Syllogism, Logical Connectives & Course of Action

Basics of Logic - I

Deductive Logic (Syllogism)

Introduction

It helps to think of deductive reasoning in terms of syllogisms.

A syllogism is a deductive argument relating two premises and a conclusion, all of which are quantified propositions, i.e. propositions joining concepts by using words such as 'some' and 'all'.

Deductive logic is used to derive conclusions from premises where the truth of the conclusion must always be contained in the truth of the premises.

Learning Objectives

- To understand the structure of an argument.
- To identify arguments involving deductive and inductive reasoning.

Let us start by first understanding terms like argument, premise and conclusion.

Argument — An 'argument expresses a single comprehensive act of thought which gives judgement and is supported by two statements. So it consists of three propositions.

It is divided into two parts: Premises and Conclusion

Premises — Two proposition which support the third proposition giving judgement are called 'Premises'.

Conclusion — The third proposition which gives a judgement and is supported by two premises is called a 'Conclusion'.

Let's consider an argument.

1. All students are wise.
2. Ravi is a student.
3. Ravi is wise.

Here obviously propositions 1 and 2 are the premises and the proposition 3 which follows from the first two propositions, is called the conclusion.

Deductive and Inductive Logic

Consider the following example.

1. All mammals have lungs.
2. Cow is a mammal.
3. Cow has lungs.

Irrespective of any other characteristics of a cow, i.e. it gives milk, it is white, etc., the conclusion that a cow has lungs holds good, if (1) and (2) are true.

This is deductive logic.

Some characteristics of deductive logic:

- It is a valid argument.
- Nothing can further strengthen this argument, i.e. no statement can make the conclusion more valid.
- Another way of looking at deductive logic is that when a 'specific' conclusion is derived from a set of general statements, then it is deductive logic.

In the previous example, if we alter the sequence of sentences, i.e.

1. Cow is a mammal.
2. Cow has lungs.
3. All mammals have lungs.

The conclusion that all mammals have lungs is not necessarily valid. However, it is not necessarily invalid. There is a probability of this conclusion being true.

This is inductive logic.

Some characteristics of inductive logic.

- The conclusion cannot be said to be either totally invalid or valid.
- Addition of certain other premises may make the conclusion either more valid or invalid.
- Another way of looking at inductive logic is that when a 'general' conclusion is derived from a set of specific statements, then it is inductive logic.

Deductive Logic

The premises in deductive logic can be either affirmative or negative and can also be universal or particular. Thus we have basically four types of premises as summarized below:

	Affirmative	**Negative**
Universal	All P are Q	No P is Q
Particular	Some P are Q	Some P are not Q

Let us understand each of these four statement in their entirety…

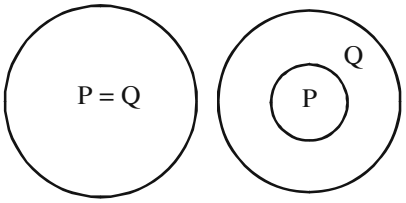
All P are Q

This statement means that there is no P which is not a Q. For those who understand the language of sets, it means that P is a sub-set of Q.

One of the most common mistakes made in interpreting this statement is that there are certain Q which are not P. This is false reasoning. It is just a possibility that there are certain Q that are not P but we cannot be sure of it. It is quite possible that the entire set of P and Q overlap with each other.

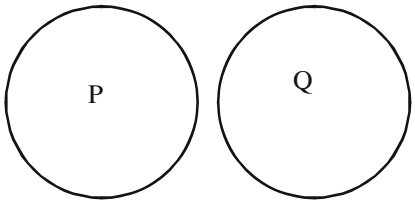
Similarly we also cannot conclude that 'All Q are P' as there is a possibility of some Q not being P

Thus there are two possible venn diagrams for this statement :



No P is Q

This statement is the simplest and has just one interpretation i.e. the two sets of P and Q are disjoint or do not overlap.



Thus we can conclude that no P is a Q and also that no Q is a P.

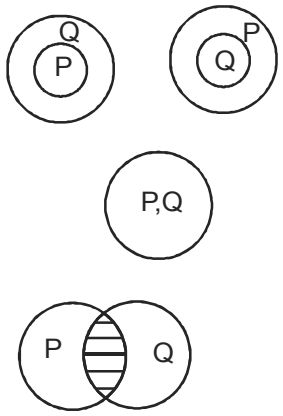
Some P are Q

The meaning of this statement is that there is atleast one P which is a Q.

Thus we can also conclude from this statement that 'some Q are P' because there is atleast one entity which is both a P and Q.

This statement is most prone to be misunderstood. One of the most common misunderstandings of this statement is the conclusion 'Some P are not Q'. Please note 'Some P are Q' does not mean 'Some P are not Q'. Understand it this way : the faculty of a class knows two individuals of the class personally and know that they are intelligent. Thus he is right in saying 'some students of this class are intelligent'. At the same time all the student may also be intelligent, it is just that he does not know them well. The faculty when he says that some students of this class are intelligent is just referring to those two individuals. The faculty is not making a remark on the others. The others may also be intelligent.

In fact, there are FOUR possible venn diagrams for this statement.



Some P are not Q

Again here all that we know that there is atleast one P which is not a Q.

Please note the 'atleast'. It is quite possible that no P may be a Q. Thus the conclusion that "some P are Q' cannot follow this statement.

To summarize:

	Correct conclusion	**Commonly made wrong conclusion**
All P are Q	Some Q are P	All Q are P
No P is Q	No Q is P	——
Some P are Q	Some Q are P	Some P are not Q
Some P are not Q	——	Some P are Q Some Q are not P

Now lets move on to find the inferences drawn from two such statements. Ideally we will try to eliminate the use of venn diagrams and try to decipher the conclusions verbally. Strive hard to visualize the venn diagram if required and not to draw it as venn diagrams are nothing but crutches and unnecessarily take time.

Strategy to Solve Syllogisms

1. Start by working backwards, i.e. from the given choices.
2. Always take the given premises to be true. Do not use general knowledge here. Trees may not be blues and reds may not be blacks, but the idea is to find the logical connection between the premises and select the conclusion. Do not let the premise distract you into general knowledge and vice versa.
3. Eliminate choices where a statement negates a previous statement.
4. Practice enough questions, so that you don't need to draw Venn diagrams. Avoid drawing Venn diagrams during the exam, as there is a time constraint except in case you wish to validate your answer and of course, if time allows.

Basics of Logic - II

Logical Connectives

In Logic, a **statement** is a sentence or a part of a sentence which is true or false (it has a truth value).

Any **statement** is termed as the **Proposition**.

"Shyam will join the Law College."

The above sentence is a good example of a proposition.

There can be **Simple Statements** or **Compound Statements**.

"Shyam will join the Law College."

The above sentence is a good example of a simple statement as it does not contain a logical connective.

Compound Statements are two simple statements connected by a **logical connective** such as **and, or, if … then** etc.

"Ram is going to college **and** Hari is going to college."

"**If** Shyam passes the exam, **then** he will join the law college."

The above sentences are good examples of compound statements as they contain a logical connective (**and** in the first and **if…then** in the second).

Propositional Logic is the first stage in logic. It deals with the manipulation of the logical implications of linked propositions or statements.

Consider the statement:

"If Shyam passes the exam, then he will join the law college."

The parts of this statement, "Shyam passes the exam," and "Shyam will join the law college." are two statements linked by words **"if"** and **"then"**. These linking words are called **Logical Connectives.**

We will also see, in due time, that the validity of the propositional inferences depends on the arrangement of propositions by logical connectives. Keeping this in mind, let's continue with the basics.

