CHAPTER

Syllogism

LEARNING OBJECTIVES

- Different Types of statements
- Interpretations and conclusions of those statements
- Conclusions derived through joining the statements
- Methods to solve the questions

In Syllogism, we study the given statements in order to substantiate the derived conclusions.

The evidence provided to substantiate the conclusions are known as premises and that which is drawn on the basis of the premises is a conclusion. Thus Syllogism can be understood to be a piece of reasoning providing 'relational arrangement' between premises and conclusions.

Let us first understand the various terms involved:

Statement 1: Some of the Indians are men.

Statement 2: All men have the potential to be good. Conclusion: Some Indians have the potential to be good.

In the above given statements, statement 1 and statement 2 are premises and conclusion is to be verified on the basis of the premises given. It is also to be noted that:

- Propositions and statements are not the same thing.
- While finding out the conclusion, we should not be concerned with the vocabulary of the terms involved in the statements. Rather, we should treat them in isolation, without taking their literal meaning into account. To understand it better, if it is given that 'All boys are good', we cannot derive any relationship between boys and bad (opposite of good), unless some association between bad and good is given in the original question.

Types of Statements and the ways to Represent them

Famous European philosopher Aristotle and other classical logicians divided the categorical statements into four types:

Universally Affirmative Statement

Whenever we say that "All girls are good", we are simply accepting the relationship between the two entities 'girls' and 'good' in such a way that anything or anybody who is a girl, has to be good. We may assume that there is such a thing called girls. But the meaning of the above premise does not depend upon the assumption that girls exist.

These kinds of statements are known as Universally Affirmative Statements because they give the impression of the statement being universally true. Like all the girls present anywhere can be anything else, but simultaneously have to be good also. And there cannot be any exception to this rule.

Examples-

All goats are animals.

All actresses are beautiful.

All prime numbers are natural numbers.

Universally affirmative statements can be also rephrased using the word 'only'.

'All goats are animals' can be written as – only animals are goats.

Or, 'All actresses are beautiful' can be written as – only the beautiful are actresses.

Or, 'All prime numbers are natural numbers' can be written as – only natural numbers are prime numbers.

Universally Negative Statement

Whenever we say that, "No man is perfect", we are simply accepting the relationship between two entities 'man' and 'perfect' in such a way that anything or anybody who is a man cannot be perfect. We may assume that there is such a thing called a man. But the meaning of the above premise does not depend upon the assumption that man exists.

These kinds of statements are known as Universally Negative Statements because they give the impression of the statement being universally true. Like all the men present anywhere might not be anything else too, but simultaneously they cannot be perfect also. And there cannot be any exception to this rule. Examples – No Indian is a coward. No prime number is a fraction. No dream is unachievable.

Particular Affirmative Statement

Whenever we say that, "Some movies are boring", we are simply accepting the relationship between two entities 'movies' and 'boring' in such a way that some of the movies have to be boring. It also means that all the movies cannot be not-boring. We may assume that there is such a thing called 'movies'. But the meaning of the above premise does not depend upon the assumption that movies exist.

These kinds of statements are known as Particular Affirmative Statements because they give the impression of the statement being true in some particular cases and not in all the cases. Hence, it falls short of being a universal fact or a universally affirmative statement.

Example– Some dogs are rich. Some people are happy. Some bosses are stupid.

Particular Negative Statement

Whenever we say that, "Some numbers are not integers", we are simply accepting the relationship between two entities 'numbers' and 'integers' in such a way that some of the numbers have to be non-integers. We may assume that there is such a thing called 'numbers'. But the meaning of the above premise does not depend upon the assumption that numbers exist.

These kinds of statements are known as Particular Negative Statements because they give the impression of the statement being true in some particular cases and not in all the cases.

Example-

Some scorpions are not honest.

Some managers are not effective.

Some relationships are not manageable.

Representing the Statements and Standard Deductions

Normally, the statements given above construct a major part of any question in a syllogism. To represent these, we can either apply the subject-predicate form or the Venn-diagram method. We will see both these methods one by one:

Universally Affirmative Statement

Consider the example-All A are B.

