Syllogism

INTRODUCTION

Syllogism is a Greek word which means 'inference' or 'deduction'. The problems of syllogism are based on two parts:

1. Proposition/Propositions
2. Conclusion/Conclusions drawn from given proposition/ propositions

PROPOSITION

Just consider the sentences given below:

(i) "All lions are pigs"
Subject — Predicate

(ii) "No cat is rat"
Subject — Predicate

(iii) "Some girls are beautiful"
Subject — Predicate

(iv) "Some kites are not birds"
Subject — Predicate

All the sentences mentioned above are proposition which give a relation between subject and predicate. Here, it is clear from the sentences that a subject is the part of a sentence something is said about, while a predicate is the term in a sentence which is related to the subject.

Now, let us define the proposition :

A proposition is a sentence that makes a statement giving a relation between two terms. It has three parts :

(a) The subject
(b) The predicate
(c) The relation between subject and predicate

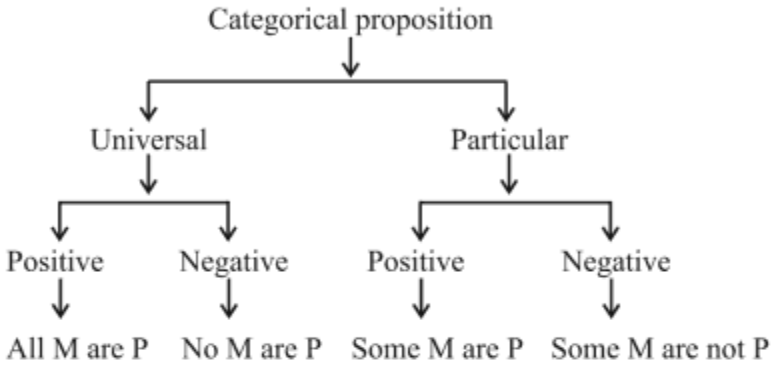
Categorical Proposition

Let us see the sentences given below:

"All M are P"
"No M are P"
"Some M are P"
"Some M are not P"

What we notice in all above-mentioned sentences that they are **condition free**. These type of sentences are called **Categorical Propositions**. In other words a categorical proposition has no condition attached with it and it makes direct assertion. It is different from non-categorical proposition, which is in the format "If M then P"

Types of categorical proposition



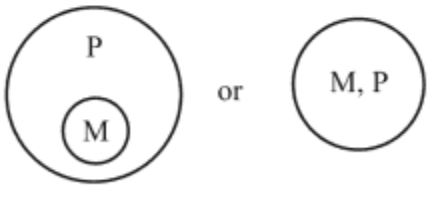
Therefore, it is clear, that universal propositions either completely include the subject (A type) or completely exclude it (E type). On the other hand, particular propositions either only partly include the subject (I type) or only partly exclude the subject (O type).

Now, we can summarise the four types of propositions to be used while solving the problems of syllogism:

Format	Type
All M are P	A
No M are P	E
Some M are P	I
Some M are not P	O

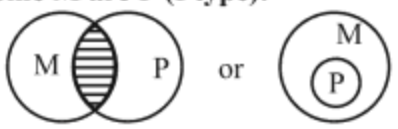
Shortcut Approach – 1

All M are P (A type):



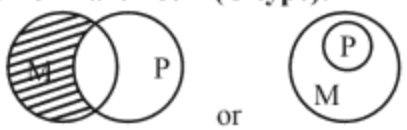
No M are P (E type):

Some M are P (I type):



Some M are P Some M are P
[All P are M]

Some M are not P (O type):



Some M are not P Some M are not P
[All P are M]

Hidden Propositions

(A) A type:

Apart from 'all' it starts with every, each and any.

Example 1.

Every girl is beautiful.
[All girls are beautiful.]

(i) A positive sentence with a particular person as its subject is A type.

He deserves Bharat Ratna
↓ Subject ↓ Predicate

Amitabh Bacchan is a great actor.
↓ Subject ↓ Predicate

(ii) A sentence with a definite exception is A type :

definite exception
↑
"All girls except Reeta are healthy."

