Exercise-1

Marked Questions may have for Revision Questions.

OBJECTIVE QUESTIONS

Section (A) : Statements, Truth table, compound statement, Tautology , Fallacy, Algebra of statements

A-1. Which of the following is a logical statement ?
(1) Open the door.
(2) What an intelligent student !
(3) Are you going to Delhi ?
(4) All prime numbers are odd numbers.

A-2. Which of the following is not a logical statement ?
(1) Two plus two equals four.
(2) The sum of two positive numbers is positive.
(3) Tomorrow is Friday.
(4) Every equilateral triangle is an isosceles triangle.

A-3. Consider the statement p : ''New Delhi is a city''. Which of the following is not negation of p?
(1) New Delhi is not a city.
(2) It is false that New Delhi is a city.
(3) It is not the case that New Delhi is not a city.
(4) It is not the case that New Delhi is a city

A-4. The negation of the statement $\sqrt{2}$ " is not a complex number" is
(1) $\sqrt{2}$ is a rational number.
(2) $\sqrt{2}$ is an irrational number.
(3) $\sqrt{2}$ is a real number.
(4) $\sqrt{2}$ is a complex number.

A-5. Which of the following is not a component statement of the statement '100 is divisible by 5, 10 and 11'?
(1) 100 is divisible by 5
(2) 100 is divisible by 10
(3) 100 is not divisible by 11
(4)100 is divisible by 11

A-6. Which of the following statements is using an "inclusive Or" ?
(1) A number is either rational or irrational.
(2) All integers are positive or negative.
(3) The office is closed if it is a holiday or a Sunday.
(4) Sum of two integers is odd or even.

A-7. For the compound statement
"All prime numbers are either even or odd". Which of the following is true?
(1) Both component statements are false
(2) Exactly one of the component statements is true
(3) At least one of the component statements is true
(4) Both the component statements are true

A-8. Statement p : "Kota is in Rajasthan"
Statement q : "Bhopal is capital of Madhya Pradesh"
then $p \Rightarrow q$ is written as
(1) If Kota is in Rajasthan then Bhopal is not capital of Madhya Pradesh.
(2) Kota is in Rajasthan and Bhopal is capital of Madhya Pradesh.
(3) Kota is in Rajasthan or Bhopal is capital of Madhya Pradesh.
(4) If Kota is in Rajasthan then Bhopal is capital of Madhya Pradesh.

A-9. Statement p : "Ashok is honest"
Statement q : "Ashok is hardworker"
then statement "Ashok is honest if and only if he is hardworker" can be written mathematically as
(1) $p \wedge q$
(2) $p \vee q$
(3) $q \Rightarrow p$
(4) $p \Leftrightarrow q$

A-10. Which one statement gives the same meaning of statement
"The Banana trees will bloom if it stays warm for a month."
(1) It stays warm for a month and the banana trees will bloom.
(2) If it stays warm for a month, then the Banana trees will bloom.
(3) It stays warm for a month or the banana trees will bloom.
(4) It stays warm for a month or the banana trees will not bloom.

A-11. The statement "x is an even number implies that x is divisible by 4" means the same as
(1) x is divisible by 4 is necessary condition for x to be an even number.
(2) x is an even number is a necessary condition for x to divisible by 4.
(3) x is divisible by 4 is a sufficient condition for x to be an even number.
(4) x is divisible by 4 implies that x is not always an even number.

A-12. If p and q are any two statements then $p \Rightarrow q$ is not equivalent to
(1) p is sufficient for q (2) q is necessary for p (3) p only if q (4) q only if p

A-13. Consider statement "If you drive over 100 km/hr, then you will get a fine". Now choose the correct option related with this statement
(1) 'Getting fine' is necessary condition.
(2) 'Driving over 100 km/hr' is necessary condition.
(3) 'Getting fine' is sufficient condition.
(4) If you donot drive over 100 km/hr then you will not get a fine

A-14. If p is true and q is false, then which of the following statement is not true?
(1) $p \vee q$ (2) $p \Rightarrow q$ (3) $p \wedge (\sim q)$ (4) $q \Rightarrow p$