Subject-predicate form: These types of statements are known as 'A-type' statements.

Venn-Diagram form: In the Venn-diagram form, we can represent A-type statements in the following ways:



In the above form, A is included inside B. And obviously set B is bigger than set A.



In the above form, set A and set B are of the same size. Following are the deductions which can be made from the above given statement:

- i. Some A are B.
- ii. Some B are A.

The given deductions are definitely true, however, we can derive some more 'probably true' deductions from the above statement. For example—'Some B are not A' is probably a true statement. And similarly 'some A are not B' is a definitely false statement.

Universally Negative Statement

Consider the example-No A are B.

Subject-predicate form: These types of statements are known as 'E-type' statements.

Venn-Diagram form:



Following are the deductions which can be made from the above given statement:

- i. No B are A.
- ii. Some A are not B.
- iii. Some B are not A.

The above given deductions are definitely true.

Particular Affirmative Statement

Consider the example–Some A are B.

Subject–Predicate form: These types of statements are known as 'I-type' statements.

Venn-Diagram form:



Following are the deductions which can be made from the above given statement:

i. Some B are A.

The above given deduction is definitely true, however we can derive some more 'probably true' deductions from the above statement. E.g., 'Some B are not A' is probably a true statement.

Particular Negative Statement

Consider the example-Some A are not B.

Subject-Predicate form: These types of statements are known as 'O-type' statements.

Venn-Diagram form:



The following are the deductions which can be made from the above given statement:

i. All A are not B.

However, we cannot make any deduction of A, E, I or O format from this statement.

Summarizing the whole discussion till now, we can have the following conclusions drawn:

	Affirmative	Negative
Universal	All (A)	No (E)
Particular	Some or Many (I)	Some not or Many not (O)

We can see the summary of all the standard deductions in a table format also:

Given statement	Deduction	Truth-metre	Summary		
	Some A are B	Definitely True	'All' can give only		
All	Some B are A	Definitely True	'Some' as definitely		
A are B	Some B are not A	ment.			
	Some A are not B	Definitely False			
	Some B are A	Definitely True	'Some' can give only		
Some A are B	Some B are not A	Probably True	'some' as definitely		
	Some A are not B	Probably True	ment.		
Some	No 'Definitely True' deduction possible				
A are not B	Some B are not A	Probably True			
	No B are A	Definitely True	'No' can give only 'No' or 'Some +		
No A are B	Some A are not B	Definitely True			
	Some B are not A	Definitely True	nitely true statement.		

Remember that

- No positive statement can give rise to any negative definitely true conclusion.
- No negative statement can give rise to any positive definitely true conclusion.

Besides the standard AEIO statements, there are a few more statements which are used in Syllogism:

Given statement	Deduc- tion	Truth-meter	Summary	
Only A are B	All B are A	Definitely True	All the conclusions	
	Some A are B	Definitely True	related to the Some format	
	Some B are A	Definitely True	will be true.	
All A is not B	Some A are not B	Definitely True		
	Some B are not A	Probably True		

Deductions of two or more than two statements of AEIO type together:

First Statement type	Second Statement type	Possible 'defi- nitely true' conclusions	Not possi- ble	
All	Some	Some	No/Some Not	
	All	All/Some	No/Some not	
	No	Some not/No	Some All	
	Some not	No conclusion is possible		
Some	All	Some	All/Some not/No	
	Some	No such conclusion possible		
	No	Some not	All/No/ Some	
	Some not	No conclusion is possible		

First State- ment type	Second Statement type	Possible 'definite- ly true' conclu- sions	Not possible	
No	All	No/Some not	All/Some	
	Some	Some not	All/No/ Some	
	No	No/Some not	All Some	
	Some not	No conclusion is possible		
Some not	All	No conclusion is possible		
	Some			
	Some not			
	No			

PRACTICE EXERCISES

Directions for questions 1 to 20: In each question given below are given three statements followed by four conclusions numbered (I), (II), (III), and (IV). You have to take the given statements to be true even if they seem to be at variance with commonly known facts and judge the conclusions on the basis of it. Choose the options based on the conclusions chosen.

