UGC-NET Paper I Unit VI: Logical Reasoning – Notes

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1. Structure of Arguments

An **argument** is a set of statements in which some (**premises**) are offered as reasons for another (**conclusion**).

- **Premise indicators:** since, because, for, as, given that, inasmuch as.
- **Conclusion indicators:** therefore, hence, thus, so, consequently, it follows that.
- A **valid** deductive argument is one where, if the premises are true, the conclusion must be true. Validity depends on form, not on content.
- A **sound** argument is valid and has all true premises.
- Inductive arguments are **strong or weak** (not valid or invalid); a strong argument with true premises is **cogent**.

Deductive	Inductive
General to particular (usually)	Particular to general (usually)
Conclusion follows necessarily	Conclusion follows with probability
Valid / invalid; sound / unsound	Strong / weak; cogent / uncogent
Conclusion contains no new information	Conclusion goes beyond the premises

2. Categorical Propositions

Type	Form	Quantity	Quality	Distributed term(s)
A	All S are P	Universal	Affirmative	Subject only
E	No S is P	Universal	Negative	Subject and predicate
I	Some S are P	Particular	Affirmative	Neither
O	Some S are not P	Particular	Negative	Predicate only

Memory aid: A and I come from 'AffIrmo' (I affirm); E and O from 'nEgO' (I deny). Universal propositions distribute the subject; negative propositions distribute the predicate.

3. Square of Opposition

Relation	Between	Rule
Contradictories	A–O and E–I	Exactly one is true and one is false
Contraries	A–E	Cannot both be true; can both be false
Sub-contraries	I–O	Cannot both be false; can both be true
Subalternation	A→I, E→O	If the universal is true, the particular is true; if the particular is false, the universal is false

Immediate inferences

Operation	Method	Valid for
Conversion	Interchange S and P	E and I (A by limitation)
Obversion	Change quality and replace P by its complement (non-P)	All four
Contraposition	Obvert, convert, obvert	A and O

Example: obverse of 'All S are P' is 'No S is non-P'.

4. Categorical Syllogism: Mood and Figure

A syllogism has two premises and a conclusion with exactly **three terms**: major term (predicate of conclusion), minor term (subject of conclusion) and **middle term** (in both premises, not in the conclusion).

Mood is the sequence of proposition types (e.g. AAA, EIO). **Figure** is the position of the middle term (M):

Figure	Major premise	Minor premise
1	M – P	S – M
2	P – M	S – M
3	M – P	M – S
4	P – M	M – S

There are 64 moods × 4 figures = 256 standard forms. Classic valid forms include Barbara (AAA-1), Celarent (EAE-1), Darii (AII-1) and Ferio (EIO-1).

Rules of validity

1. The middle term must be distributed at least once (else: *fallacy of undistributed middle*).
2. A term distributed in the conclusion must be distributed in its premise (else: *illicit major / illicit minor*).
3. Two negative premises give no conclusion (*exclusive premises*).
4. A negative premise requires a negative conclusion, and vice versa.
5. Two particular premises give no conclusion.
6. There must be exactly three terms (else: *four-term fallacy*).

5. Fallacies

Formal fallacies arise from an invalid form: undistributed middle, illicit major, illicit minor, four terms, affirming the consequent, denying the antecedent.

Informal fallacies

Fallacy	Meaning
Ad hominem	Attacking the person instead of the argument
Ad populum	Appeal to popular opinion
Ad verecundiam	Appeal to inappropriate authority
Ad ignorantiam	Something is true because it has not been proved false (or vice versa)
Ad baculum	Appeal to force or threat
Ad misericordiam	Appeal to pity
Straw man	Misrepresenting the opponent's view
Red herring	Diverting to an irrelevant issue
Petitio principii	Begging the question; assuming what is to be proved
Post hoc ergo propter hoc	Assuming that what happened earlier caused what followed
Hasty generalisation	Conclusion from too few cases
False dilemma	Presenting only two options when more exist
Slippery slope	Assuming one step leads inevitably to extreme results
Composition	What is true of parts is true of the whole
Division	What is true of the whole is true of the parts
Equivocation	Shifting the meaning of a word
Amphiboly	Ambiguous grammatical construction

6. Uses of Language and Meaning of Terms

Uses of language (Irving Copi): informative (conveys facts), expressive (conveys feelings), directive (commands or requests). Also ceremonial and performative uses.

