LECTURE 1
SYLLOGISM

- Syllogism is an important section on logical reasoning and hence its comprehension needs more than normal attention. It is a very interesting topic where the logical thinking and the decision making skills are highly tested.
- The term syllogism means inference or conclusion drawn from the statements. The question of syllogism can be solved with the help of Venn diagrams.

- In syllogism, a statement of certain relation between two or more terms is analogous to a sentence is grammar.

The proposition consists of three parts, namely subject, predicate and copula.

1. **Subject:** The subject is about which something is said.
2. **Predicate:** The predicate is the part of the proposition denoting which is affirmed or denied about the subject.
3. **Copula:** The copula is that part of the proposition which denotes the relation between the subject and the predicate.

Example:

Consider the proposition ‘Man is intelligent’.

Here the information is given about the man.

So **‘Man’** is the **subject**.

‘Intelligent’ is the quality affirmed for this subject. So it is the **predicate.**

‘Is’ denotes the relation between the subject and the predicate. So, it is the **copula**.

Structure of the Question

- Syllogism questions always starts with the directions to answer.
- In each question we could find two segments i.e., statements and conclusions.
- Always consider the information provided in the statements is true.
- Check whether the conclusions follow the statements and answer as per the direction.

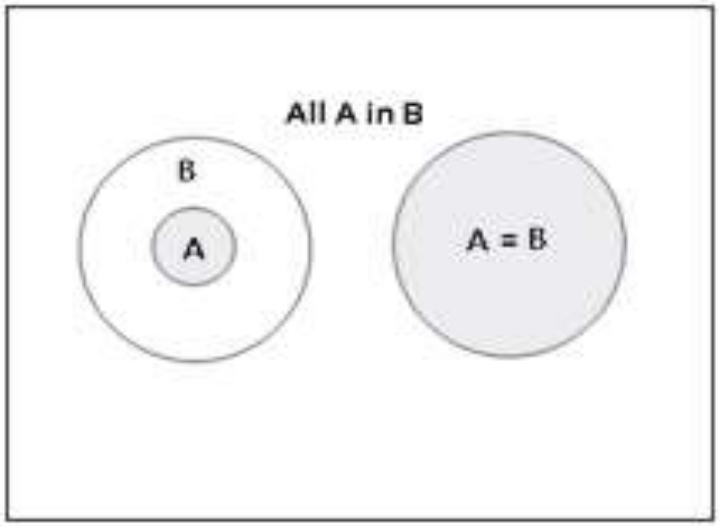
Reap to Remember

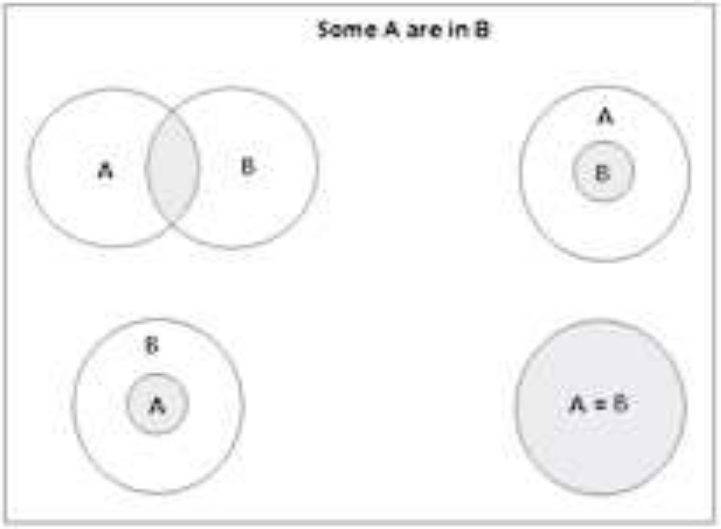
Four possible forms of statements or conclusions:

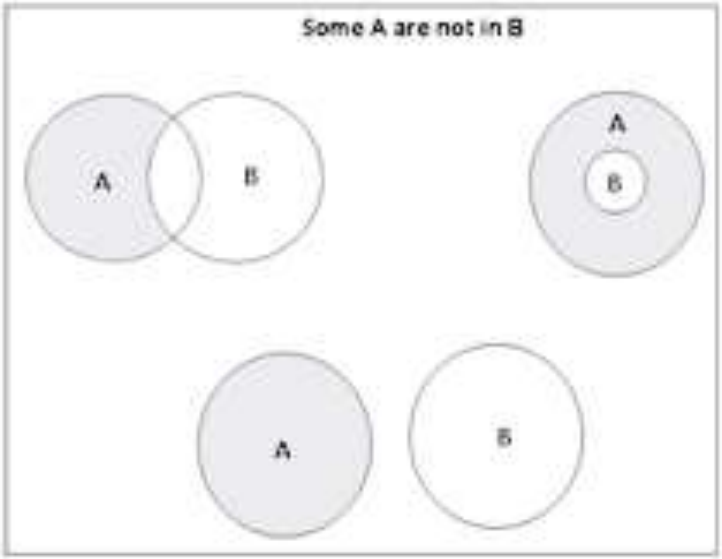
1. All A is B.
2. Some A is B.
3. Some A are not B.
4. No A is B.

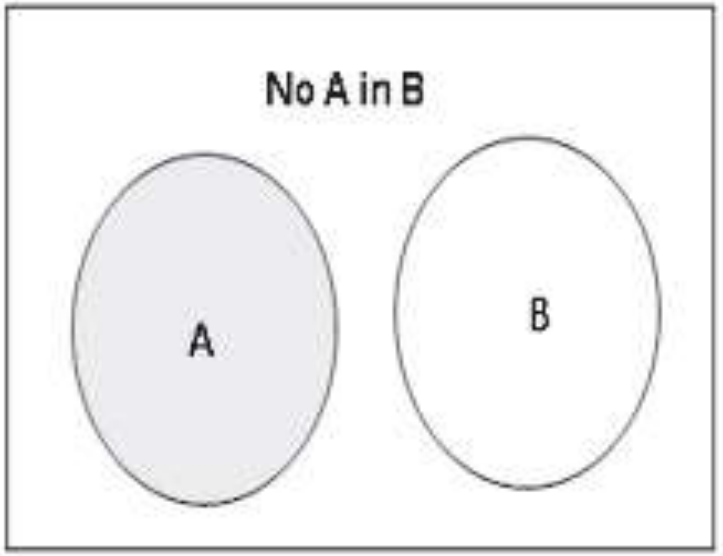
Applying the Venn diagram method will be very easy to solve any question. Go through the following basic representations of the statements.

