UNIVERSITY GRANTS COMMISSION

NET BUREAU

SYLLABUS

Subject: GENERAL PAPER ON TEACHING & RESEARCH APTITUDE **Code No.** : 00

PAPER-I

The main objective is to assess the teaching and research capabilities of the candidates. The test aims at assessing the teaching and research aptitude as well. Candidates are expected to possess and exhibit cognitive abilities, which include comprehension, analysis, evaluation, understanding the structure of arguments, deductive and inductive reasoning. The candidates are also expected to have a general awareness about teaching and learning processes in higher education system. Further, they should be aware of interaction between people, environment, natural resources and their impact on the quality of life.

The details of syllabi are as follows:

Unit-I **Teaching Aptitude**

- Teaching: Concept, Objectives, Levels of teaching (Memory, Understanding and Reflective), Characteristics and basic requirements.
- Learner's characteristics: Characteristics of adolescent and adult learners (Academic, Social, Emotional and Cognitive), Individual differences.
- Factors affecting teaching related to: Teacher, Learner, Support material, Instructional facilities, Learning environment and Institution.
- Methods of teaching in Institutions of higher learning: Teacher centred vs. Learner centred methods; Off-line vs. On-line methods (Swayam, Swayamprabha, MOOCs etc.).

- Teaching Support System: Traditional, Modern and ICT based.
- Evaluation Systems: Elements and Types of evaluation, Evaluation in Choice Based Credit System in Higher education, Computer based testing, Innovations in evaluation systems.

Unit-II **Research Aptitude**

- Research: Meaning, Types, and Characteristics, Positivism and Post-positivistic approach to research.
- Methods of Research: Experimental, Descriptive, Historical, Qualitative and Quantitative methods.
- Steps of Research.
- Thesis and Article writing: Format and styles of referencing.
- Application of ICT in research.
- Research ethics.

Unit-III **Comprehension**

- A passage of text be given. Questions be asked from the passage to be answered.

Unit-IV **Communication**

- Communication: Meaning, types and characteristics of communication.
- Effective communication: Verbal and Non-verbal, Inter-Cultural and group communications, Classroom communication.
- Barriers to effective communication.
- Mass-Media and Society.

Unit-V **Mathematical Reasoning and Aptitude**

- Types of reasoning.
- Number series, Letter series, Codes and Relationships.
- Mathematical Aptitude (Fraction, Time & Distance, Ratio, Proportion and Percentage, Profit and Loss, Interest and Discounting, Averages etc.).

Unit-VI Logical Reasoning

- Understanding the structure of arguments: argument forms, structure of categorical propositions, Mood and Figure, Formal and Informal fallacies, Uses of language, Connotations and denotations of terms, Classical square of opposition.
- Evaluating and distinguishing deductive and inductive reasoning.
- Analogies.
- Venn diagram: Simple and multiple use for establishing validity of arguments.
- Indian Logic: Means of knowledge.
- Pramanas: Pratyaksha (Perception), Anumana (Inference), Upamana (Comparison), Shabda (Verbal testimony), Arthapatti (Implication) and Anupalabddhi (Non-apprehension).
- Structure and kinds of Anumana (inference), Vyapti (invariable relation), Hetvabhasas (fallacies of inference).

Unit-VII Data Interpretation

- Sources, acquisition and classification of Data.
- Quantitative and Qualitative Data.
- Graphical representation (Bar-chart, Histograms, Pie-chart, Table-chart and Line-chart) and mapping of Data.
- Data Interpretation.
- Data and Governance.

Unit-VIII Information and Communication Technology (ICT)

- ICT: General abbreviations and terminology.
- Basics of Internet, Intranet, E-mail, Audio and Video-conferencing.
- Digital initiatives in higher education.
- ICT and Governance.

Unit-IX **People, Development and Environment**

- Development and environment: Millennium development and Sustainable development goals.
- Human and environment interaction: Anthropogenic activities and their impacts on environment.
- Environmental issues: Local, Regional and Global; Air pollution, Water pollution, Soil pollution, Noise pollution, Waste (solid, liquid, biomedical, hazardous, electronic), Climate change and its Socio-Economic and Political dimensions.
- Impacts of pollutants on human health.
- Natural and energy resources: Solar, Wind, Soil, Hydro, Geothermal, Biomass, Nuclear and Forests.
- Natural hazards and disasters: Mitigation strategies.
- Environmental Protection Act (1986), National Action Plan on Climate Change, International agreements/efforts -Montreal Protocol, Rio Summit, Convention on Biodiversity, Kyoto Protocol, Paris Agreement, International Solar Alliance.

Unit-X **Higher Education System**

- Institutions of higher learning and education in ancient India.
- Evolution of higher learning and research in Post Independence India.
- Oriental, Conventional and Non-conventional learning programmes in India.
- Professional, Technical and Skill Based education.
- Value education and environmental education.
- Policies, Governance, and Administration.

NOTE:

(i) Five questions each carrying 2 marks are to be set from each Module.

(ii) Whenever graphical/pictorial question(s) are set for sighted candidates, a passage followed by equal number of questions and weightage be set for visually impaired candidates.

SYLLABUS

Sub Unit – 1: Understanding the Structure of Arguments

SL. NO	TOPIC
1	1. Concept of Proposition
2	2. Structure of Proposition
3	2.a. Quantifier
4	2.b. Subject
5	2.c. Copula
6	2.d. Predicate
7	3. Classification, Rules and Distribution of Proposition
8	3.a. Universal Affirmative (A)
9	3.b. Universal Negative (E)
10	3.c. Particular Affirmative (I)
11	3.d. Particular Negative (O)
12	4. Immediate Inferences
13	4.a. Conversion
14	4.b. Obversion
15	4.c. Contraposition
16	5. Square of Opposition
17	5.a. Contrary
18	5.b. Sub Contrary
19	5.c. Sub Alternation
20	5.d. Contradictory
21	6. Concept of argument
22	6.a. Valid argument
23	6.b. Invalid argument
24	7. Concept of Categorical Syllogism
25	8. Arguments Structure
26	8.a. Premises
27	8.b. Conclusion
28	9. Structure of Categorical Syllogism
29	9.a. Major Term (P)
30	9.b. Minor Term (S)
31	9.c. Middle Term (M)
32	10. Figure of Categorical Syllogism
33	10.a. First Figure
34	10.b. Second Figure
35	10.c. Third Figure
36	10.d. Fourth Figure
37	11. Mood of Categorical Syllogism

38	**11.a. First Figure**
39	**11.b. Second Figure**
40	**11.c. Third Figure**
41	**11.d. Fourth Figure**
42	**12. Concept of Fallacies**
43	**12.a. Concept of Formal Fallacies**
44	**12.a.1. Appeal to Probability**
45	**12.a.2. Argument from Fallacy**
46	**12.a.3. Base Rate Fallacy**
47	**12.a.4. Conjunction Fallacy**
48	**12.a.5. Masked Man Fallacy**
49	**12.a.6. Affirming a Disjunction**
50	**12.a.7. Affirming the Consequent**
51	**12.a.8. Denying the Antecedent**
52	**12.a.9. Existential Fallacy**
53	**12.a.10. Illicit Negative**
54	**12.a. 11. Fallacy of Exclusive Premises**
55	**12.a. 12. Fallacy of Four Terms**
56	**12.a.13. Illicit Major**
57	**12.a.13. Illicit Minor**
58	**12.a.14. Negative Conclusion from Affirmative Premises**
59	**12.a.15. Fallacy of the Undistributed Middle**
60	**12.a.16. Modal Fallacy**
61	**12.b. Concept of Informal Fallacies**
62	**12.b.1. The Appeal to Emotion**
63	**12.b.2. The Red Herring**
64	**12.b.3. The Straw Man**
65	**12.b.4. Argument Against the Person**
66	**12.b.5. Appeal to Force**
67	**12.b.6. Missing the Point**
68	**12.b.7. The Argument from Ignorance**
69	**12.b.8. The Appeal to Inappropriate Authority**
70	**12.b. 9. False Cause**
71	**12.b.10. Hasty Generalization**
72	**12.b.11. Accident**
73	**12.b.12. Complex Question**
74	**12.b.13. Begging the Question**
75	**12.b.14. Equivocation**
76	**12.b.15. Amphiboly**
77	**12.b.16. Accent**
78	**12.b.17. Composition**
79	**12.b.18. Division**
80	**13. Concept of Language**

81	13.a. Concept of Relation
82	13.a.1. Reflexive
83	13.a.2. Irreflexive
84	13.a.3. Symmetric
85	13.a.4. Asymmetric
86	13.a.5. Transitive
87	14. Use of Language
88	14.1. Stipulative
89	14.2. Lexical
90	14.3. Precising
91	14.4. Theoretical
92	14.5. Persuasive
93	15. Concept of Connotation
94	16. Concept of Denotation

Sub Unit – 2: Evaluating and Distinguishing Deductive and Inductive Reasoning

SL. NO	TOPIC
95	17. Concept of Reasoning
96	18. Type of Reasoning
97	18.a. Abduction
98	18.b. Analogical Reasoning
99	18.c. Cause and Effect Reasoning
100	18.c.1. Cause-to-Effect Reasoning
101	18.c.2. Effect-to-Cause Reasoning
102	18.c.3. The Bradford Hill Criteria
103	18.d. Comparative Reasoning
104	18.e. Conditional Reasoning
105	18.f. Criteria Reasoning
106	18.g. Decomposition Reasoning
107	18.h. Deductive Reasoning
108	18.i. Exemplar Reasoning
109	18.j. Inductive Reasoning
110	19. Deductive Inference
111	20. Inductive Inference

Sub Unit – 3: Analogy

SL. NO	TOPIC
112	21. Argument of Analogy
113	22. Some Character and Use of Analogy
114	23. Appraising Analogical Arguments
115	23.a. Number of Entities
116	23.b. Variety of the Instances in the Premises
117	23.c. Number of Similar Respects.
118	23.d. Relevance
119	23.e. Dis-analogies
120	23.f. Claim that the Conclusion Makes

Sub Unit – 4: Venn Diagram

SL. NO	TOPIC
121	24. Concept of Venn Diagram
122	25. Various Types of Venn Diagram
123	25.a. Diagram_1
124	25.b. Diagram_2
125	25.c. Diagram_3
126	25.d. Diagram_4
127	25.e. Diagram_5
128	25.f. Diagram_6
129	25.g. Diagram_7
130	25.h. Diagram_8
131	25.i. Diagram_9

Sub Unit – 5: Indian Logic

SL. NO	TOPIC
132	26. Concept of Indian Logic
133	27. Prama
134	28. Pramanas
135	29. Pramanas Accept in Various Indian School