Following are the ***logical connectives*** used in basic compound sentences.

Ram is going to college **and** Hari is going to college. (**Conjunction**)

Ram is going to college **or** Hari is going to college. (**Disjunction**)

If Ram is going to college **then** Hari is going to college. (**Conditional**)

Ram is going to college **if and only if** Hari is going to college. (**Bi-conditional**)

Ram is **not** going to college. (**Negation**)

For the most part, language contains rich shades that propositional logic ignores. There are others that it does address but we will ignore them in the beginning.

To begin with, consider the seemingly easy connective **"if..., then....".** Its meaning has perplexed both the philosopher and the layman through the ages. **The statement "if A, then B" means by definition "if A is true, then B must be true as well," and nothing more.**

For example:

If it is raining then it is cloudy.

We know from experience that if it is raining, then it is cloudy. So if we see rain falling past the window, we can validly conclude that it is cloudy outside.

There are three statements that can be derived from the implication **"if A, then B"**; two are invalid, and one is valid.

From **"if A, then B"** you cannot conclude **"if B, then A.**" For example, if it is cloudy, you cannot conclude that it is raining. From experience, this example is obviously true; it seems silly that anyone could commit such an error. However, when the implication is unfamiliar to us, this fallacy can be tempting.

Another, and not as obvious, fallacy derived from **"if A, then B"** is to conclude **"if not A, then not B".** Again, consider the weather example. If it is not raining, you cannot conclude that it is not cloudy—it may still be overcast. This fallacy is popular with students.

Finally, there is one statement that is logically equivalent to **"if A, then B."** Namely, **"if not B, then not A."** This is called the **CONTRA POSITIVE**, and it is very important.

If there is a key to performing well on the logic section, it is the contra positive.

To show the contra positive's validity, we once again look at our weather example. If it is not cloudy, then from experience we know that it cannot possibly be raining.

We now know two things about the implication **"if A, then B"**:

1. **If** A is **true**, **then** B must be **true**.
2. **If** B is **false**, **then** A must be **false**.

If you assume no more than these two facts about an implication, then you will not fall for the fallacies that trap many students.

We often need to rephrase a statement when it's worded in a way that obscures the information it contains.

Type – 1:

Negation of a negative statement

In a question on the test, as in everyday speech, two negatives make a positive i.e. they cancel each other out. i.e. **not (not A) = A**

Let us consider the following example:

"It's **not** true that the witness did **not** speak the truth." It means that the witness did speak the truth.

Let's understand in a better way.

Premise **A:** Witness spoke the truth.

Premise **not A:** Witness did **not** speak the truth.

Premise **not (not A):** It's **not** true that the witness did **not** speak the truth.

Example:

"It is **not** the case that Jay did **not** pass the test" means the same thing as "Jay did pass the test."

Type – 2:

The logical relation of "A only if B" and "if A, then B"

"**A only if B**" means that when A occurs, B must also occur. That is, "**if A, then B**".

A only if B = if A, then B

Consider the following statement:

"Jay will do well on the test only if he studies hard" is logically equivalent to "if Jay did well in the test, then he must have studied hard."

Note:

Students often wrongly interpret this statement to mean "if Jay studies hard, then he will do well on the test." There is no such guarantee. The only guarantee is that if he has not studied hard he will not also well in the test.

Example:

Sanjay will pass the course ***only if*** he passes the final exam.

Type – 3:

The logical relation of "A unless B" and "if not B, then A"

The statement **"A unless B"** means that A is true in all cases, except when B is true. In other words if B is false, then A must be true. That is, **if not B, then A**.

Example:

"Sagar will take the bus to college ***unless*** his father drives him in his car." logically means, "**If** his father does **not** drive him in his car, **then** Sagar will take the bus to college."

Type – 4:

The Transitive property

The two statements **"if A, then B" and "if B, then C"** can be combined to give **"if A, then C."** This is called the transitive property.

From the two statements "**if** Jay did well on the test, **then** he studied hard" **and** "**if** Jay studied hard, **then** he did not party the night before the test" you can conclude that "**if** Jay did well on the test, **then** he did not party the night before the test."

This implies **("If A, then B" and "if B, then C") = ("if A, then C")**

Example 1:

P : **If** Rajan won the match, **then** he played well.

Q : **If** Rajan played well, **then** he concentrated.

P and **Q** together imply:

R : **If** Rajan won the match, **then** he concentrated

Example 2:

P : If Ravi studies hard, then he will pass the exam.

Q : If he passes the exam, then he will graduate to the next class.

R : If he has graduated to the next class, then his parents will be proud of him.

Which of the final statements can be concluded?

I. If Ravi's parents are proud of him, then he has studied hard.

II. If Ravi studies hard, then his parents will be proud of him.

III. If Ravi does not study hard, his parents will not be proud of him.

IV. If Ravi studies hard, his parents will not be proud of him.

(a) Only I and III (b) Only II

(c) Only IV (d) Only I

P, Q and R together imply:

S: If Ravi studies hard, then his parents will be proud of him.

One can clearly deduce that only II can be concluded from the statements. Hence, (b) is the correct answer.

Other Logical Connectives

Either / Or

Either Sushmita is beautiful or Aishwarya is beautiful implies that at least one out of the two is beautiful but it doesn't mean that both cannot be beautiful.

To understand it further, let's take the following two cases:

Case I:

Sushmita is beautiful $\Rightarrow$ Aishwarya is not beautiful.

(Incorrect; she may be beautiful too)

Case II:

Sushmita is not beautiful $\Rightarrow$ Aishwarya is beautiful.

(Correct; at least one out of the two has to be beautiful)

Example:

If Shilpi is not going to the party, then either Rita or Ravi will go. But if either Rita or Ravi goes to the party, then Rohit will not go. But Rohit goes to the party.

(a) Shilpi does not go to the party.

(b) Rita goes to the party.

(c) Ravi goes to the party.

(d) Both Rita and Ravi do not go to the party.

The given statements mean that if Shilpi goes then neither Rita nor Ravi will go to the party. Hence, (d).

Logical relation of "Whenever..." and "if A, then B"

Consider the following statement:

Example 1:

"**Whenever** Shyam rings the bell, he gets a shock".

The treatment for this particular question type is the same as that given to "**If** Shyam rings the bell, **then** he gets a shock."

Hence the valid conclusions are

1. Shyam rang the bell, he got a shock.
2. Shyam did not get a shock; he (definitely) did not ring the bell.

No other conclusion is possible.

Example 2:

"Whenever Sandhya makes a mistake, she gets punished."

Hence, Sandhya made a mistake, she got punished. Also, Sandhya did not get punished; she did not make a mistake.

Course of Action

First and foremost let us try to understand what is a 'course of action'. A course of action is the mode in which one needs to act or react in accordance to a particular situation. E.g. if one is unwell, then the course of action would be to consult a doctor. Looking at it more closely a course of action is the reaction to a problem. The course of action addresses the problem by either solving it or atleast minimizing its damages. It is immediately and urgently related to the problem. It arises as a consequence of the situation mentioned in the passage. Therefore, a *course of action* is a step of administrative decision taken for improvement or follow-up action. But, one needs to remember that the course of action needs to be a practical one. In case of a problem like outbreak of bird flu, one can't say that all chicken should be killed, as this is not a feasible solution.