(B) E type:

Apart from 'no' this type of propositions starts from 'no one', 'none', 'not a single' etc.

Example 2.

No one (student) is studious.
[No student is studious]

(i) A negative sentence with a particular person as its subject is E type propositions.

He does not deserve Bharat Ratna
↓ Subject ↓ Predicate

Amitabh Bacchan is not a great actor.
↓ Subject ↓ Predicate

(ii) Sentences in following formats are E type :

definite exception
↑
(a) " No student except Reena has failed"

(b) "Is there any truth left in the world ?"
[No truth is left in the world.]

(C) I type:

Apart from some, it also starts with words such as often, frequently, almost, generally, mostly, a few, most etc.

Example 3.

(i) Almost all the girls are beautiful.
[Some girls are beautiful].

(ii) Most of the garments are handmade.
[Some of the garments are handmade].

(iii) Usually girls are beautiful.
[Some girls are beautiful.]

(iv) A few money are left in my wallet.
[Some money are left in my wallet].

Further, let us see the sentences given below :

(i) Few girls are not studious.
[Some girls are studious.]

(ii) Rarely a girl is not beautiful.
[Some girls are beautiful].

(iii) Seldom women are not housewife.
[Some women are housewife].

It is clear from the above examples that negative sentences begining with words like 'few', 'rarely', 'seldom', etc. (Also 'hardly', 'scarcely', 'little' etc.) are reduced to I type.

Just see the other formates given below

Not a definite exception as name of girls are not given.
↑
All girls except a few are beautiful.

[Some girls are beautiful]

Not a definite exception as name of girls are not given.
↑
All girls except 5 have passed

[Some girls have passed]

Therefore, a positive proposition with an indefinite exception is reduced to I type.

(D) O type :

Apart from "Some ..... not', this type of statements start with words like 'all', 'every', 'any', 'each', etc.

Example 4.

(i) All girls are not beautiful.
[Some girls are not beautiful]

(ii) Poor are usually not healthy.
[Some poor are not healthy]

(iii) Every boy is not present.
[Some boys are not present.]

(iv) Almost all the girls are not beautiful.
[Some girls are not beautiful.]

(v) Most of the garments are not handmade.
[Some of the garments are not handmade.]

(vi) Girls are not frequently short tempered.
[Some girls are not short tempered].

It is clear from the above mentioned examples that negative propositions begining with the words like 'almost', 'frequently', 'most', 'mostly', 'a few', generally, etc. are reduced to O–type propositions.

Again, positive propositions starting with words like 'few', 'scarcely', 'rarely', 'little', 'seldom' etc. are said to be O–type.

Example 5.

Seldom women are jealous.
[Some women are not jealous]
Also, see the following formats :

No definite exception as name of girls are not given.

No girls except (three) are beautiful.

[Some girls are not beautiful.]

No definite exception as name of women are not given.

No women except (a few) are housewife.

[Some women are not housewife.]

Therefore, a negative proposition with an indefinite exception, is reduced to O type.

METHODS TO FIND THE CONCLUSION

(1) By Analytical Method
(2) By Venn Diagram

(1) Analytical method

This method has two main steps:
(a) Aligning the pair of sentences using IEA rule and table of conversion.
(b) Using conclusion table to draw conclusion.

Example 6. Statements:

I. All rats are cats.
II. All rats are men.

When aligned it takes the form as

I. Some cats are (rats) [I type]
II. All (rats) are men [A type]

Now we use the conclusion table given in this chapter that says
I + A = I type of conclusion.
Therefore, the drawn conclusion must be
"Some cats are men"
It is clear that the conclusion drawn "Some cats are men" is a mediate inference as it is the result of two propositions.