Sub Unit – 6: Pramanas

SL. NO	TOPIC
136	30. Concept of Pramana
137	31. Pratyaksha (Perception)
138	32. Anumana (Inference)

139	33. Upamana (Comparison)
140	34. Sabda (Testimony)
141	35. Arthapatti (Implication)
142	36. Anupalabddhi (Non-apprehension)

Sub Unit – 7: Structure and Kinds of Anumana, Vyapti and Hetvabhasas

SL NO	TOPIC
143	37. Structure of Anuman
144	37.a. Paksa
145	37.b. Sadhya
146	37.c. Hetu
147	38. Kind of Anuman
148	38.a. Svarthanumana
149	38.b. Pararthanumana
150	38.c. Purvavat Anuman
151	38.d. Sesevat Anuman
152	38.e. Samanyatodrsta Anuman
153	38.f. Anvayi
154	38.g. Vyatireki
155	38.h. Anvaya-vyatireki
156	39. Concept of Vyapti
157	40. Type of Vyapti
158	40.a. Sama Vyapti
159	40.b. Asama Vyapti
160	41. Concept of Hetvabhasas (Fallacies of Inference)
161	41.a. Savyabhichara or Anikantika
162	41.a.1. Sadharana
163	41.a.2. Asadharana
164	41.a.3. Anupasamhari
165	41.b. Asiddha or Sadhyasama
166	41.b.1. Ashrayasiddha
167	41.b.2. Svarupasiddha
168	41.b.3. Vyapyatvasiddha
169	41.c. Satpratipaksa
170	41.d. Badhita
171	41.e. Viruddha

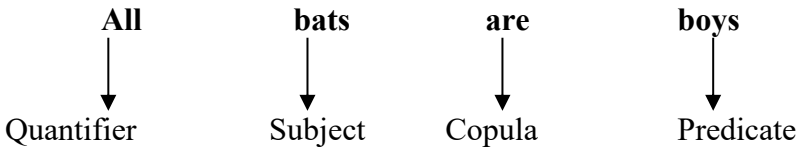
Section – 1: <u>At a Glance</u>

Sub Unit – 1: Understanding the Structure of Arguments

WHAT IS PROPOSITION: A proposition is a sentence that makes a statement and gives a relation between two or more terms.

STRUCTURE OF PROPOSITION: A proposition has four parts. Quantifier + Subject + Copula + Predicate

Example:



CLASIFICATION, RULES AND DISTRIBUTION OF PROPOSITION:

a) Universal Affirmative (A):

a.1: 'A' Proposition – The subject term is distributed but the predicate term is undistributed.

a.2: Identity the term is 'All ….is/are'

b) Universal Negative (E) :

b.1:'E' proposition distributed both their subject and their predicate terms.

b.2: Identify the term is 'No …..is/are'

c) Particular Affirmative (I):

c.1:'I' proposition both subject and predicate terms are not distributed.

c.2: Identify term is some…. is/are.

d) Particular Negative (O):

d.1:'O' proposition the subject term is not distributed but the predicate term is distributed.

d.2: Identify term is 'Some …. is/are not'

OVERVIEW

Proposition	**Letter Name**	**Quantity**	**Quality**	**Distributes**
All S is P	A	Universal	Affirmative	Only Subject
No S is P	E	Universal	Negative	Subject and Predicate
Some S is P	I	Particular	Affirmative	Neither
Some S is not P	O	Particular	Negative	Predicate Only

CONVERSION: Example

Converted		**Converse**	
A	All S is P	I	Some P is S

E	No S is P	E	No P is S
I	Some S is P	I	Some P is S
O	Some S is not P	Not possible	

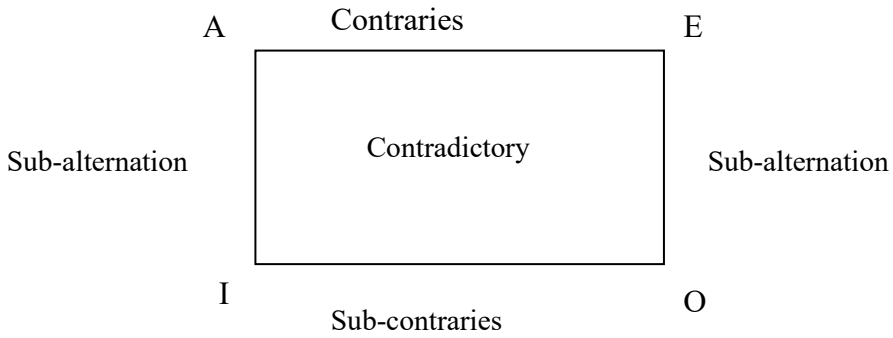
OBVERSION: Example

Obvertend		**Obverse**	
A	All S is P	E	No S are non-P
E	No S is P	A	All S are non-P
I	Some S is P	O	Some S are not P
O	Some S are not P	I	Some S are non P

CONTRAPOSITION: Example

Premise		**Contrapositive**	
A	All S is P	A	All non P is non S
E	No S is P	O	Some non P is not non S
I	Some S is P		
O	Some S are not P	O	Some non P is not non S.

SQUARE OF OPPOSITION TABLE:



TRUTH TABEL OF OPPOSITION:

A	E	I	O
T	F	T	F
F	T	F	T
U	F	T	U
F	U	U	T

N.B- T = True, F = False, t = True, F = False, U = Undecided

- Starting point of proposition is indicating any proposition's capital letter T/F.

Valid Arguments: An argument may be valid even when its conclusion and one or more of its premises are false.

Example:

All four legged creatures have wings. (False)

All spiders have four legs. (False)

Therefore, all spiders have wings. (False)

Invalid Arguments: An argument may be invalid even when it's all premises are true and its conclusion is false.

Example:

If Vijay Mallya owned all the currency in the RBI then Vijay Mallya would be wealthy (True)

Vijay Mallaya does not own all the gold in the RBI (True)

Therefore, Vijay Mallya is not wealthy (False)

STRUCTURE OF CATEGORICAL SYLLOGISM:

Major Term: The predicate term of the conclusion.

Minor Term: The subject term of the conclusion.

Middle Term: The term that appears in both premises but not in the conclusion.

Minor Term is indicated **'P'**

Major Term is indicated **'S'**

Middle Term is indicated **'M'**

FIGURE OF CATEGORICAL SYLLOGISMS:

Categorical syllogism has four figures. They are

FIRST FIGURE:

M---------P
S---------M
Therefore, S----------P

SECOND FIGURE:

P---------M
S---------M
Therefore, S--------P

THIRD FIGURE:

M--------P
M--------S
Therefore, S----------P

FOURTH FIGURE:

P--------M
M--------S
Therefore, S--------P

MOOD OF THE SYLLOGISM:

11.a.FIGURE-1	11.b.FIGURE-2	11.c.FIGURE-3	11.d.FIGURE-4
BARBARA-AAA CELARENT-EAE DARII-AII FERIO-EIO	DARAPTI-AAI DISAMIS-IAI DATISI-AII FELAPTON-EAO BOCARDO-OAO FERISON-EIO	BRAMANTIP-AAI CAMENES-AEE DIMARIS-IAI FESAPO-EAO FRESISON-EIO	CESARE-EAE CAMESTRES-AEE FESTINO-EIO BAROCO-AOO

CONCEPT OF LANGUAGE: Language has three major functions

1. Informative
2. Expressive
3. Directive

CONCEPT OF RELATION: The language of our formal logic gives us relation (predicate) symbols with any finite number of argument places, allowing us to represent relationships between two or more things, even where these cannot be decomposed into monadic properties of those things. There are various type of relation…

REFLEXIVE: If everything bears relation R to itself. For instance is reflexive (all members of a set s are members of S of course) but is not, 'knows' may be, it the injunction to 'know thyself' is vacuous.

IRREFLEXIVE: If nothing bears relation R itself. For instance is irreflexive because no number can be less than itself.

SYMMETRIC: It the relation is reversible. Plausibly our third example is symmetric, it depends a bit on how we read 'know' but may be if I know you then it follows that you know me as well, which would make the knowing relation symmetric.

ASYMMETRIC: If the relation is irreversible again is the only asymmetric relation of our three.

TRANSITIVE: Knowing people, however is not transitive for example, I know my brother and he knows his work collagens but I do not know all of them.

USE OF LANGUAGE: With this preface we may say the definition, depending on how they are used are of five kinds.

1. Stipulative
2. Lexical
3. Precising
4. Theoretical
5. Persuasive

Sub Unit – 2: Evaluating and Distinguishing Deductive and Inductive Reasoning

WHAT IS REASONING OR LOGIC: The word 'Logic' came from Greek Word 'Logos', that's means Reason.

DEDUCTIVE INFERENCE:

- The deductive inference the conclusion cannot be more general than premises.
- The deductive inference is asserted that the conclusion is guaranteed to be true if the premises are true.

INDUCTIVE INFERENCE:

- Inductive Inference the conclusion is more general than the premises.
- Inductive Inference the conclusion has a high probability of being true if the premises are true.

Sub Unit – 3: Analogy

ARGUMENT OF ANALOGY: Analogy is the common ground of our everyday inferences from past experience to what the future will hold. Every analogical argument proceeds from the similarity of two or more things in one or more respects to the similarity of those things in some further respect.

SOME CHARACTER AND USE OF ANALOGY:

(i) Analogy is also used in explanation.

(ii) To draw an analogy between two or more entities is to indicate one or more respects in which they are similar.

(iii) Analogical argument is one of the most fundamental tools of appellate courts.

(iv) Analogical argument is also common in political controversy.

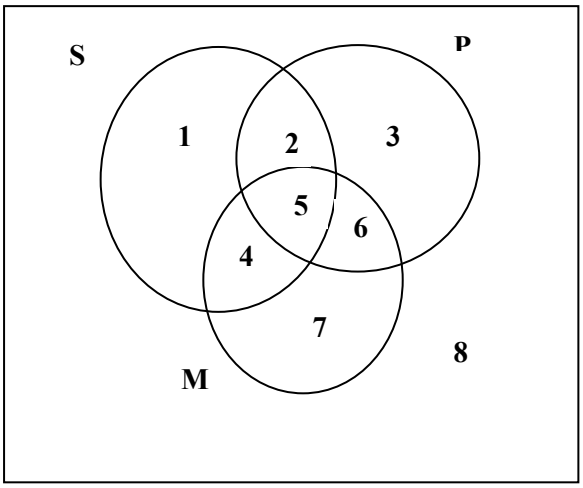
Sub Unit – 4: Venn Diagram

CONCEPT OF VENN DIAGRAM: Categorical proposition are the building blocks of arguments and our aim throughout is to analyse and evaluate argument. To do this we must be able to diagram and symbolize the A, E, I and O propositions.