Possible Diagrams:



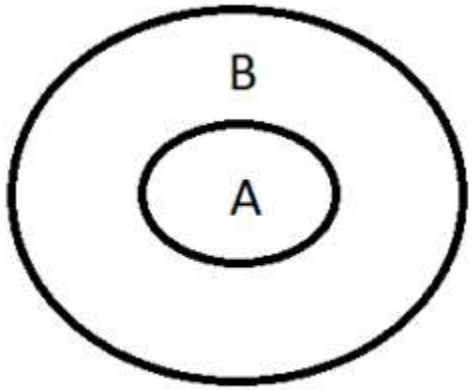






CONCEPT 1 – All A is B

The Diagram is,

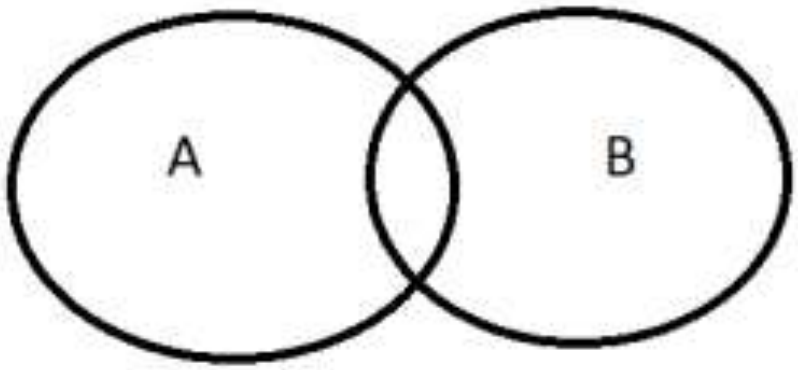


The Possible conclusions are,

- All A is B.
- Some A is B.
- Some B is A.

CONCEPT 2 - Some A is B.

The Diagram for Some A is B is



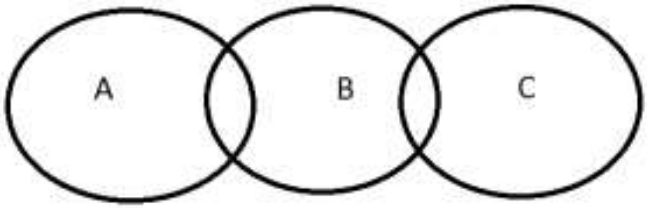
The possible conclusions are,

1) Some A is B

2) Some B is A

CONCEPT 3 – Some A is B and Some B is C

The Diagram is,

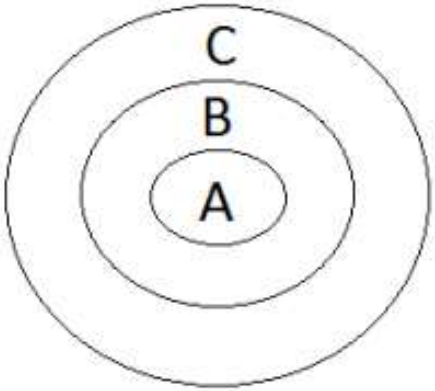


Now the Possible Conclusions are,

Between A and B	Between B and C
Some A is B	Some B is C
Some B is A	Some C is B

There is no DIRECT CONNECTION between A and C. So it is not possible to derive any conclusion between A and C.

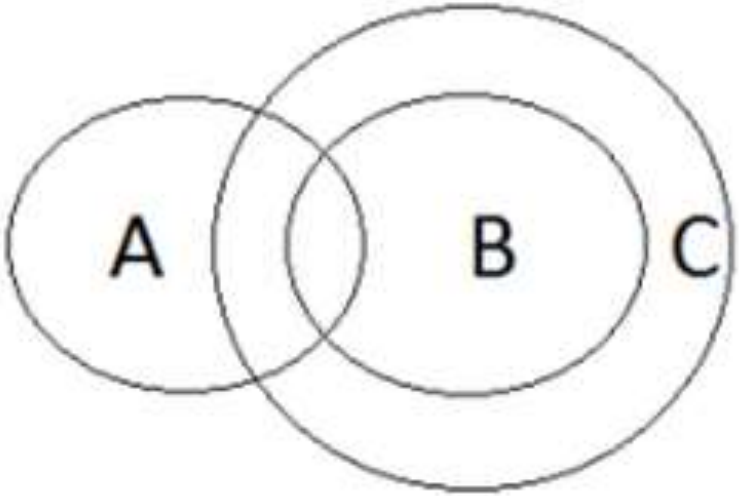
CONCEPT 4 – All A is B and All B is C



The Conclusions are,

Between A and B	Between B and C	Between A and C
All A is B.	All B is C.	All A is C.
Some A is B.	Some B is C.	Some A is C.
Some B is A.	Some C is B.	Some C is A.

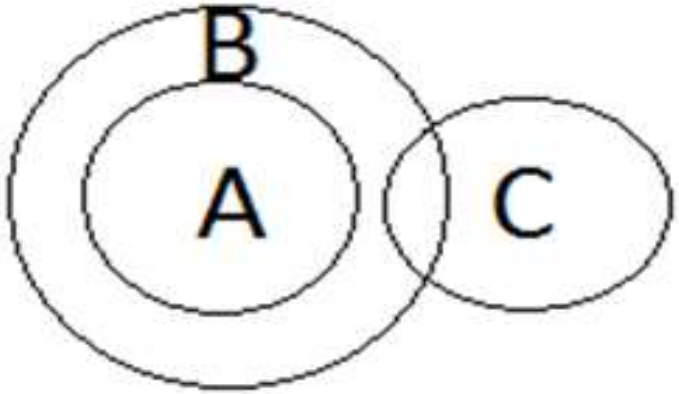
Concept 5 – Some A is B, All B is C.



The possible conclusions are,

Between A and B	Between B and C	Between A and C
Some A is B	All B is C	Some A is C
Some B is A	Some B is C	Some C is A
	Some C is B	

Concept 6 – All A is B and Some B is C

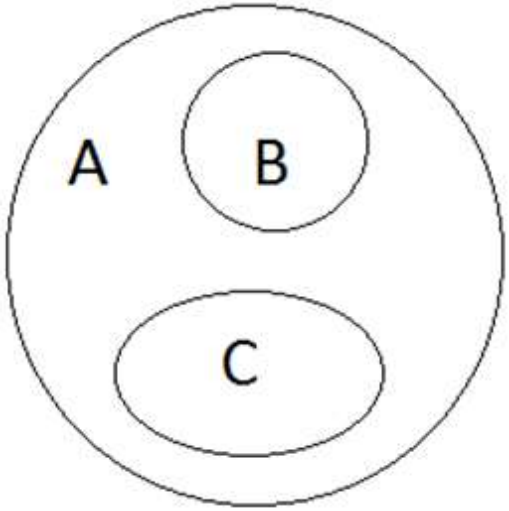


The possible conclusions are,

Between A and B	Between B and C
All A is B	Some B is C
Some A is B	Some C is B
Some B is A	

There is no DIRECT CONNECTION between A and C. So, it is not possible to derive any conclusion between A and C.