- **Q.1** Statements: (i) All boys are pens.
 - (ii) Some toys are pens.
 - (iii) All pots are toys.

Conclusion: I. All pens are pots.

- II. Some boys are toys.
- III. Some pots are boys.
- IV. Only pots are toys.
- (a) Only I, II and IV follow
- (b) Only II, III and IV follow
- (c) Only II and III follow
- (d) None of these
- **Q.2** Statement: (i) Some books are intelligent.
 - (ii) No intelligent is wise.
 - (iii) Some wise are wind.
 - Conclusions: I. Some books are not wind.
 - II. Some books are not wise.
 - III. Some wind is not intelligent.
 - IV. Some wise are not books.
 - (a) Only I and either II or IV follow
 - (b) Only III follows
 - (c) Only II and III follow
 - (d) Only II, III and IV follow
- **Q.3** Statements: (i) Some goats are cats.
 - (ii) Some pens are boxes.
 - (iii) Some cats are animals.
 - Conclusions: I. Some goats are pens.
 - II. Some goats are animals
 - III. Some pens are animals.
 - IV. Some animals are either goats or
 - (a) None follows
 - (b) Only IV follows
 - (c) Only I and II follow
 - (d) Only I, II and III follow
- **Q.4** Statements: (i) All proverbs are sentences.
 - (ii) No men are proverbs.
 - (iii) Some women are sentences.
 - Conclusions: I. Some sentences are women.
 - II. No proverbs are men.
 - III. Some proverbs are men.
 - IV. No proverbs are women.
 - (a) Only I follows
 - (b) Only II and either III or IV follow

- (c) Only II follows
- (d) None of these
- Q.5 Statements: (i) Some cars are jeeps.
 - (ii) All bikes are cycles.
 - Some jeeps are not bikes. (iii)
 - Some jeeps are not cycles. Conclusions: I.
 - II. Some cycles are not bikes.
 - III. Some jeeps are cars.
 - IV. No cycles are jeeps.
 - (a) Only III follows
 - (b) Only III and IV follow
 - (c) Only I and IV follow
 - (d) Only I and III follow
- **Q.6** Statements: (i) All khiladis are spectators.
 - (ii) Some spectators are theatres.
 - (iii) Some theatres are movies.
 - Conclusions: I. Some movies are spectators.
 - II. Some khiladis are movies.
 - III. Some theatres are khiladis.
 - IV. All spectators are khiladis.
 - (a) Only II follows
 - (b) None follows
 - (c) Only II and IV follow
 - (d) Only I and III follow
- **Q.7** Statements: (i) Some buckets are salts.
 - (ii) All salts are ipods.
 - (iii) Some ipods are woods.
 - Conclusions: I. Some woods are salt.
 - II. Some buckets are woods.
 - III. Some ipods are buckets IV. Some woods are buckets
 - (b) Only II follows (a) None follows (c) Only III follows (d) Only IV follows
- Statements: (i) Some channels are mobiles. 0.8
 - Some mobiles are computers. (ii)
 - Some computers are stations. (iii)
 - Conclusions: I. Some stations are channels.
 - II. Some mobiles are stations.
 - III. Some computers are channels.
 - IV. All channels are stations.
 - (a) None follows
 - (b) Only I and II follow
 - (c) Only I, II and III follow
 - (d) Only II and III follow
- Q.9 Statements: (i) All leaves are dim.
 - (ii) No dim is brush.
 - (iii) All tops are brushes.
 - Conclusions: I. Some tops are leaves
 - II. Some dim is top.
 - III. Some dim is leaf.
 - IV. Some tops are brushes.

- pens.