SYMBOL OF CATEGORICAL PROPOSITION:

FORM	PROPOSITION	SYMBOL	EXPLANATION
A	All S is P	$S\overline{P} = 0$	The class of things that are both S and non P is empty.
E	No S is P	$SP = 0$	S and P is empty.
I	Some S is P	$SP \neq 0$	S and P is not empty.
O	Some S is not P	$S\overline{P} \neq 0$	S and not P is not empty.

VENN DIAGRAM:



1= s

2= sp

3= p

4= sm

5= spm

6=mp

7=m

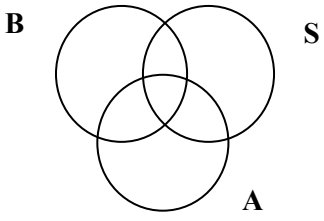
VARIOUS TYPE OF VENN DIAGRAM:

Boys, Students and Athletes

B = Boys

S = Students

A = Athletes

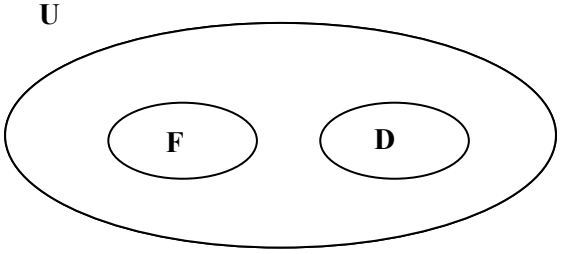


University, Formal classroom education and Distance education

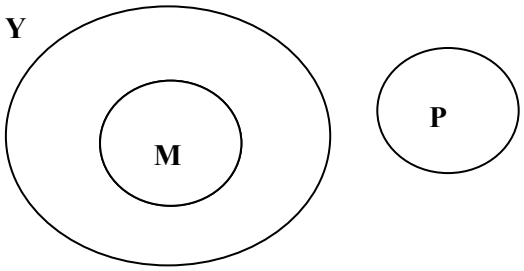
U = University

F = Formal Classroom

D = Distance Education



Men, Plants and Morality

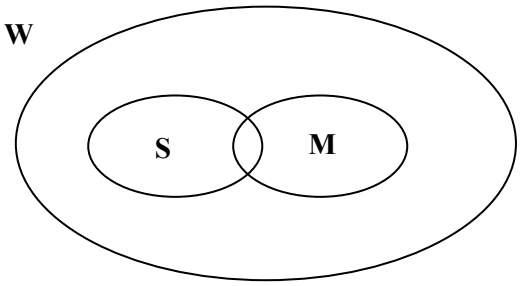


Y = Morality

M = Men

P = Plants

Women, Sister and Mother

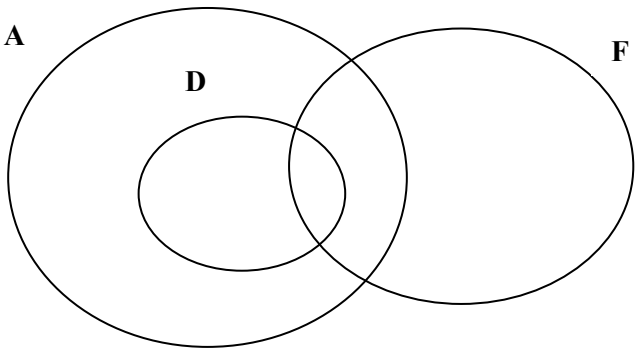


W = Women

S = Sister

M = Mother

Dogs, Animals and Flesh eaters

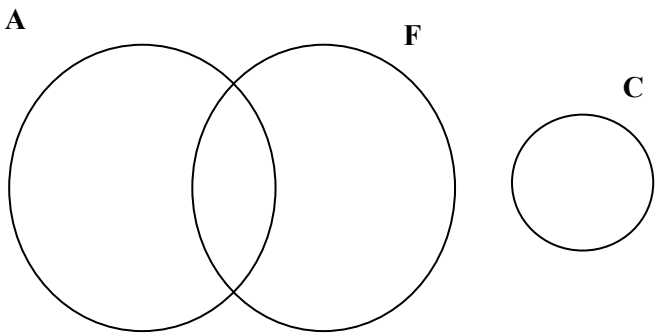


D = Dogs

A = Animals

F = Flesh-eaters

Dogs, Cow and Flesh eaters

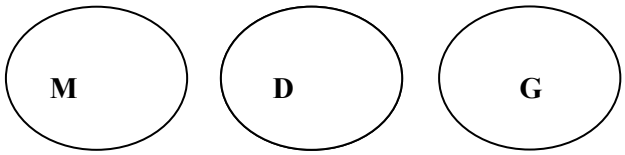


D = Dogs

C = Cow

F = Flesh-eaters

Men, Dogs and God

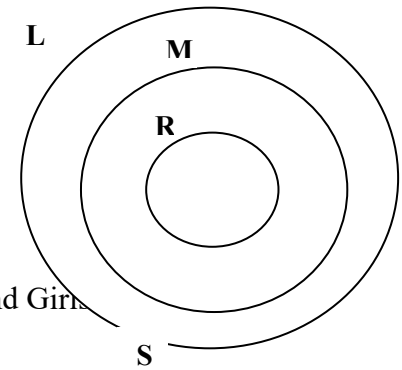


M = Men

D = Dog

G = God

Ram, Men and Mortal

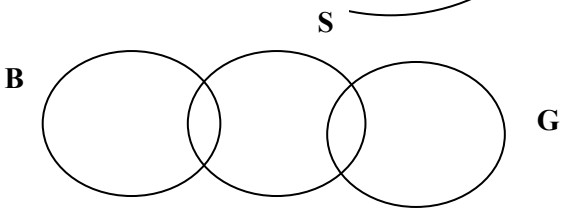


R = Ram

M = Men

L = Mortal

Boys, Students and Girl



B = Boys

S = Students

G = Girls

Sub Unit – 5: Indian Logic

CONCEPT OF INDIAN LOGIC: Indian logic is the most important part of Indian Philosophy. Basically it is included in Epistemology.

PRAMA: Prama are four type i.e. Pratyaksha, Anumiti, Upamiti and Shabda bodh.

PRAMANAS: There are four pramanas i.e. Perception (Pratyaksha), Inference (Anumana), Comparison (Upamana) and Testimony (Shabda).

Pramanas accept in various Indian School:

SL. No.	School Name	Pramana
29.a	Carvaka	Perception (Pratyaksha)
29.b	Bauddha	Perception (Pratyaksha) and Inference (Anumana)
29.c	Vaisesika	Perception (Pratyaksha) and Inference (Anumana)
29.d	Jaina	Perception (Pratyaksha), Inference (Anumana) and Testimoney (Sabda)
29.e	Samkhya	Perception (Pratyaksha), Inference (Anumana) and Testimoney (Sabda)
29.f	Yoga	Perception (Pratyaksha), Inference (Anumana) and Testimoney (Sabda)
29.g	Nyaya	Perception (Pratyaksha), Inference (Anumana), Testimoney (Sabda) and Comparison (Upamana)
29.h	Mimamsa	Perception (Pratyaksha), Inference (Anumana), Testimoney (Sabda), Comparison (Upamana), Presumption (arthapatti) and Non- Apprehension (Anupalabdhi)
29.i	Vedanta	Perception (Pratyaksha), Inference (Anumana), Testimoney (Sabda), Comparison (Upamana), Presumption (arthapatti) and Non- Apprehension (Anupalabdhi)

Sub Unit – 6: Pramanas

CONCEPT OF PRAMANA: Pramana is defined a valid means of knowledge. They are Perception, Inference, Comparison, Verbal testimony, Implication, Non-apprehension.

PRATYAKSHA (PERCEPTION): Gautam defines perception as the knowledge which is produced by the intercourse of an object with a sense-organ, indefinable, determinate and in harmony with its object.

- The two stage in Pratyaksa --- Indetermination or Nirvikalpa and Determination or Savikalpa.
- The two kind of Pratyaksa --- Ordinary or Laukika and Extraordinary or Alaukika

ANUMANA (INFERENCE): There is no scope for inference where we can have perception. Inference is called anumana because it is a kind of knowledge.

Bassically Inference is of two kinds ---

a. Inference for Oneself (svathanumana)

b. Inference for other (parathanumana)

UPAMANA (COMPARISON): The third kind of valid cognition is upamiti and its means is called upamana. It is knowledge derived from comparison and roughly corresponds to analogy.

SABDA (TESTIMONY): It is regarded as a valid source of knowledge. It is also regarded as the fourth kind of valid knowledge. It is referred as the statement of a trustworthy person.

ARTHAPATTI (IMPLICATION): Arthapatti as an independent means of valid knowledge. It is presumption or postulation or implication.
ANUPALABDHI (NON-APPREHENSION): Anupalabdhi is another name is negation. The same sense organ which perceives any object perceives its nonexistence also, and the same inference which infers the existence of any object infers its non-existence also.

Sub Unit – 7: Structure and Kinds of Anumana, Vyapti and Hetvabhasas

STRUCTURE OF ANUMAN: Anumana is the second kind of pramana. It means an inferential knowledge. It has three terms -
a. Paksa
b. Sadhya
c. Hetu
KIND OF ANUMANA: Anumana is various kinds.
They are: Svarthanumana, Parathanumana, Purvavat Anumana, Sesavat Anumana, Samanyatodrsta Anumana, Anvay, Vyatireki, Anvaya-vyatireki
CONCEPT OF VYAPTI: Vyapti imples a correlation between two factors of which one is pervaded (Vyapta) and other pervades (vyapaka).
TYPES OF VYAPTI: Basically vyapti is two types namely samavyapti and Asamavyapti or Visamavyapti. But some thinker thought vaypti is more type: Sama Vyapti and Asama Vyapti
CONCEPT OF HETVABHASAS: In indian logic a fallacy is called hetvabhasa.
SADHARANA: e.g. 'the hill has fire because it is knowable'. Here 'knowable' is present in fiery as well as non-fiery objects.
ASADHARANA: e.g. 'Sound is eternal, because it is audible'. Here 'audibility' belongs to sound only and is present nowhere else.
ANUPASAMHARI: e.g. 'all things are non-eternal because they are knowable'
ASHRAYASIDDHA: e.g. ' the sky-lotus is fragrant because it is a lotus, like the lotus of a lake.
SVARUPASIDDHA: e.g. 'Sound is a quality because it is visible.' Here visibility cannot belong to sound which is audible.
VYAPYATVASIDDHA: 'The hill has smoke because it has fire'.
SATPRATIPAKSA: Here the middle term is contradicted by another middle term. The reason is counter-balanced by another reason. And both are of equal force; e. g. 'Sound is eternal because it is audible and 'sound' is non-eternal because it is produced'. Here 'audible' is counter balanced by 'produced' and both are of equal force.
BADHITA: It is the non-inferentially contradicted middle e.g. 'fire is cold because it is a substance.' Here the middle term 'substance' is directly contradicted by perception.
VIRUDDHA: 'Sound is eternal because it is produced'. Here 'produced' instead of proving the eternality of sound, proves its non-eternality.