In actual problem, immediate inferences i.e., the conclusion drawn from a single statement are also given in conclusion part and that format is given below :

Example 7. Statements:

I. All rats are cats.
II. All rats are men.

Conclusion:
(i) Some cats are men.
(ii) Some men are cats.
(iii) Some rats are cats.
(iv) Some cats are rats.
(v) Some men are rats.
(vi) Some rats are men.

Answer options :
(a) only (iii) follows
(b) only (i), (ii) and (iii) follow
(c) only (iv) follows
(d) all follow
(e) none of these

Here, the correct option is (d).
(i) follows because it is the mediate inference of statements I & II.
Conclusion (ii) is the conversion of conclusion (i), conclusion (iii) is the immediate inference (conversion) of statement I while conclusion (iv) is the conversion of conclusion (iii).
Conclusion (v) is the immediate inference (conversion) of statement II while conclusion (vi) is the conversion of conclusion (v).
Further, in some problems, complementary pairs are also seen in the conclusion part in the forms of sentence :

(a) (i) Some cats are rats.
(ii) Some cats are not rats
(b) (i) All cats are rats.
(ii) Some cats are not rats.
(c) (i) Some cats are rats.
(ii) No cats are rats.

Apart from I - O, A - O and I - E pair, the two sentences must have some subject and predicates as are in the above mentioned pairs. For these pairs we write the form 'Either (i) or (ii) follows.
For example, see the following format :

Venn diagram method for solving problems :

Students will have to adopt three steps to solve the syllogism problems through Venn diagram method :
(a) 1st step is sketching all possible pictorial representation for the statements separately.
(b) 2nd step is combining possible pairs of these representations of all the statements into one.
(c) 3rd and final step is doing interpretation of this combined figure. Conclusions are true if they are supported by all the combined figures in 2nd step.

If any pictorial representation contradicts the given conclusion, it will be put in the category of incorrect or wrong conclusion.

Example 8.

Statements :

A. All chairs are books.

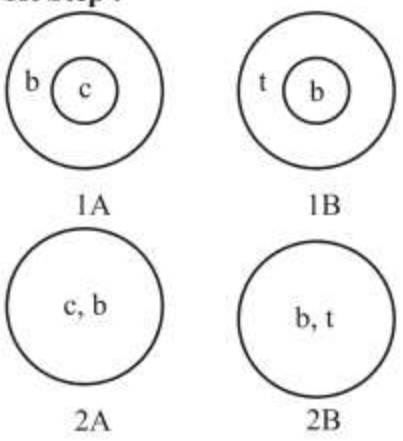
B. All books are ties.

Conclusions :

I. Some ties are books.

II. Some ties are chairs.

1st Step :



Here, 1A and 2A are representations of statement A while 1B and 2B are representations of statement B. In these representations

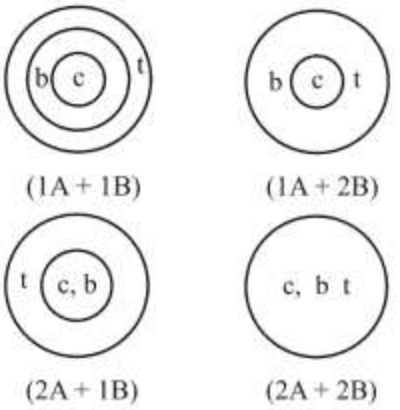
b = books

c = chairs

t = ties

2nd step :

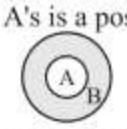
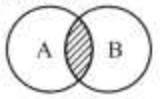
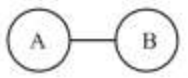
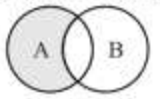
Let us combine all the possible pairs of this pictorial representations:



3rd step :

When we interpret the pictures in step II, we find that all the pictures support both the conclusions. Therefore, conclusion I : "Some ties are books" and conclusion II. "Some ties are chairs" both are true.