- (a) All follow
- (b) Only I and II follow
- (c) Only II and III follow
- (d) Only III and IV follow
- **Q.10** Statements: (i) All noodles are threads.
 - (ii) All threads are boxes.
 - (iii) All trees are boxes.
 - Conclusions: I. No noodle is a tree.
 - II. Some trees are threads.
 - III. Some boxes are noodles
 - IV. Some trees are noodles.
 - (a) Only either I or IV follows.
 - (b) Only either I or IV and II follow.
 - (c) Only III follows
 - (d) Only either I or IV and III follow.
- Q.11 Statements: (i) Some mountains are rivers.
 - (ii) Some rivers are deserts.
 - (iii) All deserts are roads.
 - Conclusions: I. Some roads are rivers.
 - Some roads are mountains. Π
 - III. Some deserts are mountains.
 - (a) None follows
 - (b) Only I follows
 - (c) Only II and III follow
 - (d) Only I and II follow
- Q.12 Statements: (i) Some cars are flowers.
 - (ii) All flowers are plants.
 - (iii) Some plants are leaves
 - Conclusions: I. Some plants are cars.
 - II. Some leaves are flowers.
 - III. No car is a leaf.
 - (a) None follows
 - (b) Only I follows
 - (c) Only II follows
 - (d) Only I and III follow
- Q.13 Statements: (i) All homes are mountains.
 - (ii) All glasses are mountains.
 - (iii) Some mountains are windows.
 - Conclusions: I. Some windows are glasses.
 - II. Some homes are windows.
 - III. Some mountains are glasses.
 - (a) Only I follows (b) Only II follows
 - (c) Only III follows (d) None follows
- Q.14 Statements: (i) Some homes are tables.
 - (ii) Some tables are gardens.
 - (iii) All lantern are gardens
 - Conclusions: I. Some lanterns are tables.
 - II. Some gardens are homes.
 - III. Some lanterns are homes.
 - (a) None follows
 - (b) Only I follows

 - (c) Only II follows
 - (d) Only III follows

- Q.15 Statements: (i) All ships are buses. (ii) No room is a bus. (iii) All boats are rooms. Conclusions: I. No boat is a ship. II. No bus is a boat. III. No ship is a room (a) Only I and II follow (b) Only II and III follow (c) Only I and III follow (d) All follow Q.16 Statements: (i) All books are copies. (ii) All copies are pencils (iii) No pencils are erasers. Conclusions: I. No erasers are books. II. No copies are erasers. III. Some pencils are copies. IV. All books are pencils. (a) Only I, II and III follow (b) Only II, III and IV follow (c) Only I, III and IV follow (d) All follow Statements: (i) All coats are shirts. Q.17 (ii) Some shirts are caps. (iii) No caps are trousers. Conclusions: I. Some coats are caps. II. Some trousers are not shirts. III. No coats are trousers. IV. Some caps are shirts. (a) Only IV follows (b) Only I and IV follow (c) Only I, II and IV follow (d) None of these Q.18 Statements: (i) No toys are bats. (ii) Some bats are boxes (iii) All boxes are pots. Conclusions: I. Some bats are not toys. II. Some toys are not boxes. III. Some pots are bats. IV. Some pots are not toys. (a) Only I and III follow (b) Only I, III and IV follow (c) Only I, II and III follow (d) None of these Q.19 Statement: (i) No slates are pencils. (ii) All pencils are dusters. (iii) No pencils are chalks. Conclusions: I. Some dusters are slates. II. No dusters are slates III. No slates are chalks. IV. Some slates are chalks. (a) Only I and III follow (b) Only either I or II and III follow
 - (c) Only I and either III or IV follow
 - (d) None of these

- Q.20 Statement: (i) Some phones are radios.
 - (ii) Some radios are recorders.
 - (iii) Some recorders are not televisions.
 - Conclusions: I. Some phones are recorders.
 - II. Some phones are not radio.
 - III. All phones are radios.
 - IV. Some radios are not televisions.
 - (a) Only IV follows
 - (b) Only I and IV follow
 - (c) Only I, II and IV follow
 - (d) None of these

Directions for questions 21 to 27: Solve the following questions.