A-15. Converse of statement $p \Rightarrow q$ is
(1) $p \wedge q$ (2) $p \vee q$ (3) $q \Rightarrow p$ (4) $p \Rightarrow \sim q$

A-16. If p, q, r and s are true propositions, then the truth values of
(i) $(p \wedge q) \rightarrow s$ (ii) $(q \wedge r) \rightarrow \sim s$ (iii) $(p \wedge \sim q) \wedge (q \rightarrow s)$ are respectively
(1) T, T and F (2) F, T and F (3) T, F and T (4) T, F and F

A-17. Converse of statement "If Ram works hard then he is rich" is
(1) If Ram does not work hard then he is rich. (2) Ram works hard and he is rich.
(3) Ram works hard or he is rich. (4) If Ram is rich then he works hard.

A-18. If p, q, r are simple propositions, then the truth value of $(\sim p \vee q) \wedge \sim r \Rightarrow p$ is
(1) true if truth values of p, q, r are T, F, T respectively
(2) false if truth values of p, q, r are T, F, T respectively
(3) true if truth values of p, q, r are T, F, F respectively
(4) true if truth values of p, q, r are T, T, T respectively

A-19. If p and q are simple propositions, then $p \Leftrightarrow \sim q$ is true when
(1) p is true and q is true (2) p is false and q is true
(3) both p and q are false (4) p and q both are not true

A-20. Consider the following statements :
p : f is a continuous function
q : f is an odd function
r : f is an even function
The proposition " f is a continuous function only if it is either even or odd" is represented is

(1) $p \to (q \vee r)$ (2) $(q \vee r) \to p$ (3) $p \wedge q \to r$ (4) $p \to (q \to r)$

A-21. Which of the following is logically equivalent to $\sim (p \leftrightarrow q)$
(1) $(\sim p) \leftrightarrow q$ (2) $(\sim p) \leftrightarrow (\sim q)$ (3) $p \to (\sim q)$ (4) $p \to q$

A-22. Let q : you have to start early to get success
p : success comes with luck
The statement " If success does not come with luck then you have to start early to get success" isrepresented by
(1) $(p \to q) \wedge (q \to p)$ (2) $(\sim p \to q) \wedge (\sim q \to p)$
(3) $(p \vee q) \wedge (\sim(p \wedge q))$ (4) $\sim p \leftrightarrow \sim q$

A-23. The statement
$[p \wedge (p \to q)] \to q$, is :
(1) a fallacy (2) a tautology
(3) neither a fallacy nor a tautology (4) not a compound statement

A-24. The proposition $(p \to \sim p) \wedge (\sim p \to p)$ is
(1) a tautology (2) a contradiction (3) equivalent to $p \to p$ (4) equivalent to $\sim p \to \sim p$

A-25. Which of the following statements is a fallacy ?
(1) $(p \to q) \leftrightarrow (q \vee \sim p)$ (2) $(\sim(\sim p \wedge q) \wedge (p \vee q)) \leftrightarrow p$
(3) $(\sim p \leftrightarrow q) \leftrightarrow (p \leftrightarrow \sim q)$ (4) $\sim(\sim p \leftrightarrow \sim q) \leftrightarrow \sim(\sim p \leftrightarrow q)$

A-26. If p is any logical statement, then :
(1) $p \wedge p = p$ (2) $p \vee (\sim p) = p$
(3) $p \wedge (\sim p)$ is a tautology (4) $p \vee (\sim p)$ is a fallacy

Section (B) : Negation of compound statements, Contrapositive of conditional statements, Quantifiers

B-1. The negation of the statement "Ramesh is cruel or he is strict" is
(1) Ramesh is neither cruel nor strict. (2) Ramesh is cruel or he is not strict.
(3) Ramesh is not cruel or he is strict. (4) Ramesh is not cruel and he is strict.

B-2. The negation of the statement "The sand heats up quickly in the sun and does not cool down fast at night" is
(1) The sand does not heat up quickly in the sun and it does not cool down fast at night.
(2) Either the sand does not heat up quickly in the sun or it cools down fast at night.
(3) The sand heats up quickly in the sun and it cools down fast at night.
(4) The sand heats up quickly in the sun or it cools down fast at night.

