6 ENGLISH USAGE

Logical Reasoning

The term logical reasoning, as applied to the question types covered in this chapter as well as the next is at best misleading. Even the so-called vocabulary based questions like sentence completion, verbal analogies, and others can be answered with a vocabulary base slightly above average, applying simple principles of reasoning.

There are several question types that need to be discussed under this head of logical reasoning. In this chapter we shall discuss categorization based questions.

(A) Syllogisms

Syllogisms 

The term 'syllogism' comes from the Greek language and means "to say together", hence giving us the sense of putting two thoughts or two propositions together in order to draw a logical conclusion from them. Here is a valid syllogism:

1. All imported cars are small.
2. All sports cars are imported cars.
3. All sports cars are small.

The following, however, is an invalid syllogism :

1. All artists are sensitive people.
2. All artists are poor.
3. All sensitive people are poor.

From the above examples of syllogism, you can farther see that every valid syllogism has a key term that appear in both premises and links these together. This connecting term is normally called the middle term of the syllogism. In the first example of valid syllogism, the middle term 'imported cars' provides a connecting link between 'sports cars' and 'small'. The second example has a middle term 'artist' which occurs in each premise. However the argument fails to be valid because the premise while indicating classes

(artists fall into the class of sensitive people and poor people) – does not inform us of any relationship between these classes. The rule of syllogism is that whatever is true of a class of things must be true of any sub–division of that class. For example, 'Anything true of all horses must be true of stallions'. If something is true of all Asians, it must be true of Indians, Pakistanis, Chinese, Sri Lankans etc. Likewise, if you deny something of a class, we must also deny it of any of its constituents or sub–divisions. If we say that no Asian deals with Australians, it will follow that no Indian deals with Australians.

Structure of Syllogism

It is interesting to study the structure of a syllogism. Let us take an example

Man is mortal.
1 2
Ganesh is a man.
3 1
Ganesh is mortal.
3 2

As shown above, there are numerically six terms in the above syllogism, but actually there are three terms, each occurring twice. As in a syllogism, subject of the conclusion must occur in one of the first two premises. The predicate must also occur in one of the premises and the middle term, i.e. the third term must appear in both the premises as shown below:

1. All men are mortal.
   (middle term) (major term)
2. Ganesh is a man.
   (minor term) (middle term)
3. Ganesh is mortal.
   (minor term) (major term)

As shown above, the middle term does not occur in the conclusion, while it is a term linking both the premises.

Propositions ☞ Propositions are those sentences which can be proved true or false and have a logical form. In the proposition 'man is mortal', the mortality of the man is affirmed. In the proposition, 'man is not irrational ', the irrationality of man is denied. The following sentences cannot be considered 'propositions' :

(i) Let him attain glory.
(ii) He should attend office regularly.
(iii) She looks cheerful.

All the above are sentences but not propositions as they do not use 'is', 'are, 'is not' as connecting verbs and therefore, they are not in the nature of affirmations or denials. In a proposition thus the relationship of the predicate with the subject is affirmed or denied.

Four types of propositions

The laws of logic are used to determine the validity of the inferences from the given premises. A statement or proposition may be affirmative or negative or it may be an all or a some proposition. The four–fold classification also considers the distribution of the subject and the predicate term and their structure would be as follows:

(i) All S is P. (ii) No S is P.

(iii) Some S is P. (iv) Some S is not P.

In the above sentences, S stands for the subject term and P stands for the predicate term, the sentence with four–fold classification would appear to be as follows:

1. All chairs are tables.
   S P

2. No chair is table.
   S P

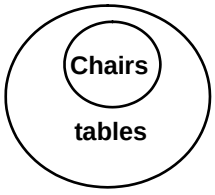
3. Some chairs are tables.
   S P

4. Some chairs are not tables.
   S P

Distributional aspects

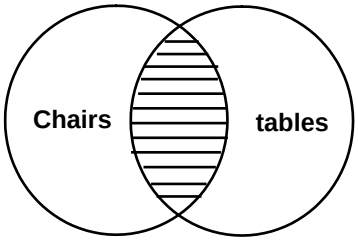
If you examine the subject and the predicate terms in the above propositions, you will find that they present four different types of sets. In the Venn diagrams, the sets would appear as follows:–

1. All the chairs are tables.

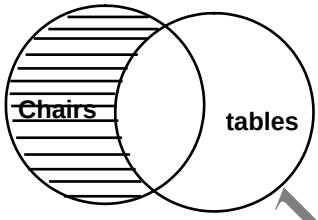


2. No chair is table.

3. Some chairs are tables.



4. Some chairs are not tables.



From the diagrams, it is manifest that in the first proposition the subject term, 'All chairs' is fully distributed, but the predicate term 'tables' is not fully distributed. This proposition is known as 'A' proposition.