- Q.21 Statements: (i) All cars are trucks.
 - (ii) No truck is a mare.
 - (iii) All mares are animals.
 - Conclusions: I. No car is a mare.
 - II. Some animals are mares.
 - III. Some trucks are cars.
 - IV. Some cars are mares.
 - (a) Only either I or IV and II follow
 - (b) Only either I or II and both III and IV follow
 - (c) Only either I or IV and both II and III follow
 - (d) Only I, II and III
- Q.22 Statements: (i)Some drums are vehicles.
 - (ii) Some vehicles are machines.
 - (iii) Some machines are mechanics
 - Conclusions: I. Some mechanics are machines.
 - II. Some vehicles are drums.
 - III. Some machines are drums.
 - IV. Some mechanics are vehicles.
 - (a) Only I and II follow
 - (b) Only III and IV follow
 - (c) Only I and IV follow
 - (d) None follows
- Q.23 Statements: (i) Some opels are televisions.
 - (ii) Some televisions are bulbs.
 - (iii) All lanterns are bulbs.
 - Conclusions: I. Some opels are lanterns.
 - II. Some opels are bulbs.
 - III. No lantern is opel.
 - IV. All bulbs are lanterns.
 - (a) IV follows
 - (b) Only II and III follow

- (c) Only either II or III follows
- (d) Only either I or III follows
- Q.24 Statements: (i) All cats are lions.
 - (ii) Some lions are mice.(iii) All mice are giraffes.
 - Conclusions: I. Some mice are cats.
 - II. Some giraffes are lions.
 - III. Some giraffes are cats.
 - IV. All giraffes are mice.
 - (a) Only I and II follow
 - (b) Only I and III follow
 - (c) Only II or III follows
 - (d) None of these
- Q.25 Statements: (i) Some apples are bees.
 - (ii) No bee is a papaya.
 - (iii) All papayas are boys.
 - Conclusions: I. Some apples are boys.
 - II. Some boys are papayas.
 - III. Some boys are apples.
 - IV. Some bees are apples.
 - (a) None follows
 - (b) Only II and IV follow
 - (c) Only II and III follow
 - (d) None of these
- Q.26 Statements: (i) Some tables are apartments.
 - (ii) All apartments are cars.
 - (iii) Some cars are trucks.
 - Conclusions: I. Some tables are trucks.
 - II. Some tables are cars.
 - III. Some cars are apartments.
 - IV. No truck is a table.
 - (a) Only II and III follow
 - (b) Either only I or II, III and IV follow
 - (c) Either only I or IV, and II and III follow
 - (d) All follow
- Q.27 Statements: (i) All tables are phones.
 - (ii) Some phones are gadgets.(iii) All gadgets are tables.
 - Conclusions: I. Some gadgets are phones.
 - II. Some gadgets are tables.
 - III. Some gadgets are not tables.
 - IV. Some tables are phones.
 - (a) Only I and II follow
 - (b) Only I and III follow
 - (c) Either II or IV follow
 - (d) None of these

ANSWER KEYS									
1. (d)	2. (d)	3. (a)	4. (d)	5. (a)	6. (b)	7. (c)	8. (a)	9. (d)	10. (d)
11. (b)	12. (d)	13. (c)	14. (a)	15. (d)	16. (d)	17. (a)	18. (b)	19. (d)	20. (d)
21. (d)	22. (a)	23. (d)	24. (d)	25. (b)	26. (c)	27. (a)			

HINTS AND SOLUTIONS

1.



Therefore, from the above venn diagram, we can see that none of the conclusion follows.

Hence, option (d) is the correct answer.

2.

3.



Therefore, from the above venn diagram, we can see that only II and III follows.

But if II follows so, IV should also follows.

Hence, option (d) is the correct answer.



Therefore, from the above venn diagram, we can see that none of the conclusion follows.

Hence, option (a) is the correct answer.



Therefore, from the above venn diagram, we can see that none of the conclusion follows.