Section – 2: Key Statements

Every candidates appearing for NET/SET examination should follow these key (main) points those can help them a better understanding regarding this unit very quickly.

Key Statements:

Concept of Proposition (1), Structure of Proposition (2), Structure and classification of Categorical Proposition (3), Conversion (4.a), Observation (4.b), Contraposition (4.c), Contrary (5.a), Sub Contrary (5.b), Sub alternation (5.c), Contradictory (5.d), Concept of Argument (6), Valid Argument (6.a), Invalid Argument (6.b), Premises (8.a), Conclusion (8.b), Minor Term (9.a), Major Term (9.b), Middle Term (9.c), Figure of Categorical Syllogism (10), Mood of Categorical syllogism (11), Concept of Fallacies(12), Concept of formal fallacies (12.a), Concept of Informal Fallacies (12.b), Concept of Language (13), Use of Language (14), Concept of Reasoning (17), Inductive Inference (20), Deductive Inference (19), Concept of Analogy (21), Character and use of Analogy (22), Concept of Veen Diagram (24), Types of Diagrams (25), Concept of Indian Logic (26), Prama (27), Pramanas (28), Pramanas accept in various Indian School (29), Pratyaksha (31), Anumana (32), Upamana (33), Sabda (34), Arthapatti (35), Anupalabddhi (36), Structure of Anuman (37), Kind of Anumana (38), Type of Vyapti (40), Concept of Hetvabhasas (41).

[N.B. – Values in parenthesis are the reference number]

Section – 3: Key Facts and Figures

Sub Unit – 1
Understanding the Structure of Arguments

……

1. Concept of Proposition

A proposition is a sentence that makes a statement and gives a relation between two or more terms. In logical reasoning, any statement is termed as a proposition.

2. Structure Of Proposition

A proposition has four parts.

Quantifier + Subject + Copula + Predicate

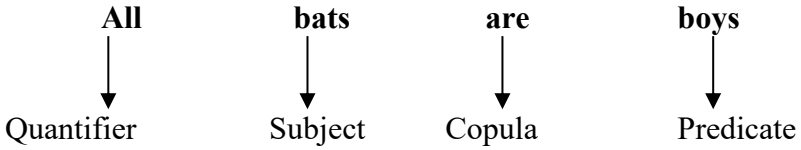
2.a. Quantifier: All and some, they specify a quantity. 'All' is a universal quantifiers and 'Some' is a particular quantifier.

2.b. Subject: About which something is being said. Its symbol is 'S'.

2.c. Copula: Relation between subject and predicate.

2.d. Predicate: Something that affirms or denies about the subject. Its symbol is 'P'.

Example:



3. Classification, Rules and Distribution of Proposition

Proposition are basically of two type namely Quality and Quantity. Quality of proposition is two types i.e. Affirmative and Negative. On the other hand Quantity of proposition is two types

i.e. Universal and Particular. So every standard form categorical proposition is four types. They are

a) Universal Affirmative (A)
b) Universal Negative (E)
c) Particular Affirmative (I)
d) Particular Negative (O)

3.a. Universal Affirmative (A):

3.a.1: The predicate agree with the whole subject. Its symbol is 'A'. Example All men are rational. All S is P.

3.a.2: 'A' Proposition – The subject term is distributed but the predicate term is undistributed.

3.a.3: Identity the term is 'All ….is/are'

3.b. Universal Negative (E):

3.b.1: The predicate does not all agree with any part of the subject. Its symbol is 'E'. Example No men are perfect. No S is P.

3.b.2:'E' proposition distributed both their subject and their predicate terms.

3.b.3: Identify the term is 'No ….. is/are'

3.c. Particular Affirmative (I):

3.c.1: The predicate agrees only with a part of the subject. Its symbol is 'I'. Example Some flowers are red. Some S are/is P.

3.c.2: 'I' proposition both subject and predicate terms are not distributed.

3.c.3: Identify term is Some…. is/are

3.d. Particular Negative (O):

3.d.1: The predicate does not agree with a part of the subject. Its symbol is 'O'. Example Some Indians are not religious. Some S is not P.

3.d.2: 'O' proposition the subject term is not distributed but the predicate term is distributed.

3.d.3: Identify term is 'Some …. is/are not'

Over View:

Proposition	Letter Name	Quantity	Quality	Distributes
All S is P	A	Universal	Affirmative	Only Subject
No S is P	E	Universal	Negative	Subject and Predicate
Some S is P	I	Particular	Affirmative	Neither
Some S is not P	O	Particular	Negative	Predicate Only

4. Immediate Inferences

Three other important kinds of immediate inference are not associated directly with the square of opposition: Conversion, obversion and Contraposition. These we now explain.

4.a: Conversion:

Conversion is an inference that proceeds by interchanging the subject and predicate terms of the proposition and these propositions may be validly inferred from one another.

- **Rules Of Conversion:**

4.a.1: Undistributed term in the convertend not be distributed in the converse.

4.a.2: Keep the same quality.

4.a.3: Interchange subject and predicate.

Example

Convertend		Converse	
A	All S is P	I	Some P is S
E	No S is P	E	No P is S
I	Some S is P	I	Some P is S
O	Some S is not P	Not possible	

4.b: Obversion:

Obversion is an immediate inference that is easy to explain once the concept of a term complement is understood. To obvert a proposition, we change its quality (affirmative to negative or negative to affirmative) and replace the predicate term with its complement.

However the subject term remains unchanged and so does the quantity of the proposition being obverted.

- **Rules of Obversion:**

4.b.1: Keep the same quantity.

4.b.2: A new proposition is inferred which has the original subject as subject as subject and the contradictory of the original predicate as its predicate.

4.b.3: The quality of the proposition is also changed.

4.b.4: Undistributed term in the obvertend not be distributed in the obverse.

Example:

Obvertend		**Obverse**	
A	All S is P	E	No S are non-P
E	No S is P	A	All S are non-P
I	Some S is P	O	Some S are not not P
O	Some S are not P	I	Some S are non P

4.c: Contraposition:

A third type of immediate inference, contraposition can be reduced to the first two conversions and obversion. To form the contrapositive of a given proposition, we replace its subject term with the complement of its predicate term and we replace its predicate term with the complement of its subject term. Neither the quality not the quantity of the original proposition is changed.

To get the contrapositive, first obvert and then convert the obverse.

Example:

Premise		**Contrapositive**	
A	All S is P	A	All non P is non S

E	No S is P	O	Some non P is not non S
I	Some S is P		
O	Some S are not P	O	Some non P is not non S.

5. Square of Opposition

Opposition:

Standard-form categorical propositions having the same subject terms and the same predicate terms may differ from each other in quality or in quantity or in both. Any such kind of differing has been traditionally called opposition. Opposition has four kinds. They are Contrary, Sub-contrary, Sub-alternation, and Contradictory.

5.a: Contrary:

5.a.1: Universal proposition having the same subject and predicate terms but differing in quality were contraries. Two proposition is A and E.

5.a.2: They cannot both be true that is, if the truth of one entails the falsity of the other.

5.b: Sub-Contrary:

5.b.1: Particular proposition having the same subject and predicate terms but differing in quality are sub-contraries. Two propositions are I and O.

5.b.2: They cannot both be false although they may both be true.

5.c: Sub-Alternation:

5.c.1: Two proposition have the same subject and the same predicate terms and agree in quality (both affirming or both denying) but differ in quantity (one universal the other particular) they are called sub-alternation

5.c.2: If universal is true, then particular must be true.

5.c.3: If universal is false, then particular may be undecided.

5.c.4: If particular is true then universal must be true.

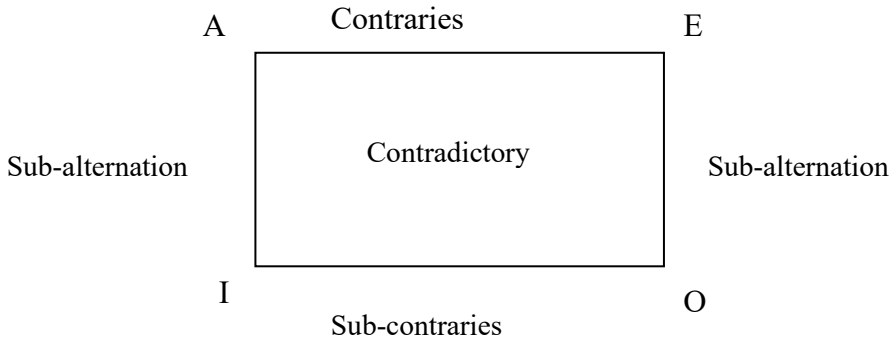
5.c.5: If particular is false then universal may be undecided.

5.d: Contradictory:

5.d.1: Two standard form categorical propositions that have the same subject and predicate terms but differ from each other in both quantity and quality are contradictory.

5.d.2: They cannot both be true and cannot both be false.

Square of Opposition Table



Truth Table of Opposition

A	E	I	O
T	F	T	F
F	T	F	T
U	F	T	U
F	U	U	T

N.B- T = True, F = False, U = Undecided

- Starting point of proposition is indicating any proposition's capital letter T/F.

6. Concept of Argument

Argument is a technical term in logic. In logic, argument refers strictly to any group of proposition of which one is claimed to follow from the others, which are regarded as providing support for the truth of that one. For every possible inference there is a corresponding argument.

6.a: Valid Arguments:

An argument may be valid even when its conclusion and one or more of its premises are false.

Example:

All four legged creatures have wings (False)

All spiders have four legs. (False)

Therefore, all spiders have wings (False)

6.b: Invalid Arguments:

An argument may be invalid even when it's all premises are true and its conclusion is false.

Example:

If Vijay Mallya owned all the currency in the RBI then Vijay Mallya would be wealthy (True)

Vijay Mallaya does not own all the gold in the RBI (True)

Therefore, Vijay Mallya is not wealthy (False)

7. Categorical Syllogism

A syllogism is, in general, a deductive argument in which a conclusion is inferred from two premises. A categorical syllogism as a deductive argument consisting of three categorical propositions that together contain exactly three terms, each of which occurs in exactly two of the constituent propositions.