In the second proposition, the diagram brings out the fact that both the subject term and the predicate term are fully distributed. 'No chair is table' means not a single chair is a table and therefore the predicate fully covers the subject term and the subject term is fully distributed. Further, 'No chair is table' also means that no table is chair – not a single table is chair. Thus the predicate term table is also fully distributed. Propositions in which both subject and predicate terms are fully distributed are known as 'E' proposition. In the third proposition, viz. 'Some chairs are tables', the portion we are referring to has been shown by shading the overlapping part of the two circles. We are thus referring only to the shaded portion and therefore in this proposition, neither the subject term nor the predicate term is fully distributed. This type of proposition is known as 'I' proposition.

In the fourth proposition, 'Some chairs are not tables', we are talking of the shaded portion of the chairs and you may see in the diagram that while the subject term 'chairs' is not fully distributed, the predicate term table is fully distributed. This is known as 'O' proposition.

Two types of (syllogism based) question formats

Format A: Choosing a set of statements (out of many) that are logically related

Let us have a look at the following simple examples:

1. A. All training programs are meant to enhance skills
   B. A few training programs enhance skills
   C. Skills are enhanced by a number of factors
   D. Training programs have worked whenever skills have been enhanced
   E. A few training programs do not work, but skills are enhanced
   F. All training programs do not enhance skills

   (1) ECF (2) ABF (3) DEF (4) AEF

Let us try to analyse this example. Here the subject is 'training programme'. And the predicate is 'enhancement of skills'. We can omit statement C which does not have the same predicate. D and E do not establish the cause and effect relationship. A direct connection can be established among A, B and F, in that order.

2. A. Five – Year Plans always cause misallocation of resources
   B. Misallocation of resources leads to underutilization of scarce capital
   C. The basic problem facing our country is misallocation of resources
   D. Five – Year Plans can help create a platform for growth
   E. Five – Year Plans are the cause of a basic problem facing our country
   F. Our country underutilizes capital

   (1) ACB (2) BFC (3) DAE (4) ACE

Let us solve this example as under:

Five – Year Plans always cause misallocation of resources
1 2

The basic problem facing our country is misallocation of resources
3 2

Five – Year Plans are the cause of a basic problem facing our country
1 3

The obvious answer is ACE.

3. A. All men have an element of the wild
B. Everything wild is adventurous
C. All men are animals
D. All men have a desire for adventure
E. All men strive throughout life
F. All men are adventurous

(1) ECF (2) ABD (3) DEB (4) AFC

Method – 1:

In this example

All men have an element of the wild
1 2

Everything wild is adventurous
2 3

All men are animals
1 4

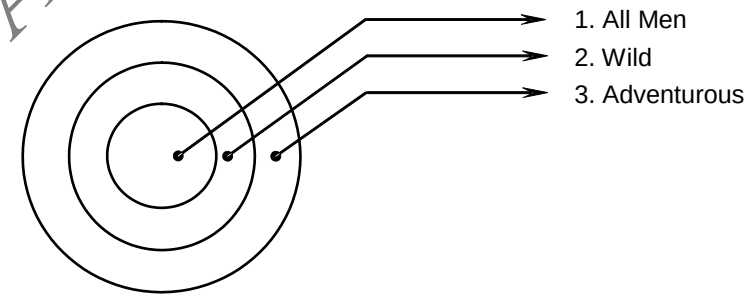
All men have a desire for adventure
1 3

All men strive throughout life
1 5

All men are adventurous
1 3

The correct sequence of sentences has to be;
A (1, 2), B (2, 3), D (1, 3)

Method – 2: (Venn Diagram)

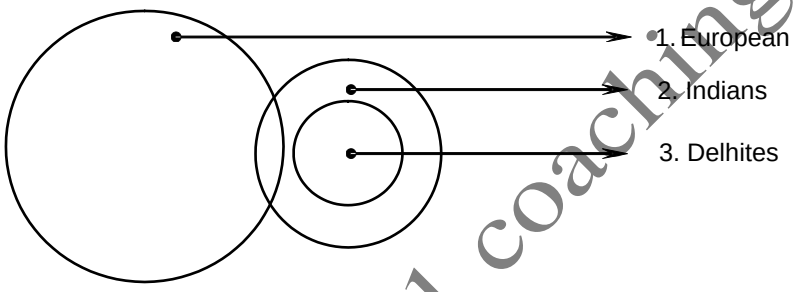


This is the most common of the syllogisms that you might come across. The option A implies that all men are wild. So we enclose all the MEN in the set of WILD entities. Note that there may be other wild entities apart from men, hence, we cannot superimpose the wild circle on men circle. Now the option B says that all wild entities are adventurous. Following the same line of reasoning, we now enclose the WILD circle with ADVENTUROUS circle. From the whole setup it is pretty obvious that ALL MEN are ADVENTUROUS. Therefore the answer is ABD.