Venn Diagram :

Universal Affirmative	Particular Affirmative	Universal Negative	Particular Negative
Direct Statement: All A's are B's  **(1) Definite conclusion** (a) Some A's are B (b) Some B's are A's (i.e. These conclusions are sure conclusions without any doubt **(2) Possible conclusions** (a) Some B's are not A's is a possibility  (b) All B's are A, is a possibility. i.e. 	**Direct Statement:** Some A's are B's  **(1) Definite conclusions** (a) Some B's are A's **(2) Possible conclusions** (a) Some A's are not B is a possibility (b) Some B's are not A is a possibility (c) All A's are B's is a possibility (d) All B's is A is a possibility	**Direct Statement:** No A's are B  **(1) Definite conclusions** (a) All B's are not A (b) Some A's are not B (c) Some B's are not A **Note :** Since there is no relation between A&B ∴ No possibility are definite conclusions	**Direct Statement:** Some A's are not B's  **(1) Definite conclusion** Nothing definite can be said from the diagram. All are a possibility **(2) Possible conclusions** (a) Some A's are B's is a possibility (b) Some B is A is a possibility (c) Some B is not equal to A is a possibility (d) All A is not equal to B is a possibility (e) All B is not equal to A is a possibility (f) All B is equal to A is a possibility  **Note :** Vice-versa i.e. All A is equal to B is not a possibility as the direct statements itself states that some A is not equal to B".

ALL	SOME	ALL NOT	POSSIBILITIES
1. Each	1. Few	1. 0% (All A are not B)	1. Can
2. Every	2. Generally	2. None (none A is B)	2. Can be
3. Each and every	3. Frequently	3. Can never	3. May be
4. 100%	4. Most		4. Might be
5. Almost	5. 99% (any % between 0 and 100)		5. If
6. Always	6. At least		6. Can not
7. None but	7. Least		
8. Only			
9. Any*			

EXERCISE

DIRECTIONS (Qs. 1-4) : *In each of the questions below are given four statements followed by three conclusions numbered I, II & III. You have to take the given statements to be true even if they seem to be at variance from commonly known facts. Read all the conclusions and then decide which of the given conclusions logically follows from the given statements disregarding commonly known facts.*

1. Statements:
All chilies are garlics.
Some garlics are onions.
All onions are potatoes.
No potato is ginger.
Conclusions:
I. No onion is ginger.
II. Some garlics are potatoes.
III. Some chillies are potatoes.
(a) Only I follows (b) Only II follows
(c) Only I & II follow (d) Only I & III follow
(e) All follow

2. Statements:
Some windows are doors.
All doors are walls.
No wall is roof.
All roofs are shelters.
Conclusions:
I. Some windows are walls.
II. No wall is shelter.
III. No door is shelter.
(a) None follows (b) Only II and III follow
(c) Only I and III follow (d) Only I follows
(e) None of these

3. Statements:
All bottles are jars.
Some jars are pots.
All pots are taps.
No tap is tank.
Conclusions:
I. No pot is tank
II. Some jars are tanks
III. Some bottles are pots.
(a) Only I & III follow (b) Only I & II follow
(c) Only II & III follow (d) All follow
(e) None of these

4. Statements:
Some fish are crocodiles.
Some crocodiles are snakes.
No snake is tortoise.
All tortoises are frogs.
Conclusions:
I. No snake is frog.
II. Some snakes are fish.
III. Some fish are frogs.
(a) None follows (b) Only I & II follow
(c) Only II & III follow (d) Only I & III follow
(e) None of these

DIRECTIONS (Qs. 5-7) : *In each of the questions below are given two or three statements followed by the conclusions numbered I and II. You have to take the given statements to be true even if they seem to be at variance with commonly known facts and then decide which of the given conclusions logically follows from the given statements. Give answer*

(a) if only conclusion I follows.
(b) if only conclusion II follows.
(c) if either I or II follows.
(d) if neither I nor II follows.
(e) if both I and II follow.

5. Statements : All books are ledgers.
All pens are keys.
Some pens are books.
Conclusions : I. Some ledgers are keys.
II. Some keys are books.

6. Statements : Some roses are thorns.
All thorns are flowers.
No flower is a petal.
Conclusions : I. No petal is a rose.
II. Some flowers are roses.