8. Argument Structure

An argument has two or more premises and a conclusion.

8.a: Premises: A premise of an argument is something that is put forward as a truth, but which is not proven. Although it is not proven, it is assumed to be true.

8.b: Conclusion: The conclusion is the statement with which you want the other person to agree. It is drawn from the premises of the argument, of which there may be many.

Example:

All mammals have lungs (Premises)

All whales are mammals (Premises)

Therefore, all whales have lungs (Conclusion)

9. Structure of Categorical Syllogism

9.a: Major Term (P):

The predicate term of the conclusion.

9.b: Minor Term (S):

The subject term of the conclusion.

9.c: Middle Term (M):

The term that appears in both premises but not in the conclusion.

Major Premise: The premise containing the major term.

Minor Premise: The premise containing the minor term.

Minor Term is indicated **'P'**

Major Term is indicated **'S'**

Middle Term is indicated **'M'**

N.B- In a standard form syllogism the major term is always stated first, the minor premise second and the conclusion last.

10. Figure of Categorical Syllogisms

Categorical syllogism has four figures. They are:

10.a: First Figure:

M---------P

S---------M

Therefore, S----------P

The middle term may be the subject term of the major premise and the predicate term of the minor premise.

10.b: Second Figure:

P---------M

S---------M

Therefore, S--------P

The middle term may be the predicate term of both premises.

10.c: Third Figure:

M--------P

M--------S

Therefore, S----------P

The middle term may be the subject term of both premises.

10.d: Fourth Figure:

P--------M

M--------S

Therefore, S--------P

The middle term may be the predicate term of the major premise and the subject term of the minor premise.

11. Mood of the Syllogism

Every syllogism has a mood. The mood of a syllogism is determined by the type of categorical propositions it contains. A categorical syllogism have 256 possible forms, there are exactly fifteen forma are valid. 15th forms are:

11.a.FIGURE-1	11.b.FIGURE-2	11.c.FIGURE-3	11.d.FIGURE-4
BARBARA-AAA **CELARENT-EAE** **DARII-AII** **FERIO-EIO**	**DARAPTI-AAI** **DISAMIS-IAI** **DATISI-AII** **FELAPTON-EAO** **BOCARDO-OAO** **FERISON-EIO**	**BRAMANTIP-AAI** **CAMENES-AEE** **DIMARIS-IAI** **FESAPO-EAO** **FRESISON-EIO**	**CESARE-EAE** **CAMESTRES-AEE** **FESTINO-EIO** **BAROCO-AOO**

12. Concept of Fallacy

When the premises of an argument fail to support its conclusion and argument of that sort may be called fallacious. So, in a very general sense, any error is reasoning is a fallacy. In this narrow sense, each fallacy is a type of incorrect argument.

Mainly fallacy is four types which are:

12.a: Concept of Formal Fallacies:

12.a.1: Appeal to Probability:

A statement that takes something for granted because it would probably be the case (or might be the cause all).

12.a.2: Argument from Fallacy:

Assumption that if an argument for some conclusion is fallacious then the conclusion is false.

12.a.3: Base Rate Fallacy:

Making a probability judgment based on conditional probabilities without taking into account the effect of prior probabilities.

12.a.4: Conjunction Fallacy:

Assumption that an outcome simultaneously satisfying multiple conditions is more probable than an outcome satisfying a single one of them.

12.a.5: Masked Man Fallacy: (Illicit Substitution of Identical)

The substitution of identical designators in a true statement can lead to a false one.

12.a.6: Affirming a Disjunction:

Concluding that one disjunction of a logical disjunction must be false because the other disjunction is true.

Example: A or B

A

Therefore, B

12.a.7: Affirming the Consequent:

The antecedent in an indicative conditional is claimed to be true because the consequent is true.

Example: A⊃B

B

Therefore, A

12.a.8: Denying the Antecedent:

The consequent in an indicative conditional is claimed to be false because the antecedent is false.

Example: A⊃B

~A

Therefore, ~B

12.a.9: Existential Fallacy:

An argument that has a universal premise and a particular conclusion.

12.a.10: Illicit Negative:

A categorical syllogism has a positive conclusion but at least one negative premise.

12.a.11: Fallacy of Exclusive Premises:

A categorical syllogism that is invalid because both of its premises are negative.

12.a.12: Fallacy of Four Terms:

A categorical syllogism that has four terms.

12.a.13: Illicit Major:

A categorical syllogism that is invalid because its major term is not distributed in the major premise but distributed in the conclusion.

12.a.14: Illicit Minor:

A categorical syllogism that is invalid because its minor term is not distributed in the minor premise but distributed in the conclusion.

12.a.15: Negative Conclusion from Affirmative Premises:

A categorical syllogism has a negative conclusion but affirmative premises.

12.a.16: Fallacy of the Undistributed Middle:

The middle term in a categorical syllogism is not distributed.

12.a.17: Modal fallacy:

Confusing possibility with necessity.

12.b: Concept of Informal Fallacies:

12.b.1: The Appeal to Emotion (ad populam): An informal fallacy committed when the support offered for some conclusion is an inappropriate appeal to the emotions partiotism, pity or the like of the listeners.

12.b.2: The Red Herring: An informal fallacy committed when some distraction is used to mislead and confuse.

12.b.3: The Straw Man: An informal fallacy committed when the position of one's opponent is misrepresented and that distorted position is made the object of attack.

12.b.4: Argument Against the Person (ad hominem): An informal fallacy committed when, rather than attacking the substance of some position, one attacks the person of its proponent, either abusively or as a consequence of his or her special circumstances.

12.b.5: Appeal to Force (ad baculum): An informal fallacy committed when force, or the threat of force, is relied on to win consent.

12.b.6: Missing the Point (ignoratio elenchi): An informal fallacy committed when one refutes, not the thesis one's interlocutor is advancing but some different thesis that one mistakenly imputes to him or her.

12.b.7: The Argument from Ignorance (ad ignorantiam): An informal fallacy in which a conclusion is supported by an illegitimate appeal to ignorance, as when it is supposed that something is likely to be true because we cannot prove that it is false.

12.b.8: The Appeal to Inappropriate Authority: The appeal to authority is illegitimate because the authority appealed to has special claim to expertise on the matter in question.

12.b.9: False Cause: The mistake arises from accepting as the cause of an event what is not really its cause.

12.b.10: Hasty Generalization: A principle that is true of a particular case is applied, carelessly or deliberately to the great run of cases.

12.b.11: Accident: An informal fallacy in which a generalization is applied to individual cases that it does not govern.

12.b.12: Complex Question: A question is asked in such a way as to presuppose the truth of some proposition buried in the question.

12.b.13: Begging the Question (petitio principii): The conclusion of an argument is stated or assumed in one of the premises.

12.b.14: Equivocation: Two or more meaning of the same word or phrase have been confused.

12.b.15: Amphiboly: Arising from the loose, awkward or mistaken way in which words are combined, leading to alternative possible meaning of a statement.

12.b.16: Accent: An informal fallacy committed when a term or phrase has a meaning in the conclusion of an argument different from its meaning in one of the premises, the difference arising chiefly from a change in emphasis given to the words used.

12.b.17: Composition: An inference is mistakenly drawn from the attributes of the parts of a whole to the attributes of the whole itself.

12.b.18: Division: A mistaken inference is drawn from the attributes of a whole to the attributes of the parts of the whole.

13. Concept of language

We reason using language manipulating propositions in a logical or informative spirit. But language is used in a great variety of ways only some of which are informative. Without the intention to inform, we among express ourselves use language 'That really great'. We may say and the poet overcome by the beauty of an ancient city' channels his emotions in writing these lines --- 'half as old as time' a rose red city.

Language has three major functions

1. Informative
2. Expressive
3. Directive

13.a: Concept of Relation:

The language of our formal logic gives us relation (predicate) symbols with any finite number of argument places, allowing us to represent relationships between two or more things, even where these cannot be decomposed into monadic properties of those things. There are various type of relation.

13.a.1: Reflexive:

If everything bears relation R to itself. For instance is reflexive (all members of a set s are members of S of course) but is not, 'knows' may be, it the injunction to 'know thyself' is vacuous.

13.a.2: Irreflexive:

If nothing bears relation R itself. For instance is irreflexive because no number can be less than itself.

13.a.3: Symmetric:

It the relation is reversible. Plausibly our third example is symmetric, it depends a bit on how we read 'know' but may be if I know you then it follows that you know me as well, which would make the knowing relation symmetric.

13.a.4: Asymmetric:

If the relation is irreversible again is the only asymmetric relation of our three.

13.a.5: Transitive:

Knowing people, however is not transitive for example, I know my brother and he knows his work collagens but I do not know all of them.

14. Use of Language

Good definitions are plainly very helpful in eliminating verbal disputes but there are other uses of definition that are important in logic. Two commonly used technical terms are useful in discussing definitions. The difiendum is the symbol being defined. The defines is the symbol used to explain the meaning of the definiendum.

With this preface we may say the definition, depending on how they are used are of five kinds.

1. Stipulative
2. Lexical
3. Precising
4. Theoretical
5. Persuasive

14.1. Stipulative:

A definition that has a meaning that is deliberately assigned to some symbol is called a stipulative definition. One who introduces a new symbol is free to assign to it or stipulate whatever meaning she cares to. Even an old term put into a new context may have its meaning stipulated. Definitions of this sort are sometimes called nominal.

14.2. Lexical:

Most often the term being defined has some established use. When the purpose of the definition is to explain that use or to eliminate ambiguity the definition is called lexical.

14.3. Precising:

Some terms are ambiguous some terms are vague. A term is ambiguous in a given contest when it has more man ore distinct meaning and the contest does not make clear which meaning is intended. Precising definition are those used to eliminate ambiguity or vagueness.

14.4. Theoretical:

In Science and in Philosophy definitions often serve as a compressed summary or recapitulation of some theory. Such definition when they are faulty, are criticized not so much because they are not precise as because they are not adequate they do not correctly encapsulate the theory in question.

14.5. Persuasive:

The four categories we have discussed so far are concerned chiefly with the informative use of language. But definitions are also used at times to express telling as well, so as to influence the conduct of others. A definition put forward to resolve a dispute by in flouncing attitudes or stirring emotions may be called a persuasive definition.

15. Concept of Connotation

The connotation of a word is an idea or feeling that the word invokes in addition to its literal meaning. Words evoke many meanings to people that extend beyond the technical definitions known as denotations.

Connotations are what we associate with words based on our personal experience with them.