These types of questions have a sentence or a short paragraph in the form of a question, presenting a situation. Following the situation, there are various options or possible courses of action. One needs to find out the option that would solve an impending problem or improve the existing situation. All the options have to be carefully evaluated for this purpose. The questions can be broadly of two types :

Type – I :

Firstly, where a fact situation is given followed by a few suggested courses of action and you have to choose the best possible answer.

Example :

Main statement: The meteorological department has predicted that monsoon will arrive in Mumbai on the 10th of July.

Courses of action

I. The Mumbai Municipal Corporation should ensure that the drainage facilities in the city are functioning properly.

II. The Mumbai Municipal Corporation should suspend all rail and road traffic in the city from the 10th of July.

III. The health department should be alerted about the possible outbreak of epidemics during monsoon.

(a) Only I follows (b) All follow

(c) None follows (d) II and III follow

Now the methodology to be used has to be of selection while eliminating options and then arriving at the correct option. On reading option (a) we can clearly see that option (a) has to be there. So we can safely eliminate options that do not have statement I. Options (c) and (d) get eliminated. Next, we take a look at statement II. This is not a possible course of action as it is not practical at all. Therefore, we do not need to look further. Option (a) is the correct answer.

Type – II:

The other type of a course of action question is where a fact situation is followed by two courses of action and certain options follow the question. One is required to choose the best possible answer.

Example :

Main statement: The normally recession-proof marriage industry has been hit by astrology. The Hindu calendar says it is an inauspicious year to marry.

Courses of Action

I. The government should declare the marriage industry sick.

II. All marriages should be postponed to next year.

Read the above passage and mark:

a. If only course of action I follows.

b. If only course of action II follows

c. If both the courses of action follow.

d. If neither course of action follows.

Solution:

Now here in this case, the problem is that the Hindu calendar says it is an inauspicious year. There is no administrative action that can be taken in such a case. Declaring the marriage industry sick or postponing the marriages to next year would not solve the problem of inauspicious days this year. The problem stays in both the cases. Moreover, people of other religion would not be affected by the Hindu calendar. Therefore, the answer would be option (d).

More Examples

Example – I

Main statement: Estimates suggest that of the Rs.20, 000 Crore market for drugs in India, fake drugs account for about Rs.4000 crores.

Courses of Action

I. Specifications on packaging material should be tightened to make copying technologically tough and economically unviable so that faking drugs becomes difficult.

II. Holograms on packaging should be made mandatory so that faking becomes difficult.

III. Fake drug manufacturing and selling should attract the most severe punishment under the law and hence work as a deterrent to others.

Select the most appropriate option from amongst the following:

(a) All of the above (b) Only I and II

(c) Only III (d) Only II and III

Now, we need to identify first the root problem from the given statement. That would be the fake drugs industry, which is rampant in India. Now looking at the options, the first and the second courses of action aptly address the issue because if such steps are taken,fake drugs would not be as easily manufactured and sold as in the present scenario. This would help in checking the growth of this illegal industry. The third course of action also would be beneficial in discouraging the fake drug manufacturers. Thus, all three courses of action are plausible and address the issue immediately. Also, they help in mitigating the existing problem.

Therefore, option (a) is the answer.

Example – II

Main statement: In the lawsuits related to communal violence in the country, several witnesses have withdrawn themselves out of fear of their lives.

Courses of Action

I. The inadequacy of the Indian Penal Code in dealing with pressures on witnesses should be addressed.

II. Witnesses should be asked not to fear for their lives.

Read the above passage and mark:

a. If only course of action I follows.

b. If only course of action II follows

c. If both the courses of action follow.

d. If neither course of action follows.

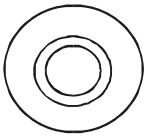
Solution: Course of action I is a valid one as it immediately, urgently, practically and logically addresses the problem i.e. withdrawal of witnesses for fear of their lives. It is a reasoned course of action and will definitely address the issue. Course of action II, on the other hand, is a mere lip service and would not be a concrete measure to address the impending problem. Thus, this course of action is a casual approach to the problem and is not valid.

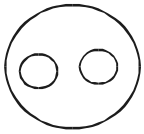
Therefore, the answer is option (a).

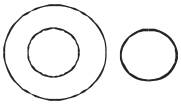
Exercise

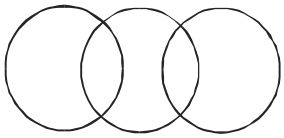
PRACTICE EXERCISE-1

Directions for questions 1 to 10: You are required to choose from among the given four diagrams — (a), (b), (c) and (d) — the diagram that best illustrates a relationship among the three given classes in the questions.

(a) 

(b) 

(c) 

(d) 

1. Eatables, Meat, Venison
2. Criminals, Thieves, Murderers
3. Bachelors, Doctors, Husbands
4. Food, Spaghetti, Oven
5. Food, Rice, Belt
6. Beverages, Liquor, Juice
7. Matter, Solid, Gas
8. Chair, Table, Furniture
9. Cutlery, Spoon, Chair
10. Croissants, Baked eatables, Brown bread

Directions for questions 11 to 35: In each question, two statements are followed by two conclusions, I and II. You have to take the given two statements to be true even if they seem to be at variance with commonly known facts. Read the conclusions and then decide which of the given conclusions logically follows from the two given statements, disregarding commonly known facts.

Mark the answer

(a) if only conclusion I follows

(b) if only conclusion II follows

(c) if both I and II follow

(d) if neither I nor II follows

11. **Statements:**

Some clouds are thunder.

All clouds are rain.

Conclusions:

I. Those clouds which are not thunder, are also rain.

II. Those clouds which are not thunder, are not necessarily rain.

12. **Statements:**

Some tins are pens.

Some pens are rods.

Conclusions:

I. No rod is tin.

II. Some tins are rods.

13. **Statements:**

Some sabres are bombs.

Key is a sabre.

Conclusions:

I. Some bombs are sabres.

II. Some keys are bombs.

14. **Statements:**

All lenses are horns.

No horn is colourful.

Conclusions:

I. Some lenses are colourful.

II. No lens is colourful.

15. **Statements:**

All flirts are smart.

All smart are rotten.

Conclusions:

I. All rotten are flirts.

II. All smarts are flirts.

16. **Statements:**

All puppies are dogs.

All dogs are trained.

Conclusions:

I. Some trained are puppies.

II. All trained are puppies.

17. **Statements:**

All advocates are obese.

Some obese are priests.

Conclusions:

I. Some advocates are priests.

II. Some priests are advocates.

18. **Statements:**

Some psychiatrists are singers.

All singers are tall.

Conclusions:

I. Some psychiatrists are tall.

II. All psychiatrists are tall.

19. **Statements:**

All coins are crows.

Some crows are pens.

Conclusions:

I. No pen is coin.

II. Some coins are pens.

20. **Statements:**

All magicians are dumb.

Some magicians are educated.

Conclusions:

I. Some dumb are magicians.

II. Some educated are dumb.

21. **Statements:**

All cots are tablets.

Some chimps are tablets.

Conclusions:

I. Some cots are chimps.

II. Some chimps are cots.

22. **Statements:**

All willows are nettles.

Some trees are willows.

Conclusions:

I. Some trees are nettles.

II. Some trees are not nettles.

23. **Statements:**

Some dolls blink.

All dolls burble.

Conclusions:

I. Those dolls which do not blink, also burble.

II. Those dolls which do not blink, don't necessarily burble.

24. **Statements:**

Some fools are intelligent.

Some fools are great.

Conclusions:

I. Some intelligent are great.

II. All great are intelligent.

25. **Statements:**

Some pumpkins are fat.

