: c

Explanation: Since all sets are subsets of A(100) therefore in union only elements of A(100)will come. A(100) contains 101 elements.

ROOM 7 – RULES OF INFERENCE

1. Which rule of inference is used in each of these arguments, “If it is Wednesday, then the Smart mart will be crowded. It is Wednesday. Thus, the Smart mart is crowded.”

a) Modus tollens

b) Modus ponens

c) Disjunctive syllogism

d) Simplification

Answer: b

Explanation: (M ∧ (M → N)) → N is Modus ponens.

2. Which rule of inference is used in each of these arguments, “If it hails today, the local office will be closed. The local office is not closed today. Thus, it did not hailed today.”

a) Modus tollens

b) Conjunction

c) Hypothetical syllogism

d) Simplification

Answer: a

Explanation: (¬N ∧ (M → N)) → ¬M is Modus tollens

3. Which rule of inference is used, ”Bhavika will work in an enterprise this summer. Therefore, this summer Bhavika will work in an enterprise or he will go to beach.”

a) Simplification

b) Conjunction

c) Addition

d) Disjunctive syllogism

Answer: c

Explanation: p → (p ∨ q) argument is ‘Addition’.

4. What rule of inference is used here? “It is cloudy and drizzling now. Therefore, itis cloudy now.”

a) Addition

b) Simplification

c) Resolution

d) Conjunction

Answer: b

Explanation: (p ∧ q) → p argument is Simplification

5. What rule of inference is used in this argument? “If I go for a balanced diet, then I will be fit. If I will be fit, then I will remain healthy. Therefore, if I go for a balanced diet, then I will remain healthy.”

a) Modus tollens

b) Modus ponens

c) Disjunctive syllogism

d) Hypothetical syllogism

Answer: d

Explanation: ((p → q) ∧ (q → r)) → (p → r) argument is ‘Hypothetical syllogism’

ROOM 8

1. What rules of inference are used in this argument? “All students in this science class has taken a course in physics” and “Marry is a student in this class” imply the conclusion “Marry has taken a course in physics.”

a) Universal instantiation

b) Universal generalization

c) Existential instantiation

d) Existential generalization

Answer: a

Explanation: ∀xP (x), ∴ P (c) Universal instantiation.

2. What rules of inference are used in this argument? “It is either colder than Himalaya today or the pollution is harmful. It is hotter than Himalaya today. Therefore, the pollution is harmful.”

a) Conjunction

b) Modus ponens

c) Disjunctive syllogism

d) Hypothetical syllogism

Answer: c

Explanation: ((p ∨ q) ∧ ¬p) → q argument is Disjunctive syllogism.

3. The premises (p ∧ q) ∨ r and r → s imply which of the conclusion?

a) p ∨ r

b) p ∨ s

c) p ∨ q

d) q ∨ r

Answer: b

Explanation: The premises (p ∧ q) ∨ r has two clauses: p ∨ r, and q ∨ r. We can also replace r → s with the equivalent clause r ∨ s. Using the two clauses p ∨ r and r ∨ s, we can conclude p ∨ s

4. What rules of inference are used in this argument? “Jay is an awesome student. Jay is also a good dancer. Therefore, Jay is an awesome student and a good dancer.”

a) Conjunction

b) Modus ponens

c) Disjunctive syllogism

d) Simplification

Answer: a

Explanation: ((p) ∧ (q)) → (p ∧ q) argument is conjunction

5. “Parul is out for a trip or it is not snowing” and “It is snowing or Raju is playing chess” imply that \_\_\_\_\_\_\_\_\_\_

a) Parul is out for trip

b) Raju is playing chess

c) Parul is out for a trip and Raju is playing chess

d) Parul is out for a trip or Raju is playing chess

Answer: d

Explanation: Let p be “It is snowing,” q be “Parul is out for a trip,” and r the proposition “Raju is playing chess.” The hypotheses as¬p ∨ q and p ∨ r, respectively. Using resolution, the proposition q ∨ r is, “Parul is out for a trip or Raju is playing chess.”

ROOM 9 – TAUTOLOGIES AND CONTRADICTIONS

1. A compound proposition that is always \_\_\_\_\_\_\_\_\_\_\_ is called a tautology.  
a) True  
b) False

Answer: a  
Explanation: Tautology is always true.

2. A compound proposition that is always \_\_\_\_\_\_\_\_\_\_\_ is called a contradiction.  
a) True  
b) False

Answer: b  
Explanation: Contradiction is always false.

3. If A is any statement, then which of the following is a tautology?  
a) A ∧ F  
b) A ∨ F  
c) A ∨ ¬A  
d) A ∧ T

Answer: c  
Explanation: A ∨ ¬A is always true.

4. If A is any statement, then which of the following is not a contradiction?  
a) A ∧ ¬A  
b) A ∨ F  
c) A ∧ F  
d) None of mentioned

Answer: b  
Explanation: A ∨ F is not always false.

5. A compound proposition that is neither a tautology nor a contradiction is called a \_\_\_\_\_\_\_\_\_\_\_  
a) Contingency  
b) Equivalence  
c) Condition  
d) Inference

Answer: a  
Explanation: Definition of contingency.

ROOM 10

1. ¬ (A ∨ q) ∧ (A ∧ q) is a \_\_\_\_\_\_\_\_\_\_\_  
a) Tautology  
b) Contradiction  
c) Contingency  
d) None of the mentioned

Answer: b  
Explanation: ≡ (¬A ∧ ¬q) ∧ (A ∧ q)  
≡ (¬A ∧ A) ∧ (¬q ∧ q)  
≡ F ∧ F ≡ F.

2. (A ∨ ¬A) ∨ (q ∨ T) is a \_\_\_\_\_\_\_\_\_\_  
a) Tautology  
b) Contradiction  
c) Contingency  
d) None of the mentioned

Answer: a  
Explanation: ≡ (A ∨ ¬A) ∨ (q ∨ T)  
≡ T ∨ T ≡ T.

3. A ∧ ¬(A ∨ (A ∧ T)) is always \_\_\_\_\_\_\_\_\_\_  
a) True  
b) False

Answer: b  
Explanation: ≡ A ∧ ¬ (A ∨ (A ∧ T))  
≡ A ∧ ¬(A ∨ A)  
≡ A ∧ ¬A ≡ F.

4. (A ∨ F) ∨ (A ∨ T) is always \_\_\_\_\_\_\_\_\_  
a) True  
b) False

Answer: a  
Explanation: ≡ (A ∨ F) ∨ (A ∨ T)  
≡ A ∨ T ≡ T.

5. A → (A ∨ q) is a \_\_\_\_\_\_\_\_\_\_  
a) Tautology  
b) Contradiction  
c) Contingency  
d) None of the mentioned

Answer: a  
Explanation: ≡ A → (A ∨ q)  
≡ ¬A ∨ (A ∨ q)  
≡ (A ∨ ¬A) ∨ q  
≡ T ∨ q ≡ T.