B-3. The negation of the statement “If a quadrilateral is a square then it is a rhombus”.
(1) If a quadrilateral is not a square then it is a rhombus.
(2) If a quadrilateral is a square then it is not a rhombus.
(3) A quadrilateral is a square and it is not a rhombus.
(4) A quadrilateral is not a square and it is a rhombus.

B-4. “If India beats Australia, then India qualifies for the world cup” Negation of the above is:
(1) If India doesn’t beat Australia, then India does not qualify for the world cup.

(2) India beats Australia and India does not qualify for the world cup.
(3) Neither India beasts Australia, not India qualifies for the world cup.
(4) India does not beat Australia and India qualifies for the world cup.

B-5. The negation of the statement “Two lines are parallel if and only if they have the same slope” is
(1) Two lines are not parallel and they have the same slope.
(2) Two lines are parallel and they do not have the same slope.
(3) Two lines are not parallel and they do not have the same slope.
(4) Either two lines are parallel and they have different slopes or two lines are not parallel and they have the same slope.

B-6. Negation of the following is
“ Demonetisation is a successful step, if and only if Modi Ji is the prime minister”
(1) Demonetisation is a not successful step, if Modi Ji is not the prime minister.
(2) Demonetisation is a successful step and Modi Ji is the prime minister and demonetisation is not a successful step.
(3) Demonetisation is not a successful step and Modi Ji is not the prime minister or demonetisation is a successful step and modi ji is the prime minister.
(4) Demonetisation is a successful step if and only if modi ji is not the prime minister.

B-7. Negation of the statement $p \rightarrow (q \wedge r)$ is
(1) $\sim p \rightarrow \sim(q \wedge r)$ (2) $\sim p \vee (q \wedge r)$ (3) $(q \wedge r) \rightarrow p$ (4) $p \wedge (\sim q \vee \sim r)$

B-8. Consider the following statements :
S_1: Negation of $(\sim p \rightarrow q)$ is $[\sim(p \vee q)] \wedge [p \vee (\sim p)]$.
S_2: Negation of $(p \leftrightarrow q)$ is $(p \wedge \sim q) \vee (\sim p \wedge q)$.
S_3: Negation of $(p \vee q)$ is $\sim p \wedge \sim q$.
S_4: $p \leftrightarrow q$ is equivalent to $(\sim p \vee q) \wedge (p \vee \sim q)$.
State, in order, whether S_1, S_2, S_3, S_4 are true or false
(1) TTTT (2)TFTF (3)FFTT (4)FTFT

B-9. The negation of $A \rightarrow (A \vee \sim B)$ is
(1) a fallacy (2) a tautology
(3) equivalent to $(A \vee B) \rightarrow A$ (4) equivalent to $A \rightarrow (A \wedge \sim B)$

B-10. Let p : you got a seat in IIT
q : you got selected in BITS
The statement " you got a seat in both IIT and BITS " is represented by
(1) $p \rightarrow \sim q$ (2) $\sim p \vee \sim q$ (3) $\sim(p \rightarrow \sim q)$ (4) $\sim(\sim p \wedge \sim q)$

B-11. Negation of the statement $(p \wedge r) \rightarrow (r \vee q)$ is
(1) $(p \wedge r) \wedge (r \vee q)$ (2) $(\sim p \vee \sim r) \wedge (r \vee q)$ (3) a tautology (4) a fallacy

B-12. Which one statement gives the same meaning of statement
"If you watch television, then your mind is free and if your mind is free then you watch television"
(1) You watch television if and only if your mind is free.
(2) You watch television and your mind is free.
(3) You watch television or your mind is free.
(4) None of these

B-13. The contrapositive of statement "Something is cold implies that it has low temperature" is
(1) If something does not have low temperature, then it is not cold.
(2) If something does not have low temprerature then it is cold.
(3) Something is not cold implies that it has low temperature.

(4) If something have low temperature, then it is not cold.