Some fat are purple.

Conclusions:

I. Some fat are purple and pumpkins.

II. Some purple are pumpkins.

26. **Statements:**

Some bosses are punctual.

Some punctual are genial.

Conclusions:

I. No genial is a boss.

II. Some bosses are genial.

27. **Statements:**

Some sea-men are foolish.

Some sea-men are illiterate.

Conclusions:

I. All illiterate are foolish.

II. No sea-men are foolish.

28. **Statement:**

All boys are heroes.

Sandy is a hero.

Conclusions:

I. Sandy is a boy.

II. All heroes are boys.

29. **Statements:**

All great scientists are college dropouts.

Some criminals are college dropouts.

Conclusions:

I. Some criminals are great scientists.

II. All great scientists are criminals.

30. **Statements:**

Sampras is a good sportsman.

Sportsmen are strong.

Conclusions:

I. All strong persons are sportsmen.

II. Sampras is strong.

31. **Statements:**

All of my classmates are intelligent.

Ravinder is not intelligent.

Conclusions:

I. Ravinder is not my classmate.

II. Ravinder needs to sharpen up his brains.

32. **Statements:**

All hippopotami have skin.

Rojo is a hippopotamus.

Conclusions:

I. Rojo has skin.

II. Animals other than hippopotamus do not have skin.

33. **Statements:**

Some sunglasses are blue.

Ray-Ban is a sunglass.

Conclusions:

I. Some blue are sunglasses.

II. Some Ray-Bans are blue.

34. **Statements:**

Some men are broad-minded.

Broad-minded people are educated.

Conclusions:

I. All educated people are broad-minded.

II. Some men are educated.

35. **Statements:**

Some pious people are priests.

Joseph is a priest.

Conclusions:

I. Some priests are pious.

II. Joseph is pious.

Directions for questions 36 to 50: In each of the following questions, three statements 1, 2 and 3 are followed by four conclusions I, II, III, IV. You have to take the given statements to be true even if they appear to be at variance with commonly known facts, and then decide which of the conclusions logically follow(s) from the given statements. For each question, mark the answer choice that you think is correct.

36. **Statements:**

1. All bibs are red.

2. All red are flowers.

3. No flowers are tablets.

Conclusions:

I. Some flowers are bibs.

II. No tablets are bibs.

III. Some red are bibs.

IV. Some tablets are red.

(a) I, II and III follow

(b) II, III and IV follow

(c) Only I and II follow

(d) Only I and III follow

37. **Statements:**

1. Some books are bibs.

2. All biscuits are pencils.

3. No bibs are biscuits.

Conclusions:

I. Some books are not biscuits.

II. Some bibs are not pencils.

III. Some books are not pencils.

IV. Some pencils are not bibs.

(a) I and IV follow

(b) II and IV follow

(c) I and III follow

(d) II and III follow

38. **Statements:**

1. All big are novels.

2. Some novels are willows.

3. No willows is pencil.

Conclusions:

I. Some willow are big.

II. Some novels are pencils.

III. No willow is big.

IV. Some novels are not pencils.

(a) I and either II or IV follow

(b) I, III and IV follow

(c) I, II and III follow

(d) Only IV follows

39. **Statements:**

1. Some whites are Canadians.

2. Some Americans are whites.

3. No American is a black.

Conclusions:

I. Some Canadians are Americans.

II. Some whites are blacks.

III. Some blacks are not Canadians.

IV. Some whites are not blacks.

(a) I and IV follow

(b) II and III follow

(c) Only III follows

(d) Only IV follows

40. **Statements:**

1. All knots are tight.

2. No collar is tight.

3. Some bush-shirts are knots.

Conclusions:

I. Some bush-shirts are collars.

II. Some bush-shirts are tight.

III. Some collars are not bush-shirts.

IV. Some bush-shirts are not collars.

(a) Only II and III follow

(b) Only II and IV follow

(c) Both I & IV follows

(d) Only IV follows

41. **Statements:**

1. All crooked are spades.

2. All big are jaded.

3. Some big are crooked.

Conclusions:

I. Some jaded are crooked.

II. Some spades are crooked.

III. Some crooked are jaded.

IV. Some spades are big.

(a) I, II and III follow

(b) II, III and IV follow

(c) I, III and IV follow

(d) All follow

42. **Statements:**

1. Some people are nice.

2. Some foreigners are people.

3. No foreigner is a Canadian.

Conclusions:

I. Some foreigners are nice.

II. Some people are Canadians.

III. Some foreigners are not nice.

IV. Some people are not Canadians.

(a) Both II and III follow

(b) Both III and IV follow

(c) Both IV and I follow

(d) Only IV follows

43. **Statements:**

1. All goats are boxes.

2. Some goats are flowers.

3. No chocolate is box.

Conclusions:

I. Some flowers are chocolates.

II. No goats are chocolates.

III. Some flowers are boxes.

IV. Some flowers are not chocolates.

(a) II, III and IV follow

(b) I, III and IV follow

(c) Only II and III follow

(d) Only III follows

44. **Statements:**

1. Some Indians are not Americans.

2. All Americans are Asians.

3. Some Asians are Americans.

Conclusions:

I. Some Indians are not Asians.

II. All Americans are not Indians.

III. All Americans are Indians.

IV. Some Americans are Indians.

(a) Only I follows

(b) Only II follows

(c) Only III follows

(d) None follows

45. **Statements:**

1. Some candies are papers.

2. All papers are vanillas.

3. Some vanillas are trams.

Conclusions:

I. Some candies are trams.

II. Some papers are trams.

III. Some trams are papers.

IV. Some vanillas are candies.

(a) Only II and III follow

(b) I and IV follow

(c) Only IV follows

(d) II, III and IV follow

46. **Statements:**

1. No foods are mangoes.

2. No oranges are potatoes.

3. All mangoes are oranges.

Conclusions:

I. Some foods are not oranges.

II. Some oranges are not foods.

III. No mangoes are potatoes.

IV. Some oranges are foods.

(a) Only III and I follow

(b) Only II and IV follow

(c) Only I and II follow

(d) Only II and III follow

47. **Statements:**
1. Some cots are docks.
2. All cots are clocks.
3. No frock is clock.
Conclusions:
I. No frock is a dock.
II. No frock is a cot.
III. Some docks are not frocks.
IV. Some docks are frocks.
(a) Both III and IV follow
(b) Both I and II follow
(c) Both II and III follow
(d) I, II and III follow

48. **Statements:**
1. Some tumblers are capsules.
2. No capsule is a medicine.
3. All medicines are syrups.
Conclusions:
I. Some tumblers are not medicines.
II. No medicine is a tumbler.
III. Some syrups are capsules.
IV. Some syrups are not capsules.
(a) I, II and III follow
(b) I, III and IV follow
(c) II, III and IV follow
(d) I and IV follow

49. **Statements:**
1. All coats are paints.
2. No paints are shirts.
3. Some shirts are vests.
Conclusions:
I. Some vests are shirts.
II. Some coats are shirts.
III. No coat is a shirt.
IV. Some vests are not coats.
(a) I, II and III follow
(b) I and IV follow
(c) I and III follow
(d) I, III and IV follow

50. **Statements:**
1. All chimps are monkeys.
2. No monkeys are mammals.
3. Some horses are mammals.
Conclusions:
I. Some horses are not chimps.
II. Some horses are not monkeys.
III. Some monkeys are not chimps.
IV. No chimp is a mammal.
(a) I, III and IV follow
(b) II, III and IV follow
(c) II and IV follow
(d) I, II and IV follow

Directions for questions 51 to 60: Each of the following questions has a main statement. Insert a pair of statements A and B (after the main statement), where the first statement (A) implies the second (B), and the two statements are logically consistent with the main statement.