Concept 7 – All B is A and All C is A

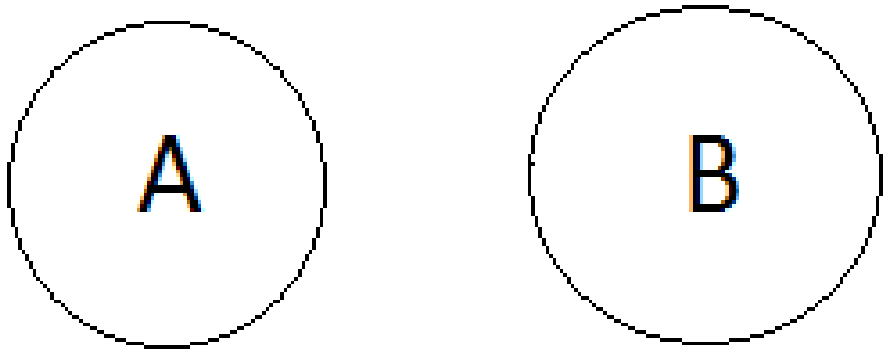


The Possible Conclusions are,

Between A and B	Between A and C
All B is A	All C is A
Some B is A	Some C is A
Some A is B	Some A is C

There is no DIRECT CONNECTION between B and C. So it is not possible to derive any conclusion between B and C.

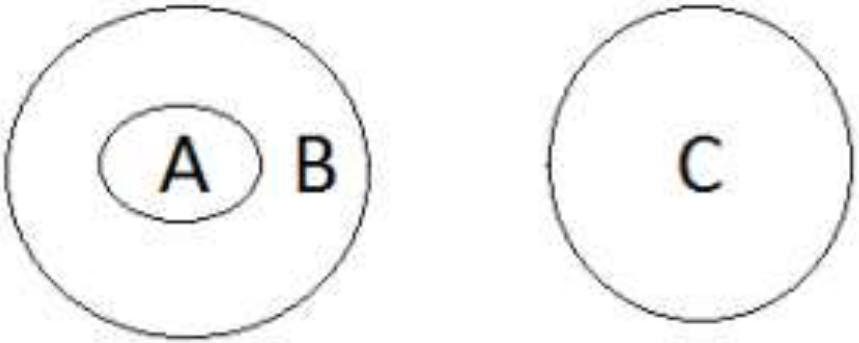
Concept 8 – No A is B



The Possible Conclusions are,

- No A is B
- No B is A
- Some A is not B
- Some B is not A

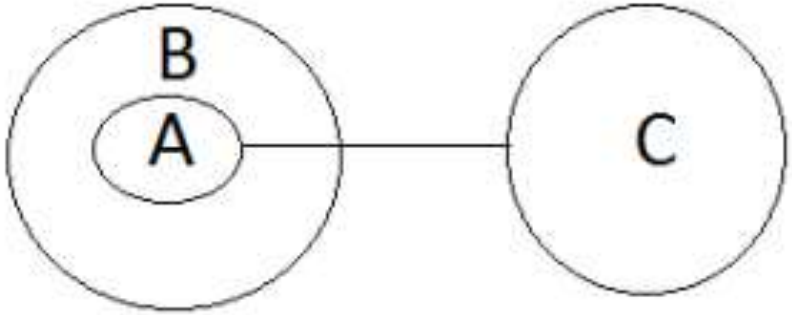
Concept 9 – All A is B and No B is C



The Possible Conclusions are,

Between A and B	Between B and C	Between A and C
All A is B	No B is C	No A is C
Some A is B	No C is B	Some A is Not C
Some B is A	Some B is not C	
	Some C is not B	

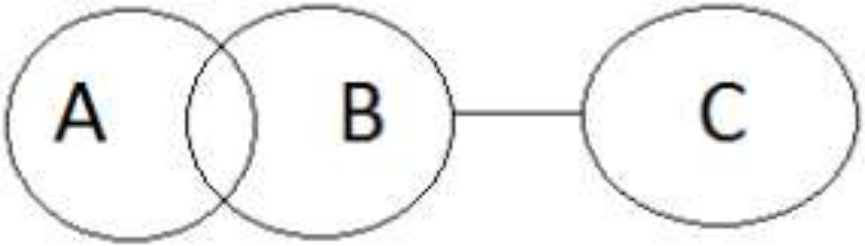
Concept 10 – All A is B and No A is C



The Possible Conclusions are,

Between A and B	Between A and C	Between B and C
All A is B	No A is C	Some B is not C
Some A is B	No C is A	
Some B is A	Some A is not C	
	Some C is not A	

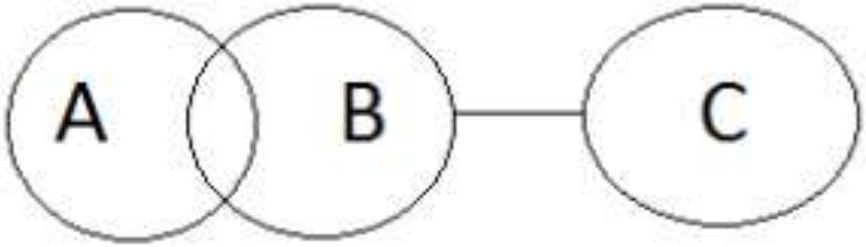
Concept 11 – Some A is B; No B is C



The Possible Conclusions are,

Between A and B	Between B and C	Between A and C
Some A is B	No B is C	Some A is not C
Some B is A	No C is B	
	Some B is not C	
	Some C is not B	

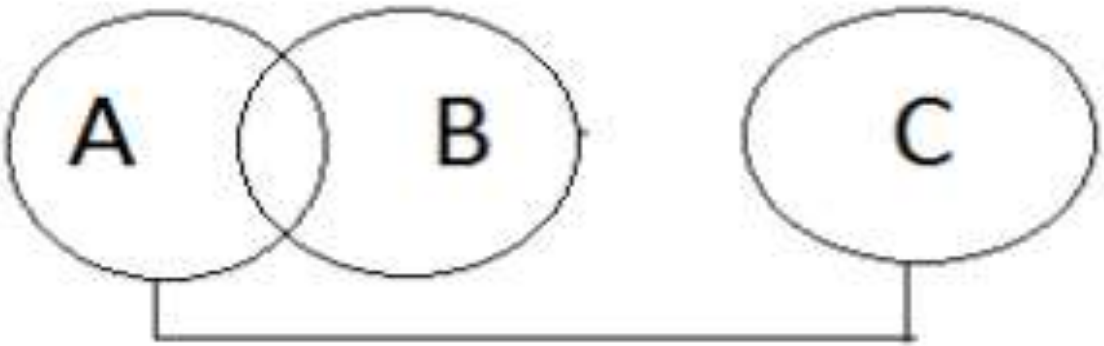
Concept 11 – Some A is B; No B is C



The Possible Conclusions are,

Between A and B	Between B and C	Between A and C
Some A is B	No B is C	Some A is not C
Some B is A	No C is B	
	Some B is not C	
	Some C is not B	

Concept 12 – Some A is B; No A is C



The Possible Conclusions are,

Between A and B	Between A and C	Between B and C
Some A is B	No A is C	Some B is not C
Some B is A	No C is A	
	Some A is not C	
	Some C is not A	

Practice questions:

In each question below are some statements followed by conclusions. Read all the conclusions and then decide which of the given conclusions logically follows from the statements.