7. Statements: All leaders are good team workers.
All good team workers are good orators.
Conclusions: I. Some good team workers are leaders.
II. All good orators are leaders.

DIRECTIONS (Qs. 8-12) : *In each of the questions below are given three statements followed by two conclusions numbered I and II. You have to take the given statements to be true even if they seem to be at variance with commonly known facts. Read all conclusions and then decide which of the given conclusions logically follows from the given statements, disregarding commonly known facts. Give answer*

(a) If only conclusion I follows
(b) If only conclusion II follows
(c) If either conclusion I or II follows
(d) If neither conclusion I nor II follows
(e) If both conclusions I and II follows

(8-10):
Statements:
Some poor are rich.
All rich are doctors.
Some intelligent are doctors.

8. **Conclusions :** I. At least some poor are intelligents.
II. All intelligents being rich is a possibility.

9. **Conclusions :** I. All intelligents being doctors is a possibility.
II. Some poor are doctors.

10. **Statements :** All fans are bulbs.
All wires are holders.
Some wires are bulbs.
Conclusions : I. At least some fans are wires.
II. All holders being fans is a possibility.

(11-12):
Statements:
No savings account is a current accounts.
Some fixed deposites are savings accounts.
Some current accounts are recurring deposits.

11. **Conclusions:**
I. All savings accounts being current accounts is a possibility.
II. All fixed deposits being current accounts is a possibility.

12. **Conclusions:**
I. All current accounts being fixed deposits is a possibility.
II. All savings accounts being recurring deposits is a possibility.

DIRECTIONS (Qs. 13-17) : *In each question 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. Read all the conclusions and then decide which of the given conclusions logically follows from the given statements, disregarding commonly known facts.*

13. **Statements** :
Some sheets are rods.
No sheet is a foil.
All rods are marbles.
Conclusions :
I. No foil is a marble.
II. Some sheets are marbles.
III. Some rods are foils.
IV. Some rods are not foils.
(a) Only I follows
(b) Only II follows
(c) Either III or IV follows
(d) Only I and either III or IV follow
(e) Only II and IV follow

14. **Statements :**
Some MLAs are not honest.
Some MLAs are dishonest.
No honest is a leader.
Conclusions :
I. Some MLAs are leader.
II. All dishonest are honest.
III. Some dishonest are MLAs.
IV. No leader is dishonest.
(a) Only IV follows (b) Only III and II follow
(c) Only I follows (d) Only I and IV follow
(e) None of these

15. **Statements** :
Some stones are not rods.
All rods are black.
No black is a crow.
Conclusions :
I. Some crows are rods.
II. Some blacks are stones.
III. Some crows are blacks.
IV. Some stones are rods.
(a) Only I follows (b) None follows
(c) Only I and IV follow (d) Only IV follows
(e) None of these

16. **Statements :**
Some garbages are money.
All papers are garbages.
All money are coins.
Conclusions :
I. Some papers are coins.
II Some garbages are coins.
III. No money is a paper.
IV. All coins are garbages.
(a) Only I follows (b) Only I and III follow
(c) Only II follows (d) Only II and III follow
(e) None of these

17. **Statements :**
Some pants are shirts.
No face is a pant.
No pant is a flower.
Conclusions :
I. No flower is a face.
II. No face is a flower.
III. Some shirts are not faces.
IV. Some shirts are pants.
(a) Only I and II follow (b) Only III and IV follow
(c) Either I or II follows (d) Only IV follows
(e) None of these

DIRECTIONS (Qs. 18-22) : *In each question below are given three statements followed by two conclusions numbered I and II. You have to take the given statements to be true even if they seem to be at variance with commonly known facts. Read all the conclusions and then decide which of the given conclusions logically follows from the given statements, disregarding commonly known facts. Give answer*

(a) if only conclusion I follows.
(b) if only conclusion II follows.
(c) if either conclusion I or II follows.
(d) if neither conclusion I nor II follows.
(e) if both conclusion I and II follow.