Connotation (intension): the set of attributes or qualities a term implies. **Denotation (extension):** the set of objects to which the term applies. As connotation increases, denotation decreases, and vice versa (e.g. 'animal' → 'mammal' → 'dog').

7. Analogies

An analogy compares the relationship between two pairs. Common relationships: tool and function (Pen : Write), worker and workplace (Doctor : Hospital), part and whole, cause and effect, synonym and antonym, product and raw material, young one and animal.

8. Venn Diagrams

John Venn's diagrams use overlapping circles to represent classes. To test a syllogism, draw three overlapping circles (S, P, M), diagram the universal premise first by shading, then the particular premise by an 'X'. If the conclusion is already shown, the syllogism is valid.

Simple tips for 'Statements and Conclusions' questions:

- 'All A are B' → A circle inside B.
- 'Some A are B' → circles overlap.
- 'No A is B' → separate circles.
- A conclusion follows only if it is true in **every** possible diagram.

9. Indian Logic: Means of Knowledge (Pramanas)

Prama is valid knowledge; **pramana** is the means of valid knowledge; **prameya** is the object known; **pramata** is the knower.

Pramana	Meaning	Example
Pratyaksha	Perception	Seeing a pot in front of you
Anumana	Inference	Inferring fire from smoke
Upamana	Comparison / analogy	Identifying a wild cow (gavaya) from the description 'it is like a cow'
Shabda	Verbal testimony of a reliable person (apta) or scripture	Learning from a trustworthy teacher
Arthapatti	Postulation / implication	'Fat Devadatta does not eat by day' → he eats at night
Anupalabdhi	Non-apprehension	Knowing there is no pot on the table because it is not perceived

Number of pramanas accepted by schools

School	Pramanas accepted	Number
Charvaka	Pratyaksha only	1
Buddhism, Vaisheshika	Pratyaksha, Anumana	2
Sankhya, Yoga	+ Shabda	3
Nyaya	+ Upamana	4
Prabhakara Mimamsa	+ Arthapatti	5
Bhatta Mimamsa, Advaita Vedanta	+ Anupalabdhi	6

Pratyaksha (perception) is classified as *nirvikalpaka* (indeterminate, without qualification) and *savikalpaka* (determinate, with name and qualities); also *laukika* (ordinary) and *alaukika* (extraordinary).

10. Anumana (Inference)

Terms of inference

Indian term	Meaning	Western equivalent
Paksha	Subject in which something is inferred (the hill)	Minor term
Sadhya	What is to be proved (fire)	Major term
Hetu / Linga	Reason or mark (smoke)	Middle term

Vyapti is the invariable concomitance (universal relation) between hetu and sadhya: 'wherever there is smoke, there is fire'. It is the logical basis of inference.

Nyaya five-membered syllogism (pararthanumana)

1. **Pratijna** (proposition): The hill has fire.
2. **Hetu** (reason): Because it has smoke.
3. **Udaharana** (example): Whatever has smoke has fire, as in a kitchen.
4. **Upanaya** (application): The hill has smoke, which is invariably associated with fire.
5. **Nigamana** (conclusion): Therefore, the hill has fire.

Kinds of anumana

- By purpose: **svarthanumana** (inference for oneself) and **pararthanumana** (inference for others, using the five-membered form).
- By the old Nyaya classification: **purvavat** (from cause to effect), **sheshavat** (from effect to cause), **samanyatodrishta** (from general observation).
- By the basis of vyapti: **kevalanvayi** (only positive concomitance), **kevalavyatireki** (only negative concomitance), **anvaya-vyatireki** (both).

11. Hetvabhasa (Fallacies of Inference)

A hetvabhasa is a reason that appears valid but is not. Nyaya lists five:

Hetvabhasa	Meaning	Example
Savyabhichara (Anaikantika)	Irregular or inconclusive middle; present with and without the sadhya	'The hill has fire because it is knowable'
Viruddha	Contradictory; the hetu proves the opposite	'Sound is eternal because it is produced'
Satpratipaksha	Counter-balanced; another hetu proves the opposite	Two equally strong reasons for opposite conclusions
Asiddha (Sadhyasama)	Unproved; the hetu itself is not established	'The sky-lotus is fragrant because it is a lotus'
Badhita (Kalatita)	Contradicted by another pramana, such as perception	'Fire is cold because it is a substance'

Asiddha has three forms: *ashrayasiddha* (the paksha does not exist), *svarupasiddha* (the hetu is not present in the paksha) and *vyapyatvasiddha* (the vyapti is not established).