1. Statements:

No file is an elephant.

All elephants are caps.

Conclusions:

I. Some caps are elephants.

II. Some files are caps.

Give answer:

(A) if only (I) conclusion follows

(B) if only (II) conclusion follows

(C) if either (I) or (II) follows

(D) if neither (I) nor (II) follows and

(E) if both (I) and (II) follow.

Practice questions:

In each question below are some statements followed by conclusions. Read all the conclusions and then decide which of the given conclusions logically follows from the statements.

2. Statements:

Some books are birds.

Some birds are fingers.

Conclusions:

I. Some fingers are books.

II . Some fingers are birds.

Give answer:

(A) if only (I) conclusion follows

(B) if only (II) conclusion follows

(C) if either (I) or (II) follows

(D) if neither (I) nor (II) follows and

(E) if both (I) and (II) follow.

Practice questions:

In each question below are some statements followed by conclusions. Read all the conclusions and then decide which of the given conclusions logically follows from the statements.

3. Statements:

All books are shrubs.

All trees are shrubs.

Conclusions:

I . Some shrubs are books.

II . Some shrubs are trees.

Give answer:

(A) if only (I) conclusion follows

(B) if only (II) conclusion follows

(C) if either (I) or (II) follows

(D) if neither (I) nor (II) follows and

(E) if both (I) and (II) follow.

Practice questions:

In each question below are some statements followed by conclusions. Read all the conclusions and then decide which of the given conclusions logically follows from the statements.

4. Statements:

All nails are ears.

Some ears are eyes.

Conclusions:

I . All ears are nails.

II . Some eyes are nails.

Give answer:

(A) if only (I) conclusion follows

(B) if only (II) conclusion follows

(C) if either (I) or (II) follows

(D) if neither (I) nor (II) follows and

(E) if both (I) and (II) follow.

Practice questions:

In each question below are some statements followed by conclusions. Read all the conclusions and then decide which of the given conclusions logically follows from the statements.

5. Statements:

Some apartments have electricity.

Some boats have electricity.

Conclusions:

I. Some apartments have boats

II. Some boats have apartments

III. No boats have apartments

IV. None of the above

(a) Only II and III follow

(b) Only IV follow

(c) Only III and IV follow

(d) None of these

Practice questions:

In each question below are some statements followed by conclusions. Read all the conclusions and then decide which of the given conclusions logically follows from the statements.

6. Statements:

Some AB is CD.

No CD is EF.

Conclusions:

I. Some AB is No EF

II. Some EF is AB

III. No AB is EF

IV. None of the above

(a) Only I and III follow

(b) Only I follow

(c) Only II and III follow

(d) None of these

Practice questions:

In each question below are some statements followed by conclusions. Read all the conclusions and then decide which of the given conclusions logically follows from the statements.

7. Statements:

No *** are ###.

Some ^^^^ are ###.

Conclusions:

I. No ^^^^ are ***

II. Some *** are no ^^^^

III. Some ^^^^ are no ***

IV. None of the above

(a) Only III follow

(b) Only I and II follow

(c) Only II and III follow

(d) None of these

Practice questions:

In each question below are some statements followed by conclusions. Read all the conclusions and then decide which of the given conclusions logically follows from the statements.

8. Statements:

Some cars are four-wheelers.

All cars are tricycles.

Conclusions:

I. No tricycles are four-wheelers

II. All four-wheelers are tricycles

III. Some tricycles are four-wheelers

IV. None of the above

(a) Only II and III follow

(b) Only I and IV follow

(c) Only III follow

(d) None of these

Practice questions:

In each question below are some statements followed by conclusions. Read all the conclusions and then decide which of the given conclusions logically follows from the statements.

9. Statements:

All smart are dumb.

Some bad are smart.

Conclusions:

I. All dumb are bad.

II. Some dumb are bad.

III. No bad are dumb.

IV. Some bad are not dumb.

(a) Only II and either III or IV follows
(b) Only I and IV follow
(c) Only II and IV follow
(d) None of these

Practice questions:

In each question below are some statements followed by conclusions. Read all the conclusions and then decide which of the given conclusions logically follows from the statements.

10. Statements:

All cities have houses.

All lands have cities.

Conclusions:

I. All houses have lands

II. All lands have houses

III. Not all houses have lands

IV. None of the above

(a) Only II follow

(b) Only I follow

(c) Only III follow

(d) None of these

Practice questions:

In each question below are some statements followed by conclusions. Read all the conclusions and then decide which of the given conclusions logically follows from the statements.

11. Statements :

All kitchens have closets.

All closets have shelves.

Conclusions:

I. Some kitchens have not shelves

II. All shelves have kitchens

III. All kitchens have shelves

IV. None of the above

(a) Only II follow

(b) Only I follow

(c) Only III follow

(d) None of these

Practice questions:

In each question below are some statements followed by conclusions. Read all the conclusions and then decide which of the given conclusions logically follows from the statements.

12. Statements :

All ambulances are life savers.

No ambulances are bumper cars.

Conclusions:

I. No life savers are bumper cars

II. No bumper cars are life savers

III. Some life savers are not bumper cars

IV. None of the above

(a) Only II follow

(b) Only I follow

(c) Only III follow

(d) None of these

Practice questions:

In each question below are some statements followed by conclusions. Read all the conclusions and then decide which of the given conclusions logically follows from the statements.

13. Statements:

All dogs are brown.

All pit bulls are brown.

Conclusions:

I. Some pit bulls are dogs

II. Some pit bulls are not dogs

III. All pit bulls are dogs

IV. None of the above

(a) Only II and III follow

(b) Either II or III follows

(c) Only I and III follow

(d) None of these

Practice questions:

In each question below are some statements followed by conclusions. Read all the conclusions and then decide which of the given conclusions logically follows from the statements.