(18-19) :

Statements:
Some goals are ranks.
No goal is a game.
All games are players.

18. Conclusions :
I. Some ranks are definitely not games.
II. All ranks being goals is a possibility.

19. Conclusions :
I. All players are games.
II. At least some players are not goals.

(20-21) :

Statements :
All files are documents.
Some dictionary are documents.
No picture is a file.

20. Conclusions :
I. All documents being dictionary is a possibility.
II. Some documents are files.

21. Conclusions :
I. Some documents are pictures.
II. All files are definitely not picture.

22. Statements :
All books are pens.
No pen is a copy.
No paper is a book.
Conclusions :
I. No pen is a paper.
II. No copy is a book.

DIRECTIONS (Qs. 23-27): *In each questions bellow are given two statements followed by two conclusions numbered I and II. You have take the two given statements to be true even if they seem to be at variance with commonly known facts. Read the conclusions logically follows from the given statements disregarding commonly known facts. Give answer.*

(a) If only conclusion I follows.
(b) If only conclusion II follows.
(c) If either conclusion I or conclusion II follows.
(d) If neither conclusion I nor conclusion follows.
(e) If both conclusion I and Ii conclusion follow.

23. Statement:
All flowers are white
Some whites are beautiful
Conclusion:
(I) All flowers being beautiful is a possibility.
(II) Atleast some white may not be flowers.

24. Statement:
All mangoes are grapes.
Some grapes are black.
Conclusion
(I) Some mangoes being black is a possibility
(II) There is a possibility that some mangoes are not black

25. Statement:
Some dreams are nights
Some nights are days
Conclusion:
(I) All days are either nights or dreams
(II) Some days are nights

26. Statement:
All stars are moons.
All moons are planets.
All planets are round.
Conclusions:
(I) All moons being stars is a possibility.
(II) All stars are round

27. Statement:
Some cakes are pastries.
Some breads are pastries.
Conclusion:
(I) All pastries being cakes is a possibility.
(II) There is a possibility that some cakes are breads.

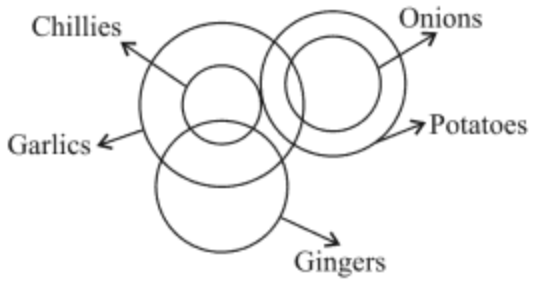
28. Statement:
All roads are bricks.
Some bricks are ropes.
All ropes are doors.
Conclusions:
(I) Some roads are doors.
(II) Some doors are bricks.
(III) Some roads are not doors.
(IV) All doors are ropes
(a) Only I and II follow.
(b) Only I, II and III follow.
(c) Either I or III and II follow.
(d) either I or III and IV follow
(e) None of these.

29. Statements:
Some pens are watches.
Some watch are tyre.
Some tyre are wheel.
Some wheels are buses.
Conclusion:
(I) Some buses are tyres.
(II) Some wheels are watches.
(III) Some wheels are Pens.
(IV) Some buses are watches.
(a) None follows (b) Only I follows
(c) Only II follows (d) Only III follows
(e) Only IV follows

30. Statement:
Some doctors are advocate
All teachers are advocate
Some engineers are advocate
All engineers are business- man
Conclusion :
(I) Some Teacher are Doctor.
(II) Some businessman are Advocate.
(III) Some businessman are Teacher.
(IV) Some Advocate are Teacher.
(a) Only I follows
(b) Only I and II follows
(c) Only I and either II or IV follows
(d) Only II and IV follows
(e) None of these

