

Swami Ramanand Teerth Marathwada University, Nanded.
B.A.(Three years Degree Course)
Subject : Logic & Methodology of Science

Objectives :

Logic is a basic discipline which enables us to enrich and encourage our rational power. Students are expected to frame and express logically correct reasoning. Logic is the study of the methods and principles used to distinguish good (valid) from bad (invalid) reasoning. The course aims to acquaint students with various techniques to identify validity and invalidity of arguments and the basic rules as how to avoid fallacies in inductive and deductive arguments. For this a systematic study of logic as a basic science of reasoning and inferences is essential at the undergraduate level. The objectives of the course is enable the students :

- a) To understand fundamental terms, definitions, concepts, principles, theories etc of logic.
- b) To get acquainted with inductive and deductive (traditional) logic.
- c) To understand modern logic as the study of inference.
- d) To differentiate various forms of statements and arguments.
- e) To apply techniques to arguments.
- f) To understand how logic is concern with scientific method.
- g) To get acquainted with the methodology of natural and social sciences.
- h) To develop an ability of logical thinking.
- i) To develop interest in Traditional logic, inductive logic, propositional logic, predicate logic, Advanced modern logic and methodology in natural and social sciences.

The course is divided in six semesters for undergraduate level.

Syllabus of B.A. First Year, With effect from June 2009

Sr.	Paper No.	Semester No.	Title of the paper	External Marks
1)	I	I	Propositional Logic(1)	40
		II	Propositional Logic(1)	40
2)	II	I	Traditional Logic	40
		II	Traditional Logic	40

Note : 40 marks for External assessment & 10 marks for Internal assessment.

B.A. First year
Logic and methodology of Science
Paper I : Propositional Logic(1)
Semester I

1) Logic : Introductory

- a) What is logic.
- b) Definitions of Logic.
- c) Logic as a formal Science.
- d) Normative nature of Logic.
- e) Argument and argument form.
- f) Proposition and propositional form.
- g) Truth and validity.

2) Nature, classification and symbolization of proposition:

- a) Proposition and sentence : Logical form.
- b) Distinction between proposition and sentence.
- c) Modern classification of propositions.
- d) Types of compound propositions : Negative, conjunctive disjunctive, implicative and equivalent propositions.
- e) Symbolizing compound propositions.
- f) Symbolization of arguments.

3) Variables, constants and basic truth tables :

- a) Nature of propositional variables.
- b) Main logical constants : Negation(\sim), Conjunction(\cdot), disjunction – Strong and weak, Implication(\supset) and equivalence (\equiv).
- c) Basic truth tables of Logical constants (logical-connectives)
- d) Relations of truth functional connectives with each other.
- e) Testing validity of arguments by truth table method.

Semester II

1) Truth table method as a decision procedure :

- a) Nature of decision procedure.
- b) Main types of decision procedure.
- c) Truth table method : Nature and structure.
- d) Deciding tautology, contradiction and contingent by truth table method.
- e) Practical examples on Truth table method.
- f) Merits and demerits of Truth table method.

2) Shorter truth table method as decision procedure :

- a) Nature of shorter truth table method.
- b) Basic principles of shorter truth table method.
- c) Technique of S.T.T. method.
- d) Deciding tautology, contradictory and contingent by S.T.T.method.
- e) Examples on shorter truth table method.
- f) Shorter truth table method as reduction-ad-absurdum.
- g) Shorter truth table as trial and error method.

3) Method of deductive demonstration :

- a) Nature of deductive proof.
- b) Two types of Logical rules.
- c) Rules of inference : its symbolic form.
- d) Rules of replacement : its symbolic form.
- e) distinction between rules of inference and rules of replacement.
- f) Proving validity by using rules of inference only.
- g) Practical examples be asked.
- h) Examples on proving validity by Justification.

Books for reading and reference for Semester I & II :-

English

- 1) Symbolic Logic : I.M.Copi and Carl Cohen (Chapter 1, 2 and 3)
- 2) Introduction to logic : I.M.Copi (Relevant chapters only)
- 3) A modern introduction to logic : L.S. Stebbing
- 4) Elements of logic : Stephen Barker.
- 5) The elements of formal Logic : Hughes and Londey
- 6) Introduction to logic : Patric Suppes
- 7) Methods of Logic: W.V.O. Quine
- 8) Elements of modern Logic : Mellone
- 9) Introduction to symbolic Logic : Basson A.H. and O Connor
- 10) Introduction to symbolic logic and its application : Carnap R.
- 11) An introduction to logic and scientific method : Cohen and Nagel
- 12) Formal logic : Its scope and limits : Richard Jeffery (2nd edition chapters 1 to 5)
- 13) Systems of formal Logic : L.H.Hack staff
- 14) Fundamentals of symbolic Logic : Alice Ambrose and Morris Lazerowitz
- 15) First order Logic : Smullyan