14. Statements:

Some books are no reference books.

All books are encyclopedias.

Conclusions:

I. Some reference books are not encyclopedias

II. No reference books are encyclopedias

III. All reference books are encyclopedias

IV. None of the above

(a) Either I or III follow

(b) Only I and IV follow

(c) Only II and IV follow

(d) None of these

Practice questions:

In each question below are some statements followed by conclusions. Read all the conclusions and then decide which of the given conclusions logically follows from the statements.

15. Statements:

Some vans are cars.

Some cars are roads.

Conclusions:

I. Some roads are vans.

II . Some cars are vans.

III. No van is road.

IV. Some roads are cars.

(a) Only II and III follow

(b) Only I and IV follow

(c) Only II and IV follow

(d) None of these

Practice questions:

In each question below are some statements followed by conclusions. Read all the conclusions and then decide which of the given conclusions logically follows from the statements.

16. Statements:

All outlaws are meek.

Some meek (men) are clever.

All clever (men) are foolish.

Conclusions:

I. Some foolish (men) are outlaws.

II. No foolish (man) is outlaw.

III. Some meek (men) are foolish.

IV. All clever (men) are meek

(a) None of these

(b) Only I or II follows

(c) Only III and either I or II follow

(d) Only I or II and III follow

Practice questions:

In each question below are some statements followed by conclusions. Read all the conclusions and then decide which of the given conclusions logically follows from the statements.

17. Statements:

Some papers are balls.

Ball is not spherical.

Conclusions:

I . Some papers are spherical.

II. Some balls are spherical.

III . Some papers are not spherical.

IV . Some balls are papers.

(a) Only III follows

(b) Only IV follows

(c) Either I or III follows

(d) Only III and IV follow

Practice questions:

In each question below are some statements followed by conclusions. Read all the conclusions and then decide which of the given conclusions logically follows from the statements.

18. Statements:

Some fowls are insects.

All fowls are butterflies. All insects are snakes.

Conclusions:

I. Some snakes are fowls.

II. Some butterflies are insects.

III. Some snakes are butterflies.

IV. Some insects are fowls.

(a) All follow

(b) Only IV follows

(c) Either I or III follows

(d) None of these

Practice questions:

In each question below are some statements followed by conclusions. Read all the conclusions and then decide which of the given conclusions logically follows from the statements.

19. Statements:

1. All cats are bulls
2. Some bulls are dogs

Conclusions:

I. All bulls are cats

II. Some cats are dogs

III. No cats are dogs

IV. Some bulls are cats

a) Only IV follows

b) Only III follows

c) Only II follows

d) Only IV and II follow

e) Only IV and either II or III follow

20. If “Some kings are soldiers,
no soldier is revolutionary”,
Which of the following conclusions is logical?

(a) Some soldiers are not revolutionary.
(b) All revolutionaries are soldiers.
(c) All soldiers are kings.
(d) None of these

Directions for Q21 and Q22:

Each question has a set of four statements. Each statement has three segments. Choose the alternative where the third segment in the statement can be logically deduced using both the preceding two, but not just from one of them.

21.

A. No cowboys laugh. Some who laugh are sphinxes. Some sphinxes are not cowboys.

B. All ghosts are florescent. Some ghosts do not sing. Some singers are not florescent.

C. Cricketers indulge in swearing. Those who swear are hanged. Some who are hanged are not cricketers.

D. Some crazy people are pianists. All crazy people are whistlers. Some whistlers are pianists.

(a) A and B
(b) C only
(c) A and D
(d) D only

22.

A. Dinosaurs are prehistoric creatures. Water-buffaloes are not dinosaurs. Water-buffaloes are not prehistoric creatures.

B. All politicians are frank. No frank people are crocodiles. No crocodiles are politicians.

C. No diamond is quartz. No opal is quartz. Diamonds are opals.

D. All monkeys like bananas. Some GI Joes like bananas. Some GI Joes are monkeys.

(a) C only
(b) B only
(c) A and D
(d) B and C

Practice Questions			
Q.1	A	Q.12	C
Q.2	B	Q.13	B
Q.3	E	Q.14	A
Q.4	D	Q.15	C
Q.5	B	Q.16	C
Q.6	B	Q.17	D
Q.7	A	Q.18	D
Q.8	C	Q.19	E
Q.9	A	Q.20	A
Q.10	A	Q.21	C
Q.11	C	Q.22	B

Thank you

LECTURE-3

NUMBER RANKING

In this chapter, generally we will deal two types of questions. They are based on:

- Number test
- Ranking test

In this chapter, we deal with questions which are followed with a sequence consisting numbers, and ranking

- We have to find answers on the basis of given condition.
- The importance of such types of questions cannot be over-emphasized as their presence in a test of reasoning is almost certain.
- Though no explanations are required as how to attempt these questions in exams.

Number Test:

In this type of questions, generally a set , group or series of numerals is given and the candidate is asked to trace out numerals following certain given conditions or lying at specific mentioned positions after shuffling according to a certain given pattern.

1. How many 4's are there preceded by 7 but not followed by 3?

5 9 3 2 1 7 4 2 6 9 7 4 6 1 3 2 8 7 4 1 3 8 3 2 5 6 7 4 3 9 5 8 2 0 1 8 7 4 6 3

a) 3
b) 4
c) 5
d) 6

2. How many 5s are there in the following number sequence which are immediately preceded by 7 and immediately followed by 6?

Terms : 7 5 5 9 4 5 7 6 4 5 9 8 7 5 6 7 6 4 3 2 5 6 7 8

(a) 1

(b) 2

(c) 3

(d) 4

3. How many even numbers are there in the following series of numbers, each of which is immediately preceded by an odd number, but not immediately followed by an even number?

Terms : 5 3 4 8 9 7 1 6 5 3 2 9 8 7 3 5

(a) Nil

(b) 1

(c) 2

(d) 3

Direction for Q4 and Q5:

Following questions are based on the five three-digit numbers given below

5 1 9 3 6 4 2 8 7 1 5 8 8 3 5

4. If the positions of the first and the third digit within each number are interchanged, which of the following will be the third digit of the second lowest number?