Examples of Connotation:

A good example of connotation in words is the word spider.

- Word = spider
- Denotation = an eight-legged arachnid.
- Connotation = many people are terrified of spiders, so fear is a common connotation when spider is used. Others might simply find them gross.

Animals make for good illustrations of connotation, so let's look at another.

- Word = snake
- Denotation = long, limbless reptile
- Connotation = Many people associate snakes with liars and tricksters. This may have biblical origins, but it obviously differs from the denotation of the word

16. Concept of Denotation

The denotation of a word is the technical, literal meaning of a word. This is the meaning one would find when looking the word up in a dictionary.

For example, if you were to look up the word house or snore in the dictionary, you may see something like this.

- **House:** a building for human habitation
- **Snore:** to breathe with a rough hoarse noise while sleeping

Denotation is contrasted with *connotation*, which has to do with the feelings a word suggests. Let's compare the denotation and connotation of the words *house* and *snore.*

- **House**:
- Denotation: a building for human habitation.
- Connotation: warm, friendly, comforting.
- **Snore**:
- Denotation: to breathe with a rough hoarse noise while sleeping.
- Connotation: loud, abrasive, irritating, unnerving.

Sub Unit – 2
Evaluating and Distinguishing Deductive and Inductive Reasoning

……

17. Concept of Reasoning

- Logic is the study of the method and principles used to distinguish correct from incorrect reasoning.
- The word 'Logic' came from Greek Word 'Logos', that's means Reason.

18. Type of Reasoning

Reasoning is various type of reason. They are

18.a. Abduction:

The process of creating explanatory hypotheses.

18.b. Analogical Reasoning:

Relating things to novel other situations.

18.c. Cause and Effect Reasoning:

Showing causes and resulting effect.

18.c.1: Cause-to-Effect Reasoning: Starting from the cause and going forward.

18.c.2: Effect-to-Cause Reasoning: Starting from the effect and working backward.

18.c.3: The Bradford Hill Criteria: For cause and effect in medical diagnosis.

18.d. Comparative Reasoning: Comparing one thing against another.

18.e. Conditional Reasoning: Using If and then.

18.f. Criteria Reasoning: Comparing against established criteria.

18.g. Decompositional Reasoning: Understand the parts to understand the whole.

18.h. Deductive Reasoning: Starting from the general rule and moving to specifics.

18.i. Exemplar Reasoning: Using an example.

18.j. Inductive Reasoning: Starting from specifies and deriving a general rule.

❖ **Inferences:**

Inferences are the reasoning parts of an argument conclusions are a type of inference, but always the final inference. Usually an argument will be complicated enough to require inferences linking the premises with the final conclusion.

1. Doctor earns a lot of money. (Premises)
2. With a lot of money, a person can travel a lot. (Premises)
3. Doctors can travel a lot. (Inf. 1 and 2)
4. I want to travel a lot. (Premise)
5. I should become a doctor (Inf. 3 and 4)

Inference has two types. There are Deductive Inference and Inductive Inference.

19. Deductive Inference

- The deductive inference the conclusion cannot be more general than premises.
- The deductive inference is asserted that the conclusion is guaranteed to be true if the premises are true.

Example:

All men are mortal. (Premises)

Ram is man. (Premises)

Therefore, Ram is mortal. (Conclusion)

20. Inductive Inference

- Inductive Inference the conclusion is more general than the premises.
- Inductive Inference the conclusion has a high probability of being true if the premises are true.

Example:

Ram is mortal. (Premises)

Vim is mortal. (Premises)

Sita is mortal. (Premises)

Therefore, All men are mortal. (Conclusion)

Sub Unit – 3
Analogy

21. Argument of Analogy

Analogy is the common ground of our everyday inferences from past experience to what the future will hold. Every analogical argument proceeds from the similarity of two or more things in one or more respects to the similarity of those things in some further respect.

Not every analogical argument need concern exactly two things or exactly three different characteristics, of course. Thus the argument presented earlier suggesting that other planets in our solar system may well be inhabited, draws analogies among six thing in some eight respect. Apart from these numerical differences, however all analogical arguments have the same general structure or pattern.

Example:

Schematically, where a, b, c and d are any entities and P, Q and R any attributes or respects an analogical argument may be represented as having the form.

a, b, c, d all have the attributes P and Q

a, b, c all have the attribute R.

Therefore D probably has the attribute R

22. Some Character and Use of Analogy

(i) The first concludes, on the basis of what we commonly think to be prudent and fair, that it would be prudent and fair to adopt now a major change in public policy.

(ii) Entirely plausible when first presented two centuries ago whose conclusion is very probably false

(iii) Argument by analogy is not to be classified as either valid or invalid, probability is all that is claimed for them.

(iv) Analogy is also used in explanation.

(v) To draw an analogy between two or more entities is to indicate one or more respects in which they are similar.

(vi) Analogical argument is one of the most fundamental tools of appellate courts.

(vii) Analogical argument is also common in political controversy.

23 Appraising Analogical Arguments

23.a Number Entities:

Each instance may be thought of as an additional entity and the number of entities is the first criterion in evaluating an analogical argument. In general, the larger the number of entities – that is case in our past experience the stronger the argument. But there is no simple ratio between that number and the probability of the conclusion.

23.b: Variety of the Instances in the Premises:

The more dissimilar the instances mentioned only in the premises of the analogical argument, the stronger is the argument.

23.c: Number of Similar Respects:

The greater the number of respects in which the entity in the conclusion is similar to the entities in the premises, the more probable is that conclusion.

23.d: Relevance:

Respects add to the force of the argument when they are relevant (as style of shoe, and price and material surely are) and a single highly relevant factor contributes more to the argument than a host of irrelevant similarities.

23.e: Dis-analogies:

Dis-analogies weaken analogical argument. The dissimilarity it may provide is more likely to have been provided by earlier instances, in which case it will add little or nothing to the protection of the conclusion from damaging dis-analogies.

23.f.: Claim that the Conclusion Makes:

The more modest the claim, the less burden is placed of the premises and the stronger the argument; the bolder the claim, the greater is the burden on the premises and the weaker the argument.

Sub Unit – 4
Venn Diagram

24. Concept of Venn Diagram

Categorical proposition are the building blocks of arguments and our aim throughout is to analyse and evaluate argument. To do this we must be able to diagram and symbolize the A, E, I and O propositions. Boolean interpretation of categorical propositions named after George Boole an English mathematician whose contributions to logical theory played a key role in the later development of the modern computer. There are two interpretations of categorical propositions the Aristotelian, which is traditional and the Boolean, which is modern.

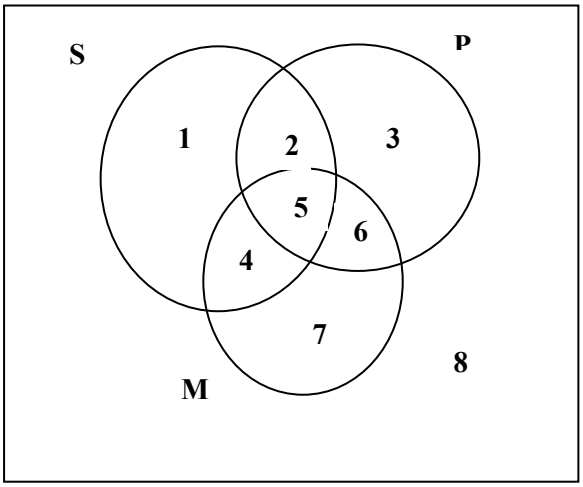
The Boolean interpretation of categorical propositions depends heavily on the notion of an empty class. It is convenient to have a special symbol to represent it. The zero symbol, 'O' is used for this purpose. To say that the class designated by the term S has not members, we write an equals sign between S and O. Thus the equation S = 0 says that there are no S or that S has no members.

To say the class designated by S does have members is to deny that S is empty. To assert that there are S is to deny the propositions symbolized by S = 0. We symbolize that denied by drawing a slating line through the equals sign. Thus the inequality S ≠ 0 says that there are S by denying that S is empty.

❖ **Symbol of Categorical Proposition:**

FORM	PROPOSITION	SYMBOL	EXPLANATION
A	All S is P	$S\bar{P} = 0$	The class of things that are both S and non P is empty.
E	No S is P	SP = 0	S and P is empty.
I	Some S is P	SP ≠ 0	S and P is not empty.
O	Some S is not P	$S\bar{P} \neq 0$	S and not P is not empty.

Venn Diagram



1= s

2= sp

3= p

4= sm

5= spm

6=mp

7=m

25. Various Types of Venn Diagram

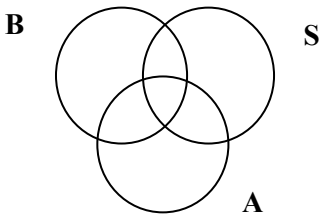
25.a. If the three items are partly related to each other, then they are represented as shown example.

Boys, Students and Athletes

B = Boys

S = Students

A = Athletes



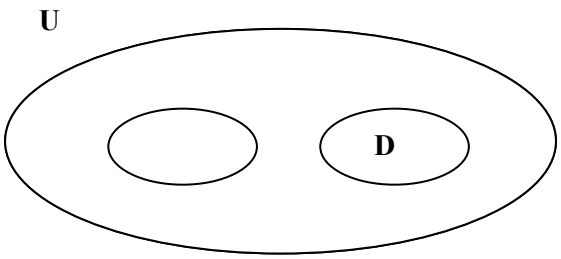
Here some Boys are students and vice-versa; some boys may be athletes and vice-versa. Some students may be athletes and vice-versa.

25.b. It two different items are completely related to third item, they will be shown as example.

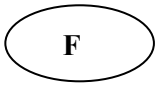
University, Formal classroom education and Distance education

U = University

F = Formal Classroom



D = Distance Education



Here two small circle represent formal classroom education and Distance education which is include the big circle University.

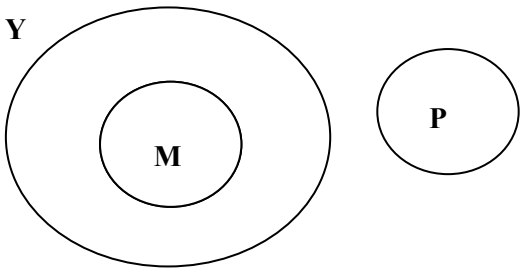
25.c. Two items are related to each other completely and third item is entirely different from first two. Example

Men, Plants and Morality

Y = Morality

M = Men

P = Plants



Here, All the men are morality but no plants are morality or Men.