51. If Juhi went to the park she did not go the shopping mall.
A. _____
B. _____

52. Either the motorist is not tired, or he dislikes traffic.
A. _____
B. _____

53. Either the tea is hot, or the coffee is cold.
A. _____
B. _____

54. Whenever he starts the computer, the screen fluctuates.
A. _____
B. _____

55. If I talk to Sheetal, then I do not need to attend the class.
A. _____
B. _____

56. Rahul will write a letter if and only if he receives a call.
A. _____
B. _____

57. Either Reena went to the doctor, or to the parlour.
A. _____
B. _____

58. If Reena did not go to the doctor, she went to the parlour.
A. _____
B. _____

59. Either Prem did not pass the final exam or he did not pass the course.
    A. _____
    B. _____
60. Salman neither practiced hard, nor won the match.
    A. _____
    B. _____

Directions for questions 61 to 73: Each of the following questions has a main statement followed by four statements labelled A, B, C and D. Choose the ordered pair of statements where the first statement implies the second and the two are logically consistent with the main statement.

61. Sanu likes either Lemon or Orange.
    A. Sanu does not like lemon.
    B. Sanu likes lemon.
    C. Sanu likes orange.
    D. Sanu does not like orange.
    (a) AB (b) CD
    (c) AC (d) BC
62. If I drink something cold, I will fall ill.
    A. I drank something cold.
    B. I have not fallen ill.
    C. I did not drink something cold.
    D. I have fallen ill.
    (a) CB (b) CA
    (c) CD (d) AD
63. If you are hurt, you must sing.
    A. You are hurt
    B. You did not sing
    C. You felt relieved
    D. You sang
    (a) BC (b) CA
    (c) AD (d) BD
64. Those who live in jails are not necessarily criminals.
    A. The ripper lives in the jail.
    B. The ripper is a cop.
    C. The ripper is not a criminal.
    D. The ripper has many crimes to his credit.
    (a) BC (b) AB
    (c) CD (d) None
65. If you are not healthy, you do not cry.
    A. You are not healthy
    B. You have not cried
    C. You felt healthy
    D. You cried
    (a) AB (b) CA
    (c) AD (d) BD
66. If it is raining, we are going to get wet
    A. It is raining.
    B. We are going to get wet.
    C. We are in my backyard.
    D. We are not going to get wet.
    (a) CD (b) CA
    (c) CB (d) AB
67. If you are not a part of the solution, then you are a part of the problem.
    A. Jack is a part of the solution.
    B. Jack is the problem.
    C. Jack is the only one who can solve the problem.
    D. Jack is not a part of the problem.
    (a) DC (b) DA
    (c) AB (d) None
68. All those who live to be 80, will live to be 100 years.
    A. Rao is an octogenarian.
    B. In 15 years time Rao will be at least 90.
    C. Rao will live for at least another 11 years.
    D. In 26 years time, Rao would have definitely lived in 2 centuries.
    (a) CD (b) AC
    (c) BA (d) DC
69. The Rooney cries whenever it sees a snake.
    A. Couleen, the snake has come out in the open.
    B. Rooney, has been crying.
    C. Rooney has seen Couleen, the snake.
    D. Rooney had not been crying for some time.
    (a) BC (b) AB
    (c) CB (d) AD
70. Tabs are quick communication tools.
    A. This tool communicates quickly.
    B. This tool is a tab.
    C. All tabs are quick tools.
    D. All tools communicate quickly.
    (a) CD (b) DC
    (c) BA (d) None

71. It is noon only if the clock strikes 12.
    A. 6 hours have elapsed since the last time the clock struck 12.
    B. The clock has struck 12.
    C. It is not noon
    D. It is noon
    (a) CB (b) CA
    (c) AB (d) DB

72. In IPL either CSK or KKR will win.
    A. CSK has won.
    B. KKR has won.
    C. CSK has not won.
    D. KKR has not won.
    (a) CD (b) CB
    (c) AB (d) BA

73. Ragini sleep sunless she drives Tusar mad.
    A. Ragini is driving Tusar mad.
    B. Ragini is not sleeping.
    C. Ragini is sleeping.
    D. Ragini is not driving Tusar mad.
    (a) CD (b) AB
    (c) DB (d) None

74. If it is true that 'either Joe is a cousin of Radha, or is he an archaeologist', then which one of the following statements is true?
    (a) Joe is a cousin of Radha and an archaeologist.
    (b) Joe is not a cousin of Radha but he is also not an archaeologist.
    (c) Joe is not a cousin of Radha and he is an archaeologist.
    (d) Joe is an archaeologist and a cousin of Radha.

75. Identify the conclusion which follows from the premises given below:
    If you do not eat well, you will not be healthy.
    If you will not be healthy, then you will fall sick.
    If you fall sick, you will need to see a doctor.
    (a) You eat well, then you will need to see a doctor.
    (b) You do not eat well, you do not need to see a doctor.
    (c) You do not need to see a doctor, then you are eating well.
    (d) You eat well, you will fall sick.

Directions for questions 76 to 85: A situation is followed by two courses of action I and II.

Mark the answer as:

(a) if I should logically follow as the course of action
(b) if II should logically follow as the course of action
(c) if both courses of action I and II follow
(d) if neither course of action I nor II follows

76. Financial stringency prevented the State Government from paying salaries to its employees since March this year.
    Courses of Action
    I. The State Government should curtail the staff strength at least by 20%.
    II. The State Government should reduce wasteful expenditure and arrange to pay the salaries of its employees.

77. The Government has decided not to provide financial support to voluntary organizations next year onwards and has communicated that all such organizations should raise funds to meet their financial needs.
    Courses of Action
    I. Voluntary organizations should collaborate with foreign agencies.
    II. They should explore other sources of financial support.

78. The Indian electronic industry venturing into the West European markets faces tough competition from the Japanese.
    Courses of Action
    I. India should search for other international markets for its products.
    II. India should improve the quality of its electronic components in order to compete with the Japanese in the capturing of markets.

79. The Minister stressed on the need to make the education system more flexible and regretted that the curriculum has not been revised in accordance to the changes taking place.
    Courses of Action
    I. Curriculum should be revised.
    II. System of education should be made more flexible.

80. Most of the development plans in departments happen only on paper.
    Courses of Action
    I. Field work should be supervised regularly.
    II. Supply of paper to these departments should be cut.