Format B: Logically related inferences drawn from two statements

Let us have a look at the following two examples:

1. All Delhites are Indians. Some Indians are European.
   If both the above statements are true, which of the following inferences can be drawn?
   A. All Delhites are European.
   B. Some European are Delhites.



   From the diagram above we can deduce neither A nor B.

2. Some spectacles are not lenses. Some Sunglasses are not lenses.
   A. Some Sunglasses are spectacles.
   B. Some Sunglasses could be spectacles.

   In this question the use of word COULD BE is the trick.

(B) Concluding Assertion:

In this question type you get four or more statements pertaining to the same idea. Since all the statements pertain to the same topic, one out of these would be the leading statement, called concluding assertion (this may be termed A). Remember there cannot be more than one leading statement in a group, same as there cannot be two swords in a sheath. Then there are one or more supporting statements (termed B). There could also be opposing statement(s) (termed D) and/or irrelevant statement(s) (termed C). The catch here is that there has to be one, and only one leading statement. Any answer option that has no concluding assertion (A), or has more than one concluding assertion cannot be our answer. The strategy is to look for two or more statements that are mutually supportive. One of these is likely to be the concluding assertion. Alternatively we may look for a statement that neither supports, nor opposes any other statement.

The practice on this question type will also help you to answer sentence arrangement questions (parajumbles). If you are able to identify a leading statement in a sentence arrangement question, you know that such a statement should either begin or conclude the paragraph, and should not fall in between.

Let us have a look at a few examples of this question type.

1. 1. Competitive tests stress more on application than mere cramming.
   2. Students get good jobs after clearing such tests.
   3. Their parents feel proud of them.
   4. Competitive exams are the best tool to select the cream.

   (1) ABAB (2) BCCA (3) BACD (4) CABD

If we go through the above statements carefully, we find that 4 is the main statement on the topic of effectiveness of competitive exams. Statement 1 directly supports this statement. So the answer has to be B - - A. Option (1) has got two concluding assertions and therefore, cannot be the answer.

2. 1. "Natural selection" is the key to Earth's evolutionary years.
   2. Darwin became famous for this theory.
   3. All species existing today support the causal function of natural selection.
   4. Earth's evolution may be unrelated to natural selection.

   (1) ACCD (2) ABBD (3) ABCD (4) ACBD

   According to the answer choices here, the statement 1 is definitely the assertion. Now Darwin might have proposed the theory but as far as the theory being a key to Earth's evolutionary years is concerned, Darwin has nothing to do with it & so the statement will be irrelevant to 1. This leaves us with answer choices (1) & (4). The statement 3 is in the same line as 1. So it should be marked B. Hence, answer is (4).

The question can figure under slightly modified formats. Another format could be where a statement is provided as question statement, and a set of four statements are provided underneath the same. The student is required to categorize these other statements as:

1. **Upstream statement:** If it logically should precede the stem statement.

2. **Downstream statement:** If it logically should follow the stem statement.

3. **Supporting argument:** If it does not logically follow the stem statement, but otherwise supports it.

4. **Irrelevant statement:** If it is unconnected with the stem statement.

(C) Categorizing statements as Fact, Inference, and Judgment:

Here the student is presented with a set of related statements and is asked to categorize the statements as under:

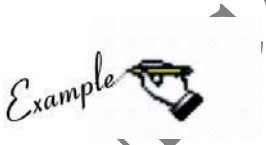
F: Fact: If it relates to a known matter of direct observation, or an existing reality or something known to be true,
J: Judgment: If it is an opinion or estimate or anticipation of common sense or intention.
I: Inference: If it is a logical conclusion or deduction about something, based on the knowledge of facts.

Let us have a look at a couple of examples of this question type:

1. A. If India has embarked on the liberalization route; she cannot afford to go back.
   B. Under these circumstances, being an active supporter of WTO policies will be a good idea.
   C. The WTO is a truly global organization aiming at freer trade.
   D. Many member countries have already drafted plans to simplify tariff structures.

   (1) FJFI (2) IFJF (3) IJFF (4) IFlF

The strategy here is to look for a statement which is definitely a fact or a judgment. In the above example, statement D cannot but be a fact. Likewise statement B is definitely an opinion or a judgment. From these two clues, we can work out (3) as the answer.



2. A. The Minister definitely took the wrong step.
   B. Under the circumstances, he had many other alternatives.
   C. The Prime Minister is embarrassed due to the Minister's decision.
   D. If he has put the government in jeopardy, the Minister must resign.

   (1) JFFI (2) IFJI (3) FFJI (4) IFIJ

Here too statement A is definitely a judgment and statement B definitely a fact. The two combine to provide us with the right answer (1).