B-14. If $x = 5$ and $y = -2$ then $x - 2y = 9$. The contrapositive of this statement is
(1) If $x - 2y = 9$ then $x = 5$ and $y = -2$
(2) If $x - 2y \neq 9$ then $x \neq 5$ and $y \neq -2$
(3) If $x - 2y \neq 9$ then $x \neq 5$ or $y \neq -2$
(4) If $x - 2y \neq 9$ then either $x \neq 5$ or $y = -2$

B-15. The contrapositive of the following statement,
" If the side of a square doubles, then its area increases four times", is
(1) If the area of a square does not increase four times, then its side is not doubled.
(2) If the area of a square increases four times, then its side is not doubled.
(3) If the area of a square increases four times, then its side is doubled.
(4) If the side of a square is not doubled, then its area does not increase four times.

B-16. The contrapositive of the statement "If it is raining, then I will not come", is :
(1) If I will come, then it is raining
(2) If I will not come, then it is not raining
(3) If I will not come, then it is raining
(4) If I will come, then it is not raining

B-17. Consider the following statements :
p : I have the raincoat
q : I cannot walk in the rain
The proposition " If I walk in the rain then I do not have the raincoat " is represented by
(1) $p \rightarrow \sim q$
(2) $q \rightarrow \sim p$
(3) $p \rightarrow q$
(4) $\sim q \rightarrow p$

B-18. The contrapositive of the statement "p implies q" is
(1) ~p implies ~ q
(2) q implies p
(3) ~q implies ~p
(4) p only if q

B-19 The contrapositive of $(p \wedge q) \Rightarrow r$ is
(1) $\sim r \Rightarrow (p \vee q)$
(2) $r \Rightarrow (p \vee q)$
(3) $\sim r \Rightarrow (\sim p \vee \sim q)$
(4) $p \Rightarrow (q \vee r)$

B-20. The contrapositive of $p \rightarrow (\sim q \rightarrow \sim r)$ is
(1) $(\sim q \wedge r) \rightarrow \sim p$
(2) $(q \wedge \sim r) \rightarrow \sim p$
(3) $p \rightarrow (\sim r \vee q)$
(4) $p \wedge (q \vee r)$

B-21. Negation of the following statement "Every natural number is greater than 0" is
(1) Every natural number is less than 0.
(2) Every natural number is less than or equal to 0.
(3) There exists a natural number which is not greater than 0.
(4) Atleast one natural numbers is greater than 0.

B-22. Consider the statement p : "Everyone in Germany speaks German" which of the following is not negation of p
(1) Not everyone in Germany speaks German.
(2) No one in Germany speaks German.
(3) There are persons in Germany who do not speak German.
(4) There is atleast one person in Germany who does not speak German.

Exercise-2

Marked Questions may have for Revision Questions.

PART - I : OBJECTIVE QUESTIONS

1. Which of the following is not a logical statement
(1) There are 12 month in a year.
(2) The sun is a star.
(3) Product of two irrational numbers is irrational.
(4) Sum of two rational numbers is irrational.

2. If p : Mumbai is in Japan and q : Delhi is in South Africa then
(1) $p \rightarrow q$ is true
(2) $p \rightarrow q$ is false
(3) $p \rightarrow \sim q$ is false
(4) $\sim q \rightarrow \sim p$ is false

3. The converse of the statement "If it is a national holiday, then kids go to picnic with their parents" , is
(1) If it is a national holiday, then kids go to picnic with their parents.
(2) kids go to picnic with their parents and it is a national holiday.
(3) If kids go to picnic with their parents, then it is a national holiday.
(4) kids go to picnic with their parents or it is a national holiday.

4. If p, q, r are three statements then converse of $p \Rightarrow (q \sim r)$ is
(1) $\sim (r \vee \sim q) \rightarrow p$ (2) $(r \vee \sim q) \rightarrow p$ (3) $(r \vee q) \rightarrow p$ (4) $\sim (r \wedge \sim q) \rightarrow p$

5. Consider statement ''If you are born in India then you are a citizen of India''. Which of the following is logical equivalent to the given statement ?
(1) If you are not born in India then you are not a citizen of India.
(2) If you are a citizen of India then you are not born in India.
(3) You are born in India only if you are a citizen of India.
(4) Taking birth in India is not sufficient condition to be a citizen of India.