81. We are stuck inside a lift.

Courses of Action

I. We should bang on the door and panic

II. We should ring the emergency bell for help.

82. My car tyre has gone flat in the middle of the road.

Courses of Action

I. I should take out the spare tyre and change the flat tyre

II. I should take help to push the car to the side of the road.

83. Mrs. Das wants to get peace of mind.

Courses of Action

I. She should go to the Himalayas

II. She should run away from the city.

84. The doctor has prescribed very strong medicines.

Courses of Action

I. One should heed the doctor's advice.

II. One should take the medicines diligently.

85. Tonight I want to watch a movie in a theater.

Courses of Action

I. I should buy popcorn.

II. I should buy movie tickets.

Answer Key

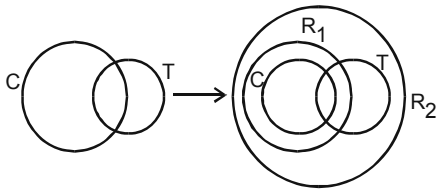
1. (a)	**2.** (b)	**3.** (d)	**4.** (c)	**5.** (c)	**6.** (b)	**7.** (b)	**8.** (b)	**9.** (c)	**10.** (b)
11. (a)	**12.** (d)	**13.** (a)	**14.** (b)	**15.** (d)	**16.** (a)	**17.** (d)	**18.** (a)	**19.** (d)	**20.** (c)
21. (d)	**22.** (a)	**23.** (a)	**24.** (d)	**25.** (d)	**26.** (d)	**27.** (d)	**28.** (d)	**29.** (d)	**30.** (b)
31. (a)	**32.** (a)	**33.** (a)	**34.** (b)	**35.** (a)	**36.** (a)	**37.** (a)	**38.** (d)	**39.** (d)	**40.** (b)
41. (d)	**42.** (d)	**43.** (a)	**44.** (d)	**45.** (c)	**46.** (d)	**47.** (c)	**48.** (d)	**49.** (d)	**50.** (d)
51. (*)	**52.** (*)	**53.** (*)	**54.** (*)	**55.** (*)	**56.** (*)	**57.** (*)	**58.** (*)	**59.** (*)	**60.** (*)
61. (c)	**62.** (d)	**63.** (c)	**64.** (d)	**65.** (a)	**66.** (d)	**67.** (b)	**68.** (b)	**69.** (c)	**70.** (c)
71. (d)	**72.** (b)	**73.** (b)	**74.** (c)	**75.** (c)	**76.** (b)	**77.** (c)	**78.** (b)	**79.** (c)	**80.** (a)
81. (b)	**82.** (c)	**83.** (d)	**84.** (c)	**85.**(b)					

Explanations

Deductive Logic (Syllogism)

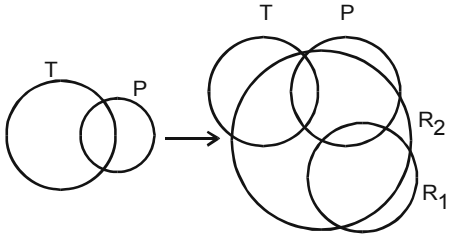
Practice Exercise-1

11. a



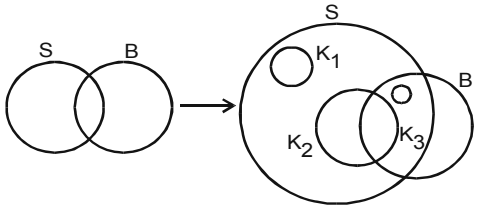
Hence, clouds which are not thunder are also rain.

12. d



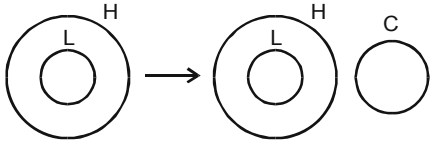
Some rods may or may not be tins. Some tins may or may not be rods. Hence, none of the conclusions definitely follows.

13. a



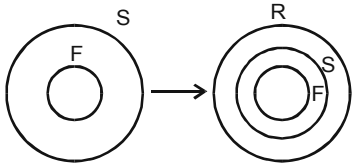
From the above venn diagram we conclude only I follows.

14. b



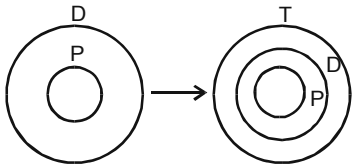
Hence, no lens is colourful.

15. d



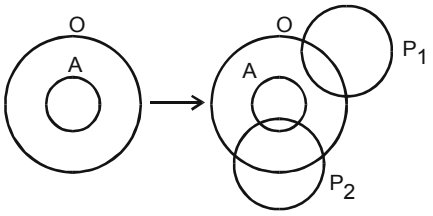
Hence, all flirts are rotten.

16. a



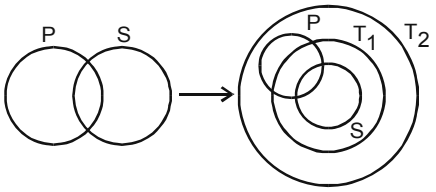
Hence, some trained are puppies.

17. d



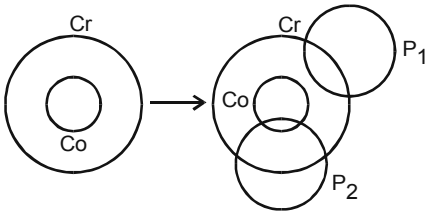
So priests may or may not be advocates.

18. a



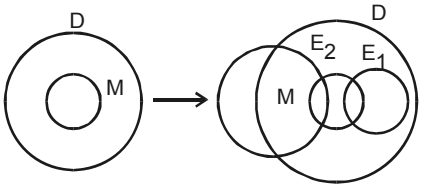
From the above venn diagram we can conclude that some psychiatrists are tall.

19. d



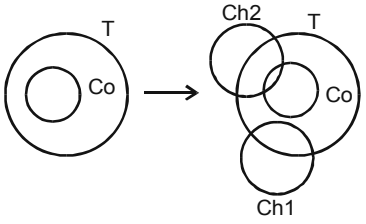
Some coins may or may not be pens. Hence, none of the conclusions follow.

20. c



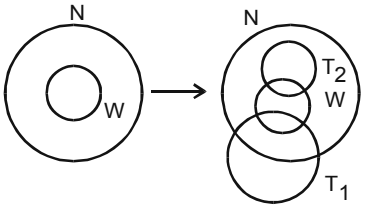
Hence, some dumb are magicians and some educated are dumb.

21. d



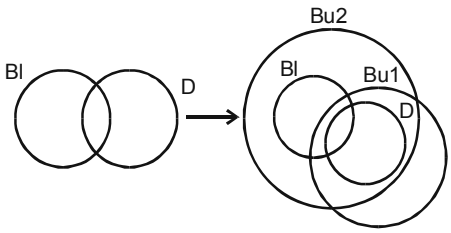
Hence, some chimps may or may not be cots.

22. a



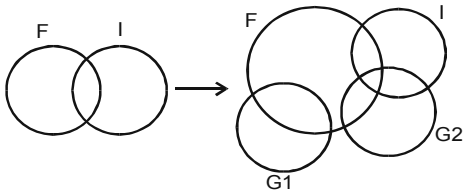
From the above venn diagram we can conclude that some trees are definitely nettles.

23. a



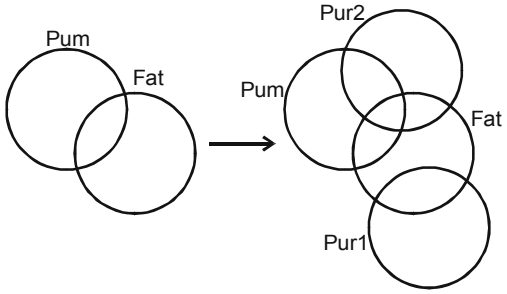
All dolls, whether they blink or not, burble.

24. d



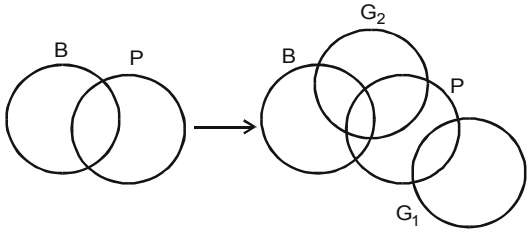
Some intelligent may or may not be great. Hence, neither conclusion I nor II follows.