(a) 9

(b) 4

(c) 7

(d) 8

5 1 9 3 6 4 2 8 7 1 5 8 8 3 5

5. Which of the following is the difference between the second digit of the lowest and the highest of these numbers?

(a) 3

(b) 1

(c) 2

(d) 0

6. If it is possible to form a number which is a perfect square of a two digit odd number using the second, fourth, seventh digits of the number 739142658 using each only once, which of the following is the second digit of that two-digit odd number?

a) 4
b) 7
c) 3
d) None

7. The positions of the first and sixth digits in the number 5109238674 are interchanged. Similarly the positions of the second and the seventh digits are interchanged and so on . which of the following will be the third digit from the right end after the after the rearrangement?

a) 9
b) 0
c) 6
d) 3

8. How many such digits are there in the number 7346285 which are as far away from the beginning of the number, as they will be when arranged in ascending order within the number?

a) None
b) One
c) Two
d) Three

9. How many numbers amongst the numbers 9 to 54 are there which are exactly divisible by 9 but not by 3 ?

a) 5

b) 6

c) 0

d) 9

Ranking Test:

There are many different types of questions that are asked from the order and ranking topic. Those questions are generally related to rank from the left, right, top, and bottom, the total number of persons, products or elements, etc. Thus, many different types of questions can be formed based on the position or the rank of the persons, things, or products. In this topic, we will discuss how the concepts of Order and Ranking works. Let us understand, it with the help of the important rules:

Rule No 1:

To find the total number of persons/things of a single row, when ranks of one person/things is/are given from both sides of the row.

Formula: Total number of persons/things = Rank from Left end + Rank from Right end – 1

Example 1:

In a row of girls, the position of Radhika is 38th from the left side of the row, and the position from the right side of the row is 19th. Find the total number of girls in that row?

Solution: Total no. of person= (The position of Radhika from the left end + the position of Radhika from the right end) – 1

Therefore, the total no. of person is = (38 + 19) – 1= 57 – 1 = 56

Hence, the total number of girls in that row is 56.

Rule No. 2:

To find the rank or position of a person/thing from the opposite side, when rank or position from one side and total number of persons/things are given.

Formula: Position of a person from the opposite ends= (Total number of persons of that row – Position of the same person/thing from the given side) + 1

Example 2:

In a row of 31 persons, the position of Vicky from the left side of the row is 8th. What is the position of Vicky from the right side of that row?

Solution:

The position of Vicky from the right side is = (The total number of persons of that row – Position of Vicky from the left side) +1 = (31-8) + 1 = 24

Rule No. 3:

To find the number of persons/things after or before a person/thing whose rank from another side is given –

Number of persons/things after or before the given person/thing in a row = Total no. of persons/things – Position of the same person/thing from another side

Example 3:

In a billing line of 32 persons, the position of Hafiz from the front side of the row is 14th. Find the number of persons after Hafiz in that row?

Solution:

Number of persons after Hafiz = Total number of persons – Position of Hafiz from the front side

⇒ Number of persons after Hafiz in the row = 32 – 14 = 18

Hence, 18 persons are there after Hafiz in that row.

Rule No. 4:

To find the total number of persons/things in a row, when ranks of two persons/things and number of the persons/things who are sitting between those two persons/things are given.

In, such cases there will be two possible type:-

A. Case of Overlapping:

When the number of persons/things –> (position of a person/thing from the right side + position of another person/thing from the left side) is greater than the total number of persons/things

Number of persons between them = (Sum of positions of two different persons/things from both sides) – (Total number of persons/things) – 2

Example 4:

In a row of 22 boys. Ronak is 26th from the left side of the row and Shanky is 9th from the right side of the row. Find out the number of persons sitting between them?

Solution:

Number of persons between Ronak and Shanky = (26+9)-22-2= 35-22-2 = 11

Hence, the number of persons sitting between them is 11.

B. Case of not overlapping:

When Total number of persons/things is greater than the (position of one person from the right side /thing + position of another person/thing from the left side).

Number of persons between two persons/articles = Total number of persons/articles – (Sum of positions of two different persons/articles from both sides)

Example 5:

In a row of 85 persons. Manya is 24th from the left side of the row and Rashi is 19th from the right side of the row. Find out the number of persons sitting between them?

Solution:

Number of persons between Manya and Rashi = 85 – (24+19) = 85-43 = 42

Hence, there are 42 persons between Manya and Rashi.

Rule No. 5:

When in a single row, the positions of two persons are given and their positions are interchanged and after interchanging the position of first person is given from the same side as before interchanging.

a) To find the total number of persons of that row:

Formula:

Total Number of persons = Sum of the particular positions of a place (different person) from both sides – 1

Example 6:

In a row of persons, Ashish is 11th from the left and Salman is 20th from the right. If they interchange their positions, then Ashish becomes 17th from the left. Find out the total number of persons of that row.

Solution:

Total Number of persons = Sum of the particular positions of a place (different person) from both sides – 1

Positions of Salman before change + position of Ashish after change – 1

20 + 17 – 1 = 36

Hence, there are 36 persons.

b) To find the new position of the second person from the same side as before interchanging:

Formula: The position of the second person from the same side as before interchanging = The position of the second person from the same side before interchanging + (position of the first person after interchanging – position of the first person before interchanging from the same side

Example 7 :

In a row of persons, Ashish is 11th from the left and Salman is 20th from the right. If they interchange their positions, then Ashish becomes 17th from the left. Then, what will be the new position of Salman from the right end?

Total no of persons in a row = Position from the right end + Position from the left end – 1

= 20 + 17 – 1 = 35

Salman's position from right end = Total persons – Ashish's position from the left end + 1

= 36 – 10 + 1 = 27

Hence, in the new arrangement, the position of Salman is 27th from the right end.

c) To find the number of persons between that two persons:

Formula:

Number of persons between two persons = Difference in the positions of a person (same person) whose position from same side before and after interchanging is given – 1

Example 8:

In a row, Avni is 14th from the left end and Tanmay is 13th from the right end of the row. If they interchanged their positions Avni becomes 19th from the left end. Find the number of persons between them.

Solution:

Number of persons between Avni & Tanmay = (Position of Avni from left after interchanging– Position of Avni from left before interchanging) – 1

⇒ Number of persons between Avni & Tanmay is = (19 – 14) – 1 = 5 – 1 = 4

Rule No. 6:

In a row, if the positions of two different persons are given from opposite sides of the row and a third person is sitting exactly in the middle of that two person. If total number of persons is to be calculated, then there are will be two conditions –

a) When the position of the third person is to the left side of that person whose position was given from the right side. Or when the position of the third person is to the right side of that person whose position was given from the left side.

b) When the position of the third person is to the left side of that person whose position was given from the left side. Or when the position of the third person is to the right side of that person whose position was given from the right side.

Example 9:

In a row there are some persons, the position of Nishant from the left side of the row is 16th and position of Shikha from the right side of the row is 11th. If Mahesh is sitting just in the middle of Nishant and Shikha and there are two persons between Mahesh and Nishant. Find the total number of persons in the row?