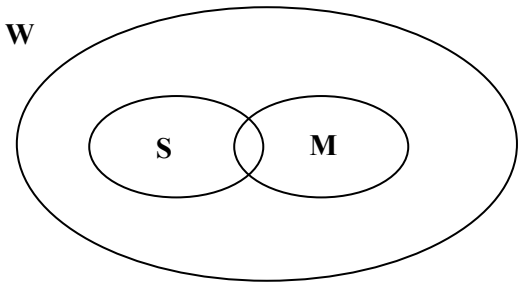
25.d. If two items belong to the class of the third such that some items of each of these two groups are common in relationship, then they are represented by two intersecting circles enclosed within a bigger circle. Example

Women, Sister and Mother

W = Women

S = Sister

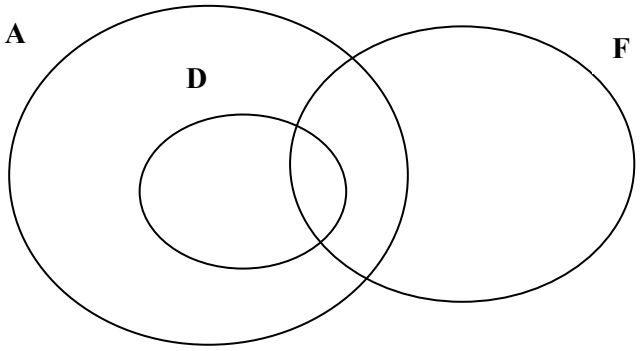
M = Mother



Here, some sister may be mother and vice-versa. Similarly some mothers may not be sisters and vice-versa. But all the mothers belong to women group.

25.e. If one item belongs to the class of second and the third item is partly related to these two, then they are represented as shown example

Dogs, Animals and Flesh eaters



D = Dogs

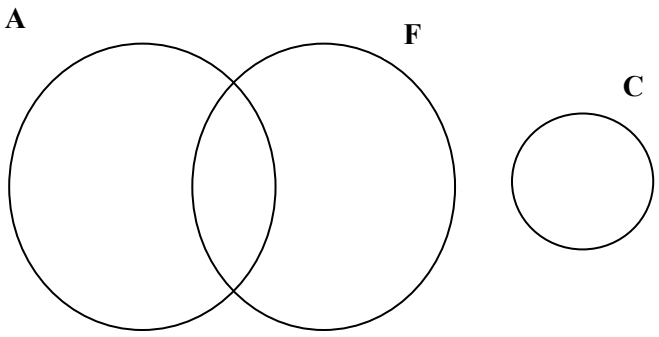
A = Animals

F = Flesh-eaters

Here, all the dogs are belonging to animals but some dogs are flesh eater but not all.

25.f. First item is partly related to second but third is entirely different from the first two.

Dogs, Cow and Flesh eaters



D = Dogs

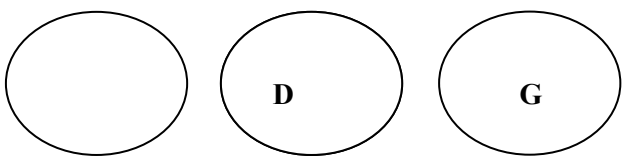
C = Cow

F = Flesh-eaters

Here, some dogs flesh-eaters but not all while any dog or any flesh eater cannot be cow.

25.g. If the items evidently belong to three different groups, the venn diagram representing these elements shall have the following pattern. Exam

Men, Dogs and God



M = Men

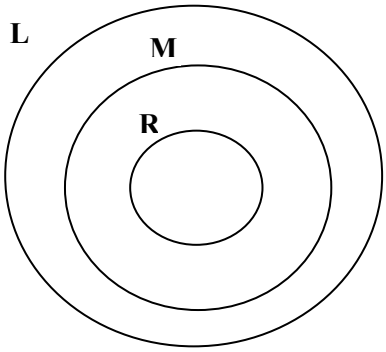
M **M** D = Dog

G = God

Here, men, Dogs and God different to each other.

25.h. If the first word is related to second word and second word is related to third word. Then they will be shown by diagram as given below.

Ram, Men and Mortal



R = Ram

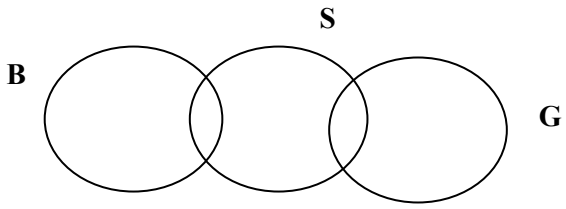
M = Men

L = Mortal

Here, Ram included all men. All men included all mortals.

25.i. If two items are partly related to their and are themselves independent to each other they are represented by three intersecting circles. Exam

Boys, Students and Girls



B = Boys

S = Students

G = Girls

Here, the boys and girl are different items while some boys may be students. Similarly among girls some may be students.

Sub Unit – 5
Indian Logic

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26. Concept of Indian Logic

Indian philosophy is essentially spiritual. Philosophy and religious are intimately connected with each other in India. Philosophy is the theory of the reality. It is an insight into the nature of the reality which leads to liberation. So, Philosophy is called Darsan which means vision. Philosophy is the vision of the reality as a whole. It is an insight into the nature of the whole reality.

Indian Philosophy is based on logical reason subordinate to the authority of the Vedas, which are believed to embody the intuitions of seers of truth. The authority of the Vedas is that of intuition. Logical reason is subordinate to intuition. So Indian Philosophy is based on rational speculation in harmony with the Vedas, and consciously aims at achieving the highest perfection attainable in human life.

Indian logic is the most important part of Indian Philosophy. Basically it is included in Epistemology.

27. Prama

The Nyaya epistemology deals with the nature of valid knowledge (prama). Prama is a valid knowledge. The knower is a pramata and the known object is pramaye. Valid knowledge constitutes the reality. The self is the knower. Prameya is the object that is known. Pramiti is the valid knowledge of an object. The knowledge which corresponds with the real nature of its object as valid (prama) and what does not correspond with its real character as in valid (aprama). Prama are four type i.e. Pratyaksha, Anumiti, Upamiti and Shabda bodh.

28. Pramanas

The Nyaya epistemology deals with the nature of valid knowledge, its instruments (Pramana). Pramana is the instrument by means of which the self knows an object. Pramana is the collocation of conditions which is the immediate antecedent of the production of valid knowledge. There are four pramanas i.e. Perception (Pratyaksha), Inference (Anumana), Comparison (Upamana) and Testimony (Shabda) which generate different kinds of valid

knowledge. The self and an object are presupposed by a pramana. It is and instrument (karana) of the self by which it knows an object on which a pramana operates. Knowledge cannot by specified by the self or an object. Pramana is the complement of condition other than the self and an object which immediattly produce valid knowledge which is undoubted and in harmony with the real nature of its object.

29. Pramanas Accept in Various Indian School

Indian Philosophy is not dogmatic and uncritical. Every system of philosophy is based on epistemology or theory of knowledge. The Carvaka recognizes perception only as a means of valid knowledge (pramana). The Bauddha recognizes perception and inference as pramanas. The Vaisesika also holds the same view. The Samkhya recognizes perception, inference and testimony as pramanas. The Nyaya recognizes perception, inference, comparison and testimony as pramanas. Prabhakara (Mimansa) recognizes perception, inference, comparison, testimony and presumption as pramanas. Kumaril (Mimansa) and the Advaita Vedanta recognize perception (pratyaksa), Inference (anumana), Comparison (upamana), Testimony (sabda), Presumption (arthapatti) and Non-apprehension (anupalabdhi) as pramanas. They discuss the nature, objects conditions and grounds of valid knowledge. Inference is a chief means of valid knowledge.

Indian Philosophy has nine schools. They are accepts various pramanas.

SL. No.	School Name	Pramana
1	Carvaka	Perception (Pratyaksha)
2	Bauddha	Perception (Pratyaksha) and Inference (Anumana)
3	Vaisesika	Perception (Pratyaksha) and Inference (Anumana)
4	Jaina	Perception (Pratyaksha), Inference (Anumana) and Testimoney (Sabda)
5	Samkhya	Perception (Pratyaksha), Inference (Anumana) and Testimoney (Sabda)
6	Yoga	Perception (Pratyaksha), Inference (Anumana) and Testimoney (Sabda)
7	Nyaya	Perception (Pratyaksha), Inference (Anumana), Testimoney (Sabda) and Comparison (Upamana)
8	Mimamsa	Perception (Pratyaksha), Inference (Anumana), Testimoney (Sabda), Comparison (Upamana), Presumption (arthapatti) and Non-Apprehension (Anupalabdhi)
9	Vedanta	Perception (Pratyaksha), Inference (Anumana), Testimoney (Sabda), Comparison (Upamana), Presumption (arthapatti) and Non-Apprehension (Anupalabdhi)

Sub Unit – 6
Pramanas

30. Concept of Pramana

Pramana is defined a valid means of knowledge. It is also referred as a source of knowing valid knowledge. Nyaya believe in four pramanas: perception, inference, comparison and testimony. Knowledge may be valid or invalid. Valid knowledge is defined as the right apprehension of an object. Pramana are six types. They are Perception, Inference, Comparison, Verbal testimony, Implication, Non-apprehension.

31. Pratyaksha (Perception)

Gautam defines perception as the knowledge which is produced by the intercourse of an object with a sense-organ, indefinable, determinate and in harmony with its object. It is produced by the intercourse of a present object with the external sense-organs, conjunction of them with manas, and its conjunction with the self. The sense-organ is directed by manas which are directed by the self. Conjunction of the sense-organ with manas and conjunction of manas with the self are the general cause of perception. The intercourse of a sense organ with an object is a special cause of perception. Perception is generated by it, and not revealed. It is the immediate knowledge of a present object through a sense organ. Valid perception apprehends the real character of an object. Illusion does not apprehend the real nature of its object. Perception is different from inference, comparison and testimony which is not produced of a jar is produced by its conjunction with the visual organ which is in the nature of light. Auditory perception of the colour of a jar is produced by the conjunction of the visual organ with the jar in which colour inheres. It is due to united inherence. The manas is an internal organ. Perception of pleasure, pain, desire, aversion, volition and cognition is produced by the manas in conjunction with the self.