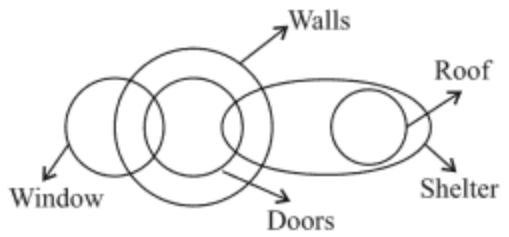
Hints & Solutions

1. (c)

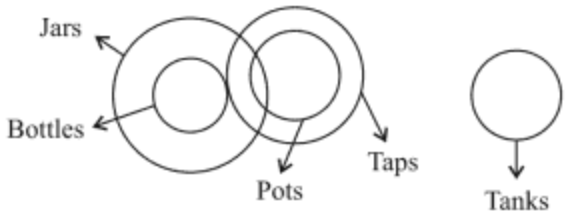


Only conclusions I and II follow.

2. (d)

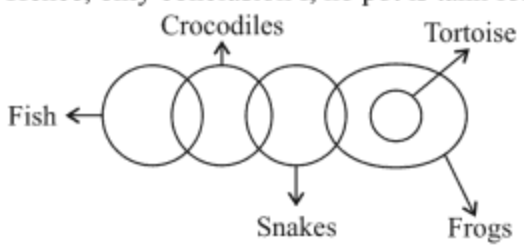


3. (e)

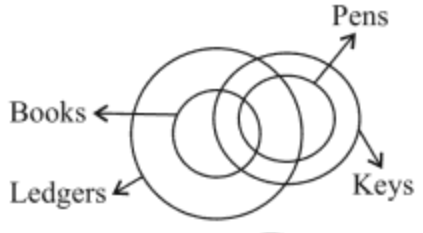


Hence, only conclusion I, no pot is tank follow.

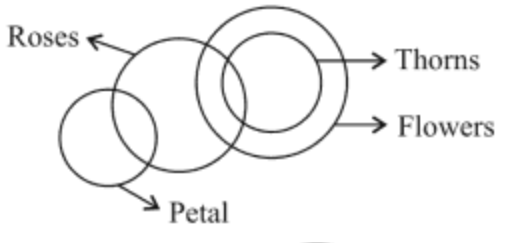
4. (a)



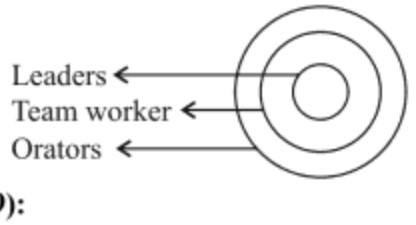
5. (e)



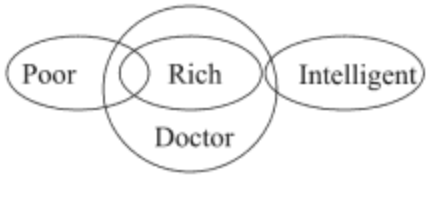
6. (b)



7. (a)

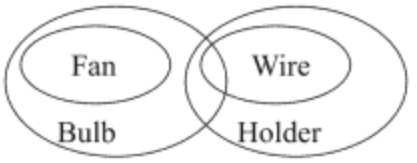


Sol. (8–9):



8. (b) 9. (e)

10. (b)

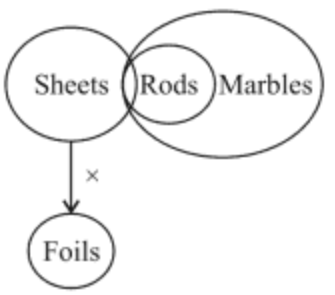


Sol. (11–12):

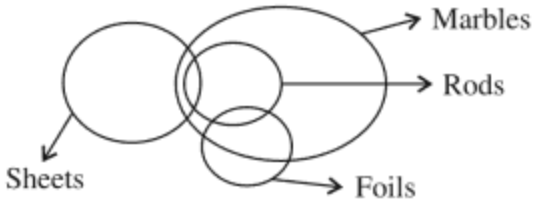
11. (d) 12. (e)