Hence, option (d) is the correct answer.



Or,

6.



Therefore, from the above venn diagrams we can see that only conclusion III follows.

Hence, option (a) is the correct answer.



Therefore, from the above venn diagram we can see that none of the conclusion follows.

Hence, option (b) is the correct answer.



Therefore, we see that only conclusion III follows. Hence, option (c) is the correct answer.





Therefore, from the above venn diagram we can see that none of the conclusion follows.

Hence, option (a) is the correct answer.



Therefore, from the above venn diagram, we can see that only conclusions III and IV follows.

Hence, option (d) is the correct answer.

10.



Therefore, from the above venn diagrams, we see that either conclusion I or conclusions III and IV follows.

Hence, option (d) is the correct answer.

11.



Therefore, from the above venn diagram, we see that only conclusion I follows.

Hence, option (b) is the correct answer.



Therefore, from the above venn diagram, we see that only conclusion I follows.

Hence, option (d) is the correct answer.



Therefore, from the above venn diagram, we see that only conclusion III follows.

Hence, option (c) is the correct answer.



Therefore, from the above venn diagram, we see that none of the conclusion follows.

Hence, option (a) is the correct answer.



Therefore, from the above venn diagram, we see that all the conclusions follow.

Hence, option (d) is the correct answer.



Therefore, from the above venn diagram, we see that all the conclusions follow.

Hence, option (d) is the correct answer.

17.



Therefore, from the above venn diagram, we see that only conclusion IV follows.

Hence, option (a) is the correct answer.

18. Conclusion I is directly derived from statement I. Using statement I and statement II, we can conclude that some boxes are not toys, NOT the other way round that some toys are not boxes. Hence, conclusion II is not true. Using statement II and III, conclusion III is derived.

Some pots are bats, and no toys are bats \Rightarrow Some pots are not toys \Rightarrow Conclusion IV is derived.

Hence I, III and IV are derived.

Hence, option (b) is the correct answer.

19.



Therefore, from the above venn diagram, we see that none of the conclusions follow.

Hence, option (d) is the correct answer.

20. "Some" + "Some" does not give any joint conclusion. At the same time, we cannot get any conclusion using

"Some + Not" statement. We just have to see if any conclusion is given with reverse language (e.g. Some A are B is given as Some B are A).

We see that none of the conclusions follow.

Hence, option (d) is the correct answer.

21. Method 1:



Therefore, from the above venn diagram, we see that II, III follows.

Method 2:

Statement 1 and statement 3 together do not give any conclusion as there is no middle term. Since statement 2 is negative statement, using it with any other statement (1 or 3) will give only negative conclusion.

Let us go through the conclusions one by one:

Conclusion II is derived directly from statement III. Similarly, conclusion III is derived directly from statement I. Identification of these two conclusions is sufficient to mark the answer as option (d).

Note - We can verify that using statement I and statement II, conclusion I is derived.

Hence, option (d) is the correct answer.

22. Method 1:



Therefore, from the above venn diagram, we see that only I and II follows.

Method 2:

"Some" + "Some" does not give any joint conclusion. Hence, no joint conclusion is possible. We have to evaluate if any conclusion is derived directly from a single statement. Conclusion I is derived directly from statement III. Conclusion II is derived directly from statement I. Conclusion III cannot be derived. Conclusion IV cannot be derived.

Hence, option (a) is the correct answer.





Therefore, from the above venn diagram, we see that either conclusion I or III follows.

Hence, option (d) is the correct answer.

24.



Therefore, from the above venn diagram, we see that none of the conclusions follow.

Hence, option (d) is the correct answer.

25.



Therefore, from the above venn diagram, we see that only conclusion II and IV follows.

Hence, option (b) is the correct answer.

26.



Therefore, from the above venn diagram, we see that either conclusion I or IV, and II and III follows.

Hence, option (c) is the correct answer.

27.



Therefore, from the above venn diagram, we see that only conclusion I and II follows.

Hence, option (a) is the correct answer.