25. d



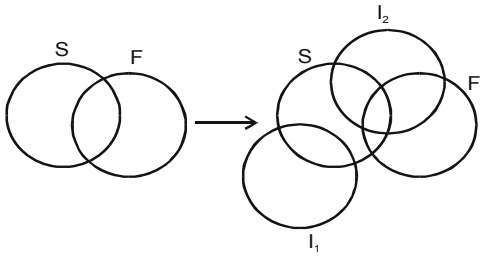
Some purple may or may not be pumpkins.

26. d



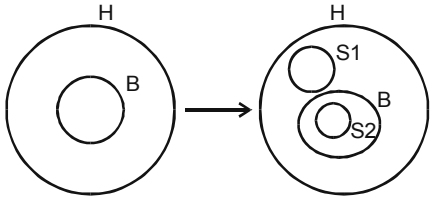
Some genial may or may not be bosses.

27. d



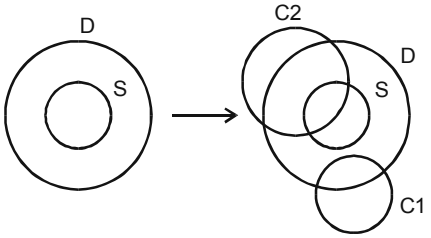
Some illiterate may or may not be foolish.

28. d



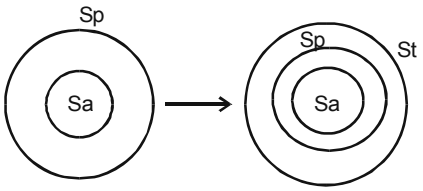
None of the conclusions follow.

29. d



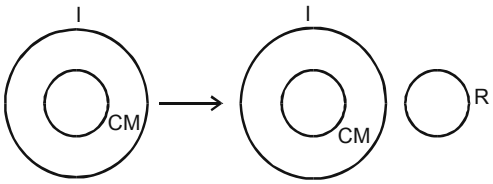
None of the conclusions follows.

30. b



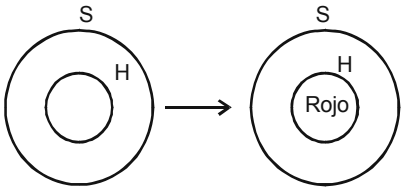
Thus, we can conclude that Sampras is strong.

31. a



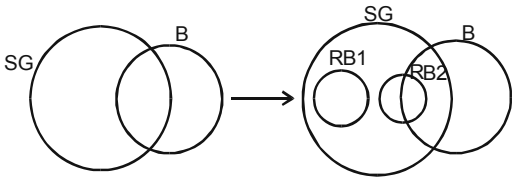
Hence, Ravinder is definitely not my classmate.

32. a



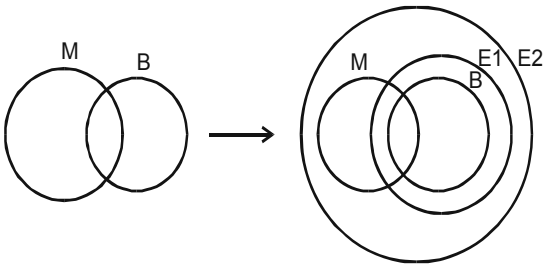
Hence, we can definitely concludes that Raj has skin.

33. a



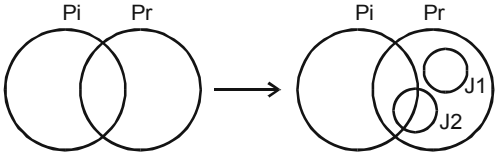
Hence, some blue are sunglasses.

34. b



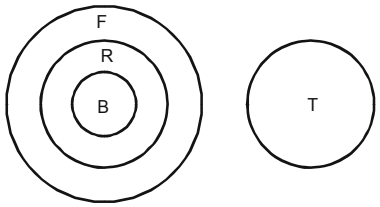
Hence, some men are educated.

35. a



Joseph may or may not be pious. Hence, only conclusion I follows.

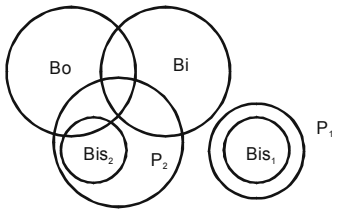
36. a



I. √
II. √
III. √
IV. ×

Hence, option (a) is the correct answer.

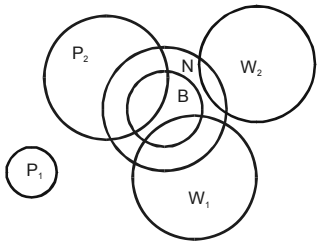
37. a



I. √
II. ×
III. ×
IV. √

Hence, option (a) is the correct answer.

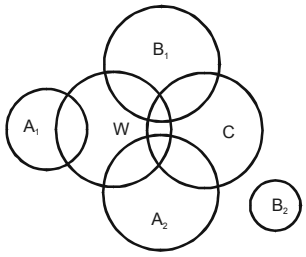
38. d



I. ×
II. ×
III. ×
IV. √

Hence, option (d) is the correct answer.

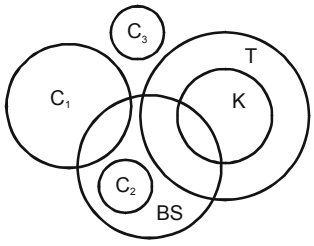
39. d



I. ×
II. ×
III. ×
IV. √

Hence, option (d) is the correct answer.

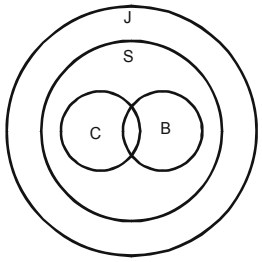
40. b



I. ×
II. √
III. ×
IV. √

Hence, option (b) is the correct answer.

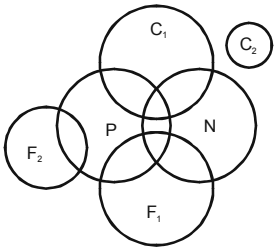
41. d



I. √
II. √
III. √
IV. √

Hence, option (d) is the correct answer.

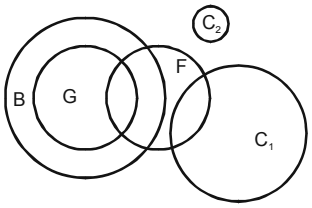
42. d



I. ×
II. ×
III. ×
IV. √

Hence, option (d) is the correct answer.

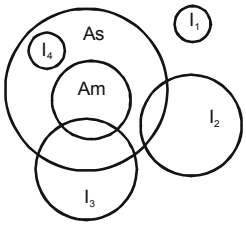
43. a



I. ×
II. √
III. √
IV. √

Hence, option (a) is the correct answer.

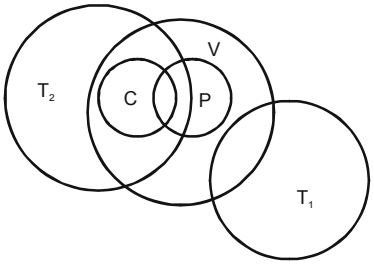
44. d



I. ×
II. ×
III. ×
IV. ×

Hence, option (d) is the correct answer.

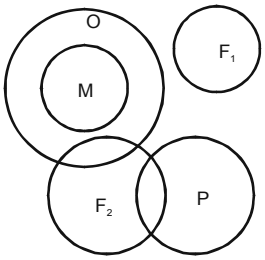
45. c



I. ×
II. ×
III. ×
IV. √

Hence, option (c) is the correct answer.