6. Consider statement ''If there are clouds in the sky then it will rain''. Which of the following give same meaning?
(1) Having clouds in the sky is sufficient to have rain.
(2) It is not necessary to have rain if there are clouds in the sky.
(3) If it is raining then there are clouds in the sky.
(4) There are clouds in the sky implies it will not rain

7. Statements "If the traders do not reduce the price then the government will take action against them" is equivalent to
(1) It is not true that the trader do not reduce the prices and government does not take action against them.
(2) It is true that the trader do not reduce the prices and government does not take action against them.
(3) It is not true that the trader do not reduce the prices and government take action against them.
(4) It is not true that the trader do not reduce the prices or government take action against them.

8. Statement $p \wedge (\sim p \vee q)$ is equivalent to
(1) $p \vee q$ (2) $p \wedge q$ (3) $\sim p \wedge q$ (4) $\sim p \vee q$

9. Statement $(p \wedge q) \vee \sim p$ is equivalent to
(1) $p \vee q$ (2) $\sim p \wedge q$ (3) $\sim p \vee q$ (4) $\sim p \vee \sim q$

10. Statement $((\sim q) \wedge p) \vee (p \vee \sim p)$ is a
(1) Tautology (2) Fallacy (3) $\sim p \wedge \sim q$ (4) $p \vee q$

11. Statement $[(p \leftrightarrow q) \wedge ((q \rightarrow r) \wedge r)] \rightarrow r$ is a
(1) Fallacy (2) Tautology (3) $\sim p \wedge \sim q$ (4) $p \vee q$

12. The proposition $\sim(p \vee \sim q) \vee \sim(p \vee q)$ is logically equivalent to :
(1) p (2) q (3) ~p (4) ~q

13. Let p, q, r denote arbitarary statements then the logically equivalent of the statement $p \Rightarrow (q \vee r)$ is
(1) $(p \Rightarrow q) \vee (p \Rightarrow r)$ (2) $(p \Rightarrow q) \wedge (p \Rightarrow \sim r)$
(3) $(p \vee q) \Rightarrow r$ (4) $(p \Rightarrow \sim q) \wedge (p \Rightarrow r)$

14. Negation of the compound proposition $p \vee (\sim p \vee q)$ is
(1) Tautology (2) Fallacy (3) $\sim p \wedge q$ (4) $\sim p \vee q$

15. Negation of statement "If ΔABC is right angled at B, then $AB_2 + BC_2 = AC_2$" is

(1) ΔABC is right angled at B and $AB^2 + BC^2 \neq AC^2$.

(2) ΔABC is right angled at B then $AB^2 + BC^2 \neq AC^2$.

(3) ΔABC is right angled at B or $AB^2 + BC^2 \neq AC^2$.

(4) ΔABC is right angled at B and $AB^2 + BC^2 = AC^2$.

16. p : you want to succeed
q : you will find a way then the negation of $\sim(p \vee q)$ is
(1) If you want to succeed then you can't find way
(2) If you don't want to succeed then you will find a way
(3) you wan't to succeed and you find a way
(4) you wan't to succeed and you don't find a way

17. Negation of $(\sim p \rightarrow q)$ is
(1) $\sim p \vee \sim q$
(2) $\sim (p \vee q) \vee (p \vee (\sim p))$
(3) $\sim (p \vee q) \wedge (p \vee (\sim p))$
(4) $(\sim p \vee q) \wedge (p \vee \sim q)$

18. Contrapositive of statement "If you watch television, then your mind is free" is
(1) If your mind is free then you are not watching television
(2) If your mind is not free then you are not watching television
(3) If your mind is not free then you are watching television
(4) If your mind is free then you are watching television

19. Consider the following two statements :
P : If 7 is an odd number, then 7 is divisible by 2.
Q : If 7 is a prime number, then 7 is an odd number.
If V_1 is the truth value of contrapositive of P and V_2 is the truth value of contrapositive of Q, then the ordered pair (V_1, V_2) equals :
(1) (F, T) (2) (T, F) (3) (F, F) (4) (T, T)

20. The contrapositive of the statments " If I am not feeling well , then I will go to the doctor" is
(1) If I will go to the doctor then I am not feeling well.
(2) If I will not go to the doctor then I am feeling well.
(3) If I am feeling well then I will not go to the doctor.
(4) If I will go to the doctor then I am feeling well.