Sol. (13–14):

13. (e)

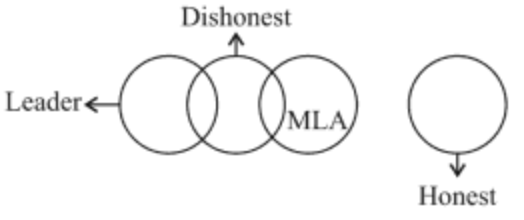


or



I. × II. ✓ III. × IV. ✓

14. (e)

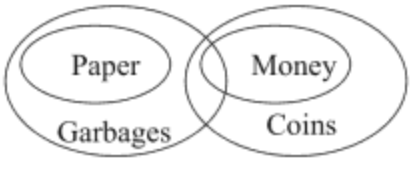


I. × II. × I II. ✓ IV. ×

15. (b)

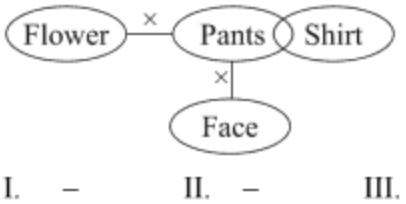
I. × II. × III. × IV. ×

16. (c)



I. × II. ✓ III. × IV. ×

17. (b)



I. – II. – III. × IV. ✓

Sol. (18-19):

18. (e) Conclusion:
I. True II. True

19. (b) Conclusion:
I. Can't Say II. True

Sol. (20-21) :

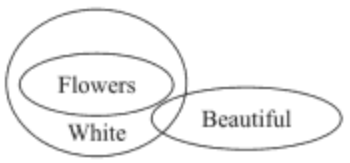
20. (e) Conclusions:
I. True II. True

21. (b) Conclusions:
I. Can't say II. True

22. (b) Conclusions:

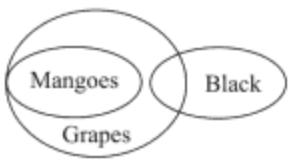
I. Can't say II. True

23. (e)



Conclusion:-
(I) All flowers being beautiful is a possibility. ✓
(II) Atleast some white may not be flowers. ✓

24. (e)



Conclusion:-
(I) Some mangoes being black is a possibility ✓
(II) There is a possibility that some mangoes are not black✓

25. (b)

Conclusions:-
(I) All days are either nights or dreams ×
(II) Some days are nights ✓

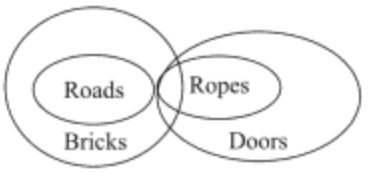
26. (e)

Conclusions:-
(I) All moons being stars is a possibility.✓
(II) All stars are round ✓

27. (e)

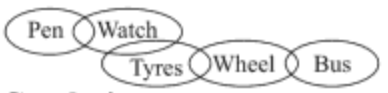
Conclusion:-
(I) all pastries being cakes is a possibility. ✓
(II) There is a possibility that some cakes are breads.✓

28. (c)



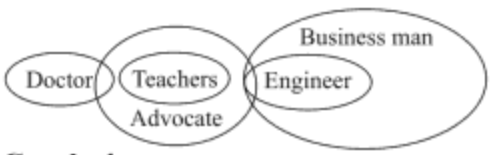
Conclusions:-
(i) Some roads are doors (×)
(ii) Some doors are bricks (✓)
(iii) Some roads are not doors (×)
(iv) All doors are ropes (×)
(i) Some roads are doors
(iii) Same roads are not doors] either i or iii

29. (a)



Conclusion:-
(I) Some buses are tyres.×
(II) Some wheels are watches.×
(III) Some wheels are Pens.×
(IV) Some buses are watches. ×

30. (d)



Conclusion:-
(I) Some Teacher are Doctor ×
(II) Some business man are advocate ✓
(III) Some business man are teacher ×
(IV) Some advocate are teacher ✓