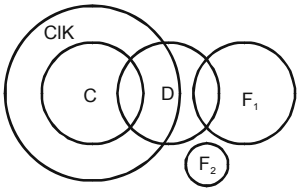
46. d



I. ×
II. √
III. √
IV. ×

Hence, option (d) is the correct answer.

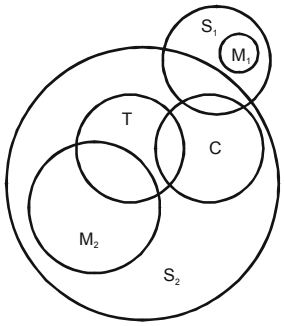
47. c



I. ×
II. √
III. √
IV. ×

Hence, option (c) is the correct answer.

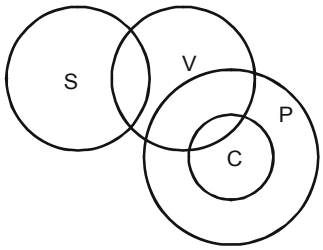
48. d



I. √
II. ×
III. ×
IV. √

Only conclusions I and IV follow. The set of 'syrups' which are 'medicines' are definitely not 'capsules'. Hence, option (d) is correct.

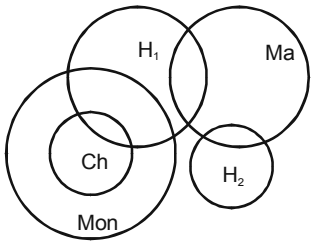
49. d



I. √
II. ×
III. √
IV. √

Hence, option (d) is the correct answer.

50. d



I. √
II. √
III. ×
IV. √

Hence, option (d) is the correct answer.

The only possible conclusions that can be drawn for the 10 questions are:

51. A. Juhi went to the park.
    B. Juhi did not go to the shopping mall. Or
    A. Juhi went to the shopping mall.
    B. Juhi did not go to the park.
52. A. The motorist is tired.
    B. He dislikes traffic. (Also vice versa)
    A. He likes traffic.
    B. The motorist is not tired. (Also vice versa)
53. A. The coffee is not cold.
    B. The tea is hot. (Also vice versa)
    A. The tea is not hot.
    B. The coffee is cold. (Also vice versa)
54. A. He has started the computer.
    B. The screen is fluctuating. Or
    A. The screen is not fluctuating.
    B. He has not started the computer.
55. A. I have talked to Sheetal.
    B. I do not need to attend the class. Or
    A. I have to attend the class.
    B. I have not talked to Sheetal.
56. A. Rahul received a call.
    B. Rahul wrote a letter. (Also vice versa)
    A. Rahul did not write a letter.
    B. Rahul did not receive a call. (Also vice versa)
57. A. Reena did not go to the parlour.
    B. Reena went to the doctor. (Also vice versa)
    A. Reena did not go to the doctor.
    B. Reena went to the parlour. (Also vice versa)
58. A. Reena did not go to the doctor.
    B. Reena went to the parlour. Or
    A. Reena did not go to the parlour.
    B. Reena went to the doctor.
59. A. Prem passed the final exam.
    B. Prem did not pass the course. (Also vice versa)
    A. Prem passed the course.
    B. Prem did not pass the final exam. (Also vice versa)
60. This is a conclusion in itself.
61. c In 'either or' condition, one of the things must happen. Since Sanu does not like orange, she must likes lemon. DB is not there in option choices. On the other hand, since Sanu does not like lemon, she must like orange. Hence, option (c) is correct.
62. d 'I drink something cold' is the sufficient condition for 'I will fall ill'. Option (d) is correct as the condition is present and so is the effect. In this type of condition if the effect is absent, and the condition will also be absent.
63. c 'you are happy' is the sufficient condition for 'you must sing.' Option (c) is correct as the condition is present and so is the effect. In this type of condition if the effect is absent, the condition will also be absent.
64. d In this type of condition, if the effect is absent, so will be the condition and if the condition is present, so will be the effect. Hence, option (d) is correct as other options are not in line with the above.
65. a 'you are not healthy' is the sufficient condition for 'you do not cry'. Option (a) is correct as in this

case the condition is present and so is the effect. Hence, option (a) is correct.

66. d 'it is raining' is the sufficient condition for 'we are going to get wet'. Option (d) is correct as in this case if the condition is present and so is the effect. In this type of condition if the effect is absent and so will be the condition. But that is not there in option choices. Hence, option (d) is correct.

77. b 'not a part of the solution' is the sufficient condition for 'a part of the problem'. Option (b) is correct as the effect is absent and so is the condition. Hence, option (b) is correct.

68. b In this question 'live to be 80' is the sufficient condition for 'live to be 100 years'. An octogenarian is in his eighties(80-89 years). Hence he is going to live for 100 years (but we do not know how many years are required for him to be 100 years old). Option (b) is correct as in this case if the condition is present, so is the effect. Hence, option (b) is correct as other options are not in line with the above.

69. c In this question 'it sees a snake' is the sufficient condition for 'Rooney cries'. Option (c) is correct as in this case the condition is present and so is the effect. In this type of condition if the effect is absent, the condition will also be absent. But that is not there in option choices. Hence, option (c) is correct.

70. c In this question 'being tabs' is the sufficient condition for 'quick communication tools'. Option (c) is correct as in this case if the condition is present and so is the effect. Hence, option (c) is correct.

71.d In this question 'clock strikes 12' is the necessary condition for 'It is noon'. Option (d) is correct as in this case if the effect is present, so is the condition. Hence, option (d) is correct.

72. b In 'either or' condition, one of the things must happen. Since CSK has not won, KKR must have won. On the other hand, if KKR has not won, CSK must have won. But that is not there in option choices. Hence, option (b) is correct.

73. b In this type of question 'she drives Tusar mad' is the sufficient condition for 'Ragini not sleeping'. Option (b) is correct as in this case if the condition is present, so is the effect. Hence, option (b) is correct.

74. c In 'either or' condition, one of the things must happen. Since Joe is not a cousin of Radha, he must be an archaeologist. On the other hand, if he is not an archaeologist, he must be a cousin of Radha. But that is not there in the option choices. Hence, option (c) is correct.

75. c In this type of condition if the effect is absent, the condition will also be absent and if the condition is present, the effect will also be present. Hence, option (c) is correct as the effect is absent and so is the condition (you do not need to see a doctor, then you are eating well).

76. b Only II follows. Curtailing staff strength cannot be a course of action as it is not a practical solution. II address the problem by providing a logical solution.

77. c Both follow. II is a natural and logical action for the organizations in order to continue operations. I is a method to pursue II, hence it is a plausible course of action.

78. b The same competition may be present in other markets and so an escapist attitude will not do. Hence I does not follow. II definitely follows as it addresses the problem of competition and market capture.

79. c Both I and II follow as both address the issues stated in the problem.

80. a Only I follows. II does not make sense as cutting paper supply would not ensure implementation of plans.

81. b Statement II is a logical action. Statement I would not solve the problem and instead increase one's anxiety.

82. c Both I and II follow. I will immediately solve the problem and II will ensure that rest of the traffic is not adversely affected (flows smoothly).

83. d Both I and II are escapist solutions and do not ensure that Mrs. Das will find peace of mind.

84. c Both I and II follow. One should rely on a doctor and listen to his advice. Also medicines should be taken as prescribed.

85. b First action is frivolous. Statement II follows.