Solution:

A) If Mahesh is to the left of Shikha, then the number of persons in the row will be:

Shortcut Rules:

⇒ Position of 1st person+ Position of 2nd person + twice of the number of people between the third person and any of them (which was given) + 1

⇒ Position of Nishant + Position of Shikha + twice of the number of people between the third person and any of them (which was given) + 1

⇒ 16 + 11 + (2 × 2) + 1 = 32

B) If Mahesh is to the right of Shikha, then the number of persons in the row will be:

Shortcut Rules:

⇒ Position of 1st person+ Position of 2nd person + twice of the number of people between the third person and any of them (which was given) – 3

⇒ Position of Nishant + Position of Shikha – twice of the number of people between the third person and any of them (which was given) – 3

⇒ 16 + 11 – (2 × 2) – 3 = 20

PRACTICE QUESTIONS

1. In a row of boys, If A who is 10th from the left and B who is 9th from the right interchange their positions, A becomes 15th from the left. How many boys are there in the row ?

a) 23
b) 31
c) 27
d) 28

2. Nitin ranks 18th in a class of 49 students. What is rank from the last ?

a) 18
b) 19
c) 31
d) 32

3. A class of boys stands in a single line, One boy is 19th in order from both the ends, How many boys are there in the class ?

a) 36
b) 37
c) 38
d) 39

4. A class of boys stands in a single line. One boy is nineteenth in order from both the ends. How many boys are there in the class?

(a) 27

(b) 37

(c) 38

(d) 39

5. Anu and Vinay are ranked seventh and eleventh respectively from the top in a class of 31 students. What will be their respective ranks from the bottom in the class?

(a) 20th and 24th

(b) 24th and 20th

(c) 25th and 21st

(d) None of these

6. In a class of 42 students, Mahesh's rank is 16th from the bottom. What is his rank from the top?

(a) 25th

(b) 26th

(c) 24th

(d) 27th

7. In a row of boys, A is 13th from the left and D is 17th from the right. If in this row A is 11th from the right then what is the positions of D from the left?

a) 6th

b) 7th

c) 10th

d) 14th

8. In a row of thirty boys, R is fourth from the right end and W is tenth from the left end . How many boys are there between R and W?

(a) 15
(b) 16
(c) 17
(d) Cannot be determined

9. There are five books of different thickness. A is thicker than C and B is thicker than D. E is not as thick as B, but is thicker than C. D is not as thick as C. Which is the thinnest book?

(a) E
(b) D
(c) B
(d) C

10. In a class of 180, where girls are twice the number of boys, Rupesh [a boy] ranked 34th from the top. If there are 18 girls ahead of Rupesh, how many boys are after him in rank?

(a) 45

(b) 44

(c) 60

(d) Cannot be determined

Time sequence test:

Here, we have to defect exact time from the given time sequence.

Practice questions:

1. If every second Saturday and all Sundays are holidays in a 30 days month beginning on Saturday, then how many working days are there in that month? (Month starts from Saturday)

a) 20
b) 21
c) 22
d) 23

2. If the 30th January 2003 was Thursday, what was the day on 2nd march, 2003?

a) Sunday
b) Thursday
c) Tuesday
d) Saturday

3. If Tuesday falls on 4th of month, then which day will fall three days after the 24th ?

a) Monday
b) Tuesday
c) Friday
d) Thursday

4. If first day of the year(not a leap year) was Monday, then what was the last day of the year?

a) Friday
b) Saturday
c) Monday
d) Sunday

5. How many days will be there from 26th January 2008, to 15th may 2008(both days are included)?

a) 111
b) 112
c) 110
d) 113

6. If the third day of a month is Tuesday, which of the following would be the 4th day before the 27th day of that month?

a) Tuesday
b) Monday
c) Wednesday
d) Sunday

7. The priest told the devotee, "The temple bell is rung at regular intervals of 45 minutes. The last bell was rung five minutes ago. The Next bell is due to be rung at 7:45am". At what time did the priest give this information to the devotee?

a) 7.40 am
b) 7.05 am
c) 7.00 am
d) 6.55 am

8. Sandhya's birthday falls on 15th August and Minu's birthday falls on 25th June. If Minu's birthday was on Wednesday, what was the day on Sandhya's birthday in the same year?

a) Friday
b) Monday
c) Tuesday
d) Saturday

9. Nitin correctly remembers that Nidhi's birthday is before Friday but after Tuesday. Dheeraj correctly remembers that Nidhi's birthday is after Wednesday but before Saturday. On which of the following days does Nidhi's birthday definitely fall?

a) Monday
b) Tuesday
c) Wednesday
d) Thursday

10. Kailash remembers that his brother Deepak`s birthday falls after 20th May but before 28th May, while Geeta remembers that Deepak`s birthday falls before 22nd May but after 12th May. On what date Deepak`s birthday falls ?

a) 20th May
b) 21st May
c) 22nd May
d) Cannot be determined

Number Test			
Q.1	B	Q.6	D
Q.2	A	Q.7	B
Q.3	D	Q.8	C
Q.4	D	Q.9	C
Q.5	C		
Ranking Test (Practice Questions)			
Q.1	A	Q.6	D
Q.2	D	Q.7	B
Q.3	B	Q.8	B
Q.4	B	Q.9	B
Q.5	C	Q.10	B
Time Sequence Test (Practice Questions)			
Q.1	D	Q.6	B
Q.2	A	Q.7	B
Q.3	D	Q.8	A
Q.4	C	Q.9	D
Q.5	A	Q.10	B

Thank you

LOGARITHMS

Content

1) Introduction
i. Properties of logarithms

2) Problems
i. Problems using properties
ii. Application (Finding number of digits of a number)

3) Solved problems

4) Practice problems

1) Introduction

What is log?

Subtraction is the inverse operation to addition.
Ex: $e + x = N$; $x = N - e$

Division is the inverse operation to multiplication
Ex: $ex = N$; $x = N/e$

Likewise
Logarithm is the inverse operation to exponentiation.
Ex: $e^x = N$: $x = \log_e N$

1.i) *Properties of Logarithms*:

Property	LHS	RHS
Addition property	$\log_a (xy)$	$\log_a x + \log_a y$
Subtraction property	$\log_a (x/y)$	$\log_a x - \log_a y$
Multiplication property	$\log_a (x^n)$	$n (\log_a x)$
Inverse property	$\log_a x$	$1 / \log_x a$
Application of multiplication and inverse	$\log_{a\wedge n} (x)$	$1/n (\log_a x)$
Division property	$\log_a x$	$\log_b x / \log_b a$
Application of division property	$\log_x x$	1
a^0 = 1 property	$\log_a 1$	0

Note: *If no base value is mentioned in log, then it is logarithms to the base 10 which are known as common logarithms.*