- The two stage in Pratyaksa - Indetermination or Nirvikalpa and Determination or Savikalpa.
- The two kind of Pratyaksa - Ordinary or Laukika and Extraordinary or Alaukika

32. Anumana (Inference)

Inference is mediate knowledge of an object (e.g. a fire) derived through the medium of the knowledge of a mark (e.g. a smoke) by virtue of the relation of invariable concomitance

between them. It depends upon the perception of a mark and the recollection of invariable concomitance. First, there is the perception of a mark (Linga), reason (hetu) or prbans (e. g. a smoke) in a subject (e.g. a hill). Secondly, there is the recollection of invariable concomitance of the reason with a predicate, probandum (sadhya) or inferable object (e.g. a fire). Thirdly there is the inference of the existence of an unperceived object or predicate (e.g. a fire) in the subject (paksa e.g. the hill). This is inference for oneself. This is the analysis of the psychological processes of inference. Inference is mediate knowledge while perception is immediate knowledge. Perception apprehends present and near object while inference apprehends past, future and remote objects as well as present and near object. Perception does not depend upon the knowledge of Vyapti. But inference is based upon it without which it is not possible. There is no scope for inference where we can have perception. Inference is called anumana because it is a kind of knowledge.

Bassically Inference is of two kind ---

a. Inference for Oneself (svathanumana)

b. Inference for other (parathanumana)

33. Upamana (Comparison)

The third kind of valid cognition is upamiti and its means is called upamana. It is knowledge derived from comparison and roughly corresponds to analogy. It has been defined as the knowledge of the relation between a word and its denotation. It is produced by the knowledge of resemblance or similarity. For example a man who has never seen a gmaya or a wild cow and does not know what it is told by a person that a wild cow is an animal like a cow, subsequently comes across a wild cow in a forest and recognizes it as the wild cow, then his knowledge is due to upamana. He has heard the word 'gavaya' and has been told that it is like a low and now he himself sees the object denoted by the word 'gavaya' and recognises it to be so. Hence upamana is just the knowledge of the relation between a name and the object denoted by that name. It is produced by the knowledge of similarity because a man recognizes a wild cow as a 'gavaya' when he perceives its similarity to the cow and remembers the description that 'a gavaya is an animal like a cow'.

34. Sabda (Testimony)

It is regarded as a valid source of knowledge. It is also regarded as the fourth kind of valid knowledge. It is referred as the statement of a trustworthy person. In consists only in

understanding its meaning. A sentence is regarded as a collection of words. A word is defined as that which has the power to convey its meaning. Testimony is regarded as personal. It is also based on the words of a trustworthy person, human or divine. Vaidika and secular are regarded as two kinds of testimony. The Vaidika manas perfect and infallible testimony. It means the words which comes only in the vedas. The Vedas are regarded as the words, which are spoken by God only. Laukika means secular testimony. It is regarded as the words of human beings. These words are always liable to error. A word is a potent symbol which signifies an object and a sentence in order to be intelligible must conform to certain conditions. These conditions are four i. e. akanksa, yogyata, sannidhi and tatparya.

35. Arthapatti (Implication)

Arthapatti Is an independent means of valid knowledge. It is presumption or postulation or implication. It is the assumption of an unperceived fact in order to reconcile two apparently in consistent perceived facts. If Devadatta is alive and he is not in his house, we presume that he is elsewhere. 'Being alive' and 'not being in the house' are two perceived facts which appear to be inconsistent. Their apparent inconsistency is removed when we presume the fact to 'being elsewhere'. If Devadatta is fact and he does not eat during day. we presume that he must be eating during night, otherwise the inconsistency between 'being fat' and 'not eating during day' con not be explained.

36. Anupalabdhi (Non-apprehension)

Anupalabdhi Is an independent ontological category. Anupalabdhi is known either by perception or by inference according as the correlate of negation is a subject of perception or of inference. Anupalabdhi is another name is negation. The same sense organ which perceives any object perceives its nonexistence also, and the same inference which infers the existence of any object infers its non-existence also.

Sub Unit – 7
Structure and Kinds of Anumana, Vyapti and Hetvabhasas

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37. Structure of Anuman

Anumana is the second kind of pramana. It means an inferential knowledge. It has three terms ---

a. Paksa

b. Sadhya

c. Hetu

37. a. Paksa:

Paksa is referred the minor term. The inference of the existence of an unperceived object or predicate (e. g. a fire) in the subject (paksa) e. g. the hill ... is called Paksa.

37.b. Sadhya:

Sadhya is referred the major term. The recollection of invariable concomitance of the reason with a predicate, probandum (sadhya) or inferable object (e.g. a fire) ... is called sadhya.

37.c. Hetu:

Sadhya is referred the middle term the perception of a mark (linga), reason (hetu) or Prabans (e.g. a smoke) in a subject ....is called Hetu.

38. Kind of Anumana

Anumana is various kinds. They are

38.a. Svarthanumana:

It is a psychological process which does not require the format statement of its different members. A person knows the invariable concomitance of smoke with fire by repeated observation. He perceives smoke in a hill and doubts that a fire may exist there. Then he remember the invariable concomitance of smoke with fire. 'whatever is smoky is fiery. from this he infers that the hill has a fire.' This is the psychological analysis of inference for oneself.

38.b. Parathanumana:

It is intended for convincing other. It is a demonstrative inference which consists of the following five members

The hill is fiery (Pratijna)

1. Because it is smoky (Hetu)
2. Whatever is smoky is fiery, for example, a kitchen (Udaharana)
3. The hill has smoke which is invariably accompanied by fire (Upanaya)
4. The hill is fiery (Nigamana)

38.c. Purvavat Anumana:

A purvavat inference is the inference of an unperceived effect from a perceived cause. A future rainfall is inferred from dense clouds which are perceived.

38.d. Sesavat Anumana:

A sesavat inference is the inference of an unperceived cause from a perceived effect. A past rainfall in the source of a river is inferred from its fullness, muddiness of water and swiftness of current which are perceived.

38.e. Samanyatodrsta Anumana:

It is the inference of an imperceptible object from a perceived mark which is known to be uniformly related to it. The movement of the sum is inferred from its different positions in the sky which are perceived even as the movement of a person is inferred from his different positions on earth.

38.f. Anvay:

Anvayi is an inference in which the reason (hetu) exists in the subject (paksa) and similar instances (sapaksa) but which is devoid of dissimilar instance (vipaksa).

Example: Sound is non-eternal because it is produced.

38. g. Vyatireki:

It is an inference in which the reason exists in the subject but does not exist in dissimilar instances there being no similar instances.

Example: This living body is not devoid of a soul because then it would be devoid of life.

38. h. Anvaya-vyatireki:

It is an inference in which the reason exists in the subject and similar instance but does not exist in dissimilar instances. 'Sound is non- eternal because it is perceptible through our sense organ being possessed of a higher genus and a lower genus.

39. Concept of Vyapti

Vyapti imples a correlation between two factors of which one is pervaded (Vyapta) and other pervades (vyapaka). The Nyaya method of induction or generalization may be analysed into five steps. These are anavaya, vyatireka, vyabhicharagraha, upadhinirasa, tarka and samanyalaksna perception respectively.

Anavaya is when a relation of agreement between two things is in absence. Vyabhichargraha is when we do not observe any contrary instance in which one of them is present without the other. Upadinirasa is the elimination of upadhis or conditions on which the relation may possible be dependent. Tarka and samanyalaksana perception have their literal meaning about which we have discussed earlier. Therefore vyapti is an invariable the middle and the major term.

40. Types of Vyapti

Basically vyapti is two types namely samavyapti and Asamavyapti or Visamavyapti. But some thinker thought vaypti is more type.

40.a. Sama Vyapti:

A vypti between two terms of equal extension concomitance, so that we may infer wither of them from the other. e. g. whatever is nameable is knowable and vice-versa.

40.b. Asama Vyapti:

It is relation of non-equipollent concomitance between two terms from one of which we may infer the other but not vice-versa. We may infer fire from smoke but no smoke from fire.

41. Concept of Hetvabhasas

In Indian logic a fallacy is called hetvabhasa. It means that middle term appears to be a reason but is not a valid reason. All fallacies are material fallacies. We have mentioned the five

characteristics of a valid middle term. When these are violated se have fallacies five kinds of fallacies are recognized.

41.a. Savyabhichara or Anaikantika:

This is the fallacy of the irregular middle. It is of three kinds.

41.a.1. Sadharana:

Here the middle term is too wide. It is present in both the sapaksa (positive) and the Vipaksa (negative) instances and violates the rule that the middle should not be present in the negative instance (vipaksattva);

e.g. 'the hill has fire because it is knowable'. Here 'knowable' is present in fiery as well as non-fiery objects.

41.a.2. Asadharana:

Here the middle term is too narrow. It is present only in the paska and neither in the sapaksa not in the vipaksa. It violates the rule that the middle term should be present in the sapaksa (sapaksasattva).

e.g. 'Sound is eternal, because it is audible'. Here 'audubility' belongs to sound only and is present nowhere else.

41.a.3. Anupasamhari:

Here the middle term is non-exclusive. The minor term is all-inclusive and leaves nothing by many of sapaksa or vipaka.

e.g. 'all things are non-eternal because they are knowable'

41.b. Asiddha or Sashyasama:

This is the fallacy of the unproved middle. The middle term must be present in the minor term (paksadhasmata). If it is not, it is unproved. It is of three kinds.

41.b.1. Ashrayasiddha:

The minor term is the locus of the middle term. If the minor term is unreal the middle term cannot be present in it.

e.g. ' the sky-lotus is fragrant because it is a lotus, like the lotus of a lake.

41.b.2. Svarupasiddha:

Here the minor term is not unreal. But the minor term.

e.g. 'Sound is a quality because it is visible.' Here visibility cannot belong to sound which is audible.

41.b.3. Vyapyatvasiddha:

Here vyapti is conditional (sopadhika). We cannot say e. g. ' wherever there is fire there is smoke. Fire smokes only when it is associated with wet fuel. A red-hot iron ball or clear firre does not smoke. Hence 'association with we fuel' is a condition necessary to the aforesaida vyapti. Being conditioned, there middle term becomes fallacious if we say 'The hill has smoke because it has fire'.

41.c. Satpratipaksa:

Here the middle term is contradicted by another middle term. The reason is counter-balanced by another reason. And both are of equal force; e. g. 'Sound is eternal because it is audible and 'sound' is non-eternal because it is produced'. Here 'audible' is counter balanced by 'produced' and both are of equal force.

41.d. Badhita:

It is the non-inferentially contradicted middle. Here the middle term is contradicted by some there pramana and not by inference. It cannot prove the major term which is disproved by another stronger source of valid knowledge; e.g. 'fire is cold because it is a substance.' Here the middle term 'substance' is directly contradicted by perception.

41.e. Viruddha:

It is the contradictory middle. The middle term, instead of being pervaded by the presence of the major term, is prevaded by the absence of the major term in the minor term. it proves its non-existence therin e. g. 'Sound is eternal because it is produced'. Here 'produced' instead of proving the eternality of sound, proves its non-eternality.