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- 19) irhdkRed rdZ kkl=&, d vH; kl % vfouk' k frokjh ¼ jLorh izdk' ku] bykgkckn½
- 20) irhdkRed rdZ kkl= % Jh dnkjukFk frokjh ¼cgkj fglhh xfk vdkneh½
- 21) rdZ kkl= ds fl /nkUr % vfoukFk frokjh ¼ jLorh izdk' ku] bykgkckn½
- 22) rdZ kkl= ifjp; % dnkjukFk frokjh

ejkBs

- 23) rdZ s[kk Hkkx 1 % MKW, l -, l -ckjfyas o MKW, e-i h-ejkBs
- 24) l qe vkdkfjd rdZ kkl= % MKW, l -vkj-dkoGs o MKW, y-Mh-xkGs
- 25) vkdkfjd rdZ kkl= % ik-esi wjxs
- 26) rdzhfi dk % ik- f0g-f0g-vdkydj
- 27) l kdfrd rdZ kkl= o mnxeu % ik-fn-; -ns ki kMs
- 28) rdZ o |k Hkkx 1 % MKWch-vkj-tks kh] ik-, l -f0g-dyd. khZ o ik-b-vkj-eBokys ¼Lokrh izdk' ku] iwkkZ½
- 29) l kekftd ' kkl=krhy l k&f l /nkarkpk Li "Vhdj. kRed dks k % rUoKku & rdZ kkl= % l a knd % MKWch-vkj-tks kh o l gys[kd ik- , l -f0g- dyd. khZ ¼dkMUVubVy izdk' ku] iqkZ½
- 30) l kdfrd rdZ kkl= % ik- fn-; -ns ki kMs] ik- l furh uh-no ¼ kfirLFkG % Jh l kbZukFk izdk' ku] ukxi j½
- 31) rdZ kkl= % ik- ch-dsl koaxhdj
- 32) rUoKku inhi % ik- l ksek/koh dfo
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B.A. First year
Sub :-- Logic and methodology of Science
Paper II – Traditional Logic
Semester I

1) General Nature of Logic :

- a) What is Logic ?
- b) Various definitions of Logic.
- c) Nature of Logic.
- d) Logic as a normative Science.
- e) Scope of Logic : Induction and Deduction.
- f) Means of Knowledge : Direct, Intuitive, Inference and Testimony
- g) Relation of Logic with Philosophy, Psychology, Language, Grammar, Rhetoric and Mathematics.
- h) Utility of Logic.

2) Nature and type of terms :

- a) Elements of Inference : Proposition and terms.
- b) Definition and Nature of term.
- c) Subject and predicate as terms.
- d) connotation and denotation of terms.
- e) Concept and term.
- f) Classification of terms : General and Singular, Concrete and abstract, Relative and absolute, Positive and negative, Collectively used and Distributively used, compatible and Incompatible, Contrary and contradictory.

3) Aristotelian Logic :

- a) Nature of proposition.
- b) Distinction between sentence and proposition.
- c) Traditional Classification of proposition.
- d) Aristotelian classification of proposition (four fold scheme of A,E,I and O propositions.)
- e) Doctrine of distribution of terms in four fold scheme of propositions.
- f) Venn and Euler's diagrams.

Semester II

1) Immediate Inference : Nature and types

- a) Nature and types of deductive inference
- b) Main forms of immediate inferences : Opposition of propositions and Education.
- c) Inference by opposition of proposition : Nature and four opposition forms.
- d) Square of opposition.
- e) Main types of Education.
- f) Conversion and obversion : Nature and Rules
- g) Examples on Conversion and obversion of propositions.
- h) Importance of immediate inference.

2) Mediate Inference : Nature and types

- a) Mediate Inference : Nature and types.
- b) Distinction between Mediate and Immediate inference.
- c) Categorical Syllogism : Nature, Structure, General rules and their proof.
- d) Figure and moods of categorical syllogism.
- e) Direct and Indirect reduction
- f) Hypothetical syllogism : Its nature and types.
- g) Disjunctive syllogism.
- h) Dilemma : Nature, types and rebuttal.

3) Logical Fallacies :

- a) Deductive formal fallacies : Nature and types.
- b) Verbal and Non-verbal fallacies.
- c) Verbal, Indictione : Fallacy of equivocation, Amphiboly, composition, Division, Accent and figure of speech.
- d) Non-verbal, Extra dictione : Fallacy of accident, converse fallacy of accident, Petitio principii, Fallacy of many questions, ignoratio elenchi and its various forms.
- e) Logical fallacies concerning with above mentioned topics No.4 and