2.i) Problems using properties

Example: Simplify $\log_{9\sqrt{3}}243$

$$\log_{9\sqrt{3}}243 = \log_{\sqrt{243}}243$$
$$= \log_{243^{1/2}}243$$
$$= 1/(1/2)\ \log_{243}243$$
$$= 2$$

Example 1. The value of $\log_2 16$ is:

A. 1/8
B. 4
C. 8
D. 16

Example: If log 27 = 1.431, then the value of log 9 is:

log 27 = 1.431
log 3^3 = 1.431
3 log 3 = 1.431
log 3 = 1.431/3

log 9 = log 3^2
= 2 log 3
= 2 (1.431/3)
= 0.954

Example 2. log $\sqrt{8}$ / log 8 is equal to:

A.1/8
B.1/4
C.1/2
D.8

Example: Simplify $\log_{13}5+3\log_{13}3-3\log_{13}3-3\log_{13}15+2\log_{13}65$

$\log_{13}5+3\log_{13}3-3\log_{13}3-3\log_{13}15+2\log_{13}65$
$= \log_{13}5+\log_{13}3^3-\log_{13}3^3-\log_{13}15^3+\log_{13}65^2$
$= \log_{13}(5* 3^3 * 65^2 / 3^3 * 15^3)$
$= \log_{13}(5* 65^2 / 15^3)$
$= \log_{13}(5* 15^2* 5^2 / 15^3)$
$= \log_{13}(5* 5^2 / 15)$
$= \log_{13}(5* 5^2 / 5* 3)$
$= \log_{13}(5^2 / 3)$
$= \log_{13}(25 / 3)$

Example 3. 2log 7 – log 81 + log 189 – log 343

a)0
b) log 21
c) log 7
d) –log 3

Example: If $\log_{10} 7 = a$, then $\log_{10} (1/70)$ is equal to:

$$\log_{10} (1/70) = \log_{10} 1 - \log_{10} 70$$
$$= \log_{10} 1 - \log_{10} 7 - \log_{10} 10$$
$$= 0 - a - 1$$
$$= -(a+1)$$

Example 4. If $\log_{10} 2 = 0.3010$, then $\log_2 10$ is equal to:

A. 699/301
B. 1000/301
C. 0.3010
D. 0.6990

Example: find x, if (log 6561)/(log 243) = $\log_{32} x+2$

(log 6561)/(log 243) = $\log_{32} x+2$
(log 3^8)/(log 3^5) = $\log_{32} x+2$
(8log 3)/(5log 3) = $\log_{32} x+2$
8/5 = $\log_{32} x+2$
32^8/5 = x+2
(2^5)^8/5 = x + 2
2^8 = x + 2
2^8 – 2 = x
x = 254

Example 5. Solve the following for x:
log 729 / log 81 = log x

a)100
b) √1000
c) 1000
d) 10

Example: If $\log_x (9/16) = -1/2$, then *x* is equal to:
A. - 3 4 B. 3 4 C. 81 256 D. 256 81

$\log_x (9/16) = -1/2$
9/16 = x^(-1/2)
x = (9/16)^-2
= (16/9)^2
= 256/81

Example 6. If $\log_x 16 = 0.8$, then find x

a)2
b) 4
c) 16
d) 32

2.ii) Application (Finding the number of digits of a number)

Example: If log 3 = 0.4771, the number of digits in 3^{24} is:

$\log 3^{24} = 24 \log 3$

$= 24 (0.4771)$

$\log 3^{24} = 11.45$

$3^{24} = 10^{11.45}$

$= 12$ digits

(or)

Number of digits in 3^{24} = mantissa + 1

= 11 + 1

= 12 digits

Mantissa is the part before decimal point

Example 7. If log 2 = 0.30103, the number of digits in 2^{64} is:

A. 18
B. 19
C. 20
D. 21

Example: Find the value of x: $\log_3(\log_2(\log_2(\log_5 x))) = 0$

Solution:

$\log_3(\log_2(\log_2(\log_5 x))) = 0$
$\log_2(\log_2(\log_5 x)) = 3^0$
$\log_2(\log_2(\log_5 x)) = 1$
$(\log_2(\log_5 x)) = 2^1$
$\log_2(\log_5 x) = 2$
$\log_5 x = 2^2$
$\log_5 x = 4$
$x = 5^4$
$= 625$

Example: If log 2 = 0.3010 and log 3 = 0.4771, the value of $\log_5 512$ is:

Solution:

$\log_5 512 = \log_5 2^9$

$= 9 \log_5 2$

$= 9 \log 2 / \log 5$

$= 9 \log 2 / \log (10/2)$

$= 9 \log 2 / \log 10 – \log 2$

$= 9 \log 2 / 1 – \log 2$

$= 9\ 0.301/1\text{-}0.301$

$= 9\ 0.301/0.699$

$= 3.87$

Example: Find the value of P, if $\log_{3125}p*\log_{9}25*\log_{343}243*\log_{2}49=4$

Solution:

$\log_{3125}p * \log_{9}25 * \log_{343}243 * \log_{2}49 = 4$
$\log_{5^5}p * \log_{3^2}5^2 * \log_{7^3}3^5 * \log_{2}7^2 = 4$
$1/5 \log_{5}p * 2/2 \log_{3}5 * 5/3 \log_{7}3 * 2 \log_{2}7 = 4$
$2/3 \log_{5}p * \log_{3}5 * \log_{7}3 * \log_{2}7 = 4$
$\log_{5}p * \log_{3}5 * \log_{7}3 * \log_{2}7 = 6$
log p / log 5 * log 5 / log 3 * log 3 / log 7 * log 7 / log 2 = 6
log p * 1 / log 2 = 6
log p / log 2 = 6
$Log_{2}p = 6$
p = 2^6
p = 64

PRACTICE QUESTIONS

1. If $a^x = b^y$, then:

A. log $a/b = x/y$
B. log $a/\log b = x/y$
C. log $a/$ log $b = y/x$
D. None of these

2. Simplify $\log_{3125}5^{25} + \log_{125}(25)^{60}$

a) 85
b) 145
c) 45
d) 145/4

3. Simplify $\log_{\sqrt{32}}(1/1024)$

a) 1
b) -1
c) -1/4
d) -4

4. Simplify log 7 + 3 log 2 – log 14 – log 4

a) 0
b) log 14
c) 2 log 56
d) 1

5. If $\log_7(x-7) + \log_7(x^2+7x+49) = 4$

a)196
b) 7
c) 49
d) 14

LOGARITHMS (Examples)			
Q.1	B	Q.6	D
Q.2	C	Q.7	C
Q.3	D		
Q.4	B		
Q.5	B		
LOGARITHMS (Practice Questions)			
Q.1	C		
Q.2	C		
Q.3	D		
Q.4	A		
Q.5	D		

Thank you