21. Let p : Team India plays well ; q : Virat Kohli is the captain, then the contrapositive of the implication $p \rightarrow q$ in the verbal form is-
(1) If team India does not play well then Virat Kohli is not the captain.
(2) If Team India plays well then Virat Kohli is not the captain
(3) If Virat Kohli is not the captain, then team India plays well.
(4) If Virat Kohli is not the captain, then team India does not play well.

22. The negation of the statement "There exists a number which is equal to its square" is
(1) There exists a number which is not equal to its square.
(2) There exists no number which is not equal to its square.
(3) There does not exists a number which is equal to its square.
(4) The square of a number is greater than the number.

PART - II : MISCELLANEOUS QUESTIONS

Section (A) : ASSERTION/REASONING

DIRECTIONS :

Each question has 4 choices (1), (2), (3) and (4) out of which ONLY ONE is correct.
(1) Both the statements are true.
(2) Statement-I is true, but Statement-II is false.
(3) Statement-I is false, but Statement-II is true.
(4) Both the statements are false.

A-1. **Statement - 1 :** $\sim(A \Leftrightarrow \sim B)$ is equivalent to $A \Leftrightarrow B$.
Statement - 2 : $A \vee (\sim(A \wedge \sim B))$ a tautology.

A-2. Let p and q be any two propositions.
Statement 1 : $(p \to q) \leftrightarrow q \vee \sim p$ is a tautology.
Statement 2 : $\sim(\sim p \wedge q) \wedge (p \vee q) \leftrightarrow p$ is a fallacy.

A-3. **Statement-1 :** Consider the statements
p : Sachin Tendulakar is a good cricketer.
q : Mukesh Ambani is a rich person in india.
Then the negation of statement $p \vee q$, is 'Sachin Tendulakar is not a good cricketer and Mukesh Ambani is not a rich person in india".
Statement - 2 : For any two statements p and q
$\sim(p \vee q) = \sim p \vee \sim q$
$\sim(p \vee q) = \sim p \vee \sim q$

A-4. **Statement -1 :** $\sim(p \leftrightarrow \sim q)$ is equivalent to $p \leftrightarrow q$
Statement -2 : $\sim(p \leftrightarrow \sim q)$ is a tautology

A-5. **Statement-1 :** The type of "OR" used in the statement "You may have a voter card or a PAN card for your identity proof" is inclusive OR.
Statement-2 : Inclusive OR is said to be used in a statement if its component statements both may happen together.

Section (B) : MATCH THE COLUMN

B-1.

	Column - I		Column - II
(A)	$\sim(\sim p \wedge q)$ is equivalent to	(p)	$p \vee (p \wedge q)$
(B)	$p \wedge (p \vee q)$ is equivalent to	(q)	t
(C)	$(p \wedge q) \vee [\sim p \vee (p \wedge \sim q)]$ is equivalent to	(r)	$p \vee \sim q$
(D)	$(p \wedge q) \to p$ is equivalent to	(s)	$(\sim p \wedge q) \vee t$

Section (C) : ONE OR MORE THAN ONE OPTIONS CORRECT

C-1. Which type of sentences are not logical statements.
(1) Imperative sentence (Expresses a request or command)
(2) Exclaimatory sentence (Expresses some strong feeling)
(3) Interrogative sentence (Asks some question)
(4) Optative sentence (Blessing & wishes)

C-2. Which of the following statements is using an "exclusive Or" ?
(1) A polygon is concave or convex.
(2) To apply for a driving license, you should have a ration card or a passport.
(3) The office is closed if it is a holiday or a Sunday.
(4) I will take leave and stay in home or I will go to office.

C-3. In which of the following compound statements, the connective "or" is exclusive?
(1) If x is a real number then x is either rational or irrational.
(2) If x is an integer, then either $x \geq 0$ or $x \leq 0$.
(3) If x is any real number, then either $x \geq 0$ or $x \leq 0$.
(4) Lines are said to be parallel If they are non intersecting or coincident.

C-4. Which of the following is a fallacy
(1) $\sim(p \Rightarrow q) \Leftrightarrow (\sim p \sim q)$ (2) $(p \wedge \sim q) \wedge (\sim p \vee q)$

(3) $p \wedge \sim p$ (4) $(p \wedge \sim q) \wedge (\sim p \wedge q)$

C-5. Statement p : "An equilateral triangle is equiangular" then negation of statement p is
(1) An equilaterial triangle is not equiangular
(2) It is false that an equilateral triangle is equiangular
(3) It is not the case that an equilateral triangle is not equiangular
(4) There exist at least one equilateral triangle which is not equiangular

Exercise-3

Marked Questions may have for Revision Questions.

PART - I : JEE (MAIN) / AIEEE PROBLEMS (PREVIOUS YEARS)

1. Let p be the statement ''x is an irrational number'', q be the statement ''y is a transcendental number'' and r be the statement ''x is a irrational number iff y is a transcendental number''.
Statement-1 : r is equivalent to either q or p.
Statement-2 : r is equivalent to $\sim (p \rightarrow \sim q)$. **[AIEEE - 2008, (4, –1), 120]**
(1) Statement-1 is False, Statement-2 is True
(2) Statement-1 is True, Statement-2 is True ; Statement-2 **is** a correct explanation for Statement-1
(3) Statement-1 is True, Statement-2 is True ; Statement-2 **is NOT** a correct explanation for Statement-1
(4) Statement-1 is True, Statement-2 is False

2. The statement $p \rightarrow (q \rightarrow p)$ is equivalent to **[AIEEE - 2008, (4, –1), 120]**
(1) $p \rightarrow (p \rightarrow q)$ (2) $p \rightarrow (p \rightarrow q)$ (3) $p \rightarrow (p \vee q)$ (4) $p \rightarrow (p \wedge q)$

3. **Statement -I** $\sim (p \leftrightarrow \sim q)$ is equivalent to $p \leftrightarrow q$. **[AIEEE - 2009, (4, –1), 120]**
Statement -II $\sim (p \leftrightarrow \sim q)$ is a tautology.
(1) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1.
(2) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1
(3) Statement-1 is True, Statement-2 is False
(4) Statement-1 is False, Statement-2 is True

4. Let S be a non-empty subset of **R**. Consider the following statement :
P : There is a rational number $x \in S$ such that $x > 0$.
Which of the following statements is the negation of the statement P ? **[AIEEE - 2010, (4, –1), 120]**
(1) There is no rational number $x \in S$ such that $x \leq 0$.
(2) Every rational number $x \in S$ satisfies $x \leq 0$.
(3) $x \in S$ and $x \leq 0 \Rightarrow x$ is not rational.
(4) There is a rational number $x \in S$ such that $x \leq 0$.

5. Consider the following statements **[AIEEE - 2011(I), (4, –1), 120]**
P : Suman is brilliant
Q : Suman is rich
R : Suman is honest.
The negation of the statement " Suman is brilliant and dishonest if and only if Suman is rich" can be expressed as :
(1) $\sim P \wedge (Q \leftrightarrow \sim R)$ (2) $\sim (Q \leftrightarrow (P \wedge \sim R))$ (3) $\sim Q \leftrightarrow \sim P \wedge R$ (4) $\sim (P \wedge \sim R) \leftrightarrow Q$

6. The only statement among the following that is a tautology is - **[AIEEE-2011(II), (4, –1), 120]**

(1) $A \wedge (A \vee B)$ (2) $A \vee (A \wedge B)$ (3) $[A \wedge (A \to B)] \to B$ (4) $B \to [A \wedge (A \to B)]$

7. The negation of the statement **[AIEEE - 2012, (4, –1), 120]**

"If I become a teacher, then I will open a school", is :

(1) I will become a teacher and I will not open a school.

(2) Either I will not become a teacher or I will not open a school.

(3) Neither I will become a teacher nor I will open a school

(4)I will not become a teacher or I will open a school.

8. Consider **[AIEEE - 2013, (4, –1), 120]**

Statement-I : $(p \wedge \sim q) \wedge (\sim p \wedge q)$ is a fallacy.

Statement-II : $(p \to q) \leftrightarrow (\sim q \to \sim p)$ is a tautology.

(1) Statement-I is true; Statement-II is true; Statement-II is a correct explanation for Statement-I.

(2) Statement-I is true; Statement-II is true; Statement-II is **not** a correct explanation for Statement-I.

(3) Statement-I is true; Statement-II is false.

(4) Statement-I is false; Statement-II is true.

9. The statement $\sim(p \leftrightarrow \sim q)$ is : **[JEE(Main) 2014, (4, – 1), 120]**

(1) a tautology (2) a fallacy (3) equivalent to $p \leftrightarrow q$ (4) equivalent to $\sim p \leftrightarrow q$

10. The negation of ~ s v (~ r s) is equivalent to **[JEE(Main) 2015, (4, – 1), 120]**

(1) $s \wedge \sim r$ (2) $s \wedge (r \wedge \sim s)$ (3) $s \vee (r \vee \sim s)$ (4) $s \wedge r$

11. The Boolean Expression $(p \wedge \sim q) \vee q \vee (\sim p \wedge q)$ is equivalent to : **[JEE(Main) 2016, (4, – 1), 120]**

(1) $p \wedge q$ (2) $p \vee q$ (3) $p \vee \sim q$ (4) $\sim p \wedge q$

12. The following statement **[JEE(Main) 2017, (4, – 1), 120]**

$(p \to q) \to [(\sim p \to q) \to q]$ is :

(1) a tautology (2) equivalent to $\sim p \to q$

(3) equivalent to $p \to \sim q$ (4) a fallacy

Answers

EXERCISE # 1

Section (A) :

A-1.	(4)	**A-2.**	(3)	**A-3.**	(3)	**A-4.**	(4)	**A-5.**	(3)	**A-6.**	(3)	**A-7.**	(1)
A-8.	(4)	**A-9.**	(4)	**A-10.**	(2)	**A-11.**	(1)	**A-12.**	(4)	**A-13.**	(1)	**A-14.**	(2)
A-15	(3)	**A-16.**	(4)	**A-17.**	(4)	**A-18.**	(1)	**A-19.**	(2)	**A-20.**	(1)	**A-21.**	(1)
A-22.	(2)	**A-23.**	(2)	**A-24.**	(2)	**A-25.**	(4)	**A-26.**	(1)				

Section (B) :

B-1.	(1)	**B-2.**	(2)	**B-3.**	(3)	**B-4.**	(2)	**B-5.**	(4)	**B-6.**	(4)	**B-7.**	(4)
B-8.	(1)	**B-9.**	(1)	**B-10.**	(3)	**B-11.**	(4)	**B-12.**	(1)	**B-13.**	(1)	**B-14.**	(3)
B-15.	(1)	**B-16.**	(4)	**B-17.**	(3)	**B-18.**	(3)	**B-19**	(3)	**B-20**	(1)	**B-21.**	(3)
B-22.	(2)												

EXERCISE # 2

PART - I

1.	(3)	**2.**	(1)	**3.**	(3)	**4.**	(1)	**5.**	(3)	**6.**	(1)	**7.**	(1)
8.	(2)	**9.**	(3)	**10.**	(1)	**11.**	(2)	**12.**	(3)	**13.**	(1)	**14.**	(2)
15.	(1)	**16.**	(2)	**17.**	(3)	**18.**	(2)	**19.**	(1)	**20.**	(2)	**21.**	(4)
22.	(3)												

PART - II

Section (A) :

A-1. (1) **A-2.** (2) **A-3.** (2) **A-4.** (2) **A-5.** (1)

Section (B) :

B-1. (A) → (r), (B) → (p), (C) → (s), (D) → (q)

Section (C) :

C-1. (1,2,3,4) **C-2.** (1,4) **C-3.** (1,4) **C-4.** (2,3,4) **C-5.** (1,2,4)

EXERCISE # 3

PART - I

1.	(1)	**2.**	(3)	**3.**	(3)	**4.**	(2)	**5.**	(2)	**6.**	(3)	**7.**	(1)
8.	(2)	**9.**	(3)	**10.**	(4)	**11.**	(2)	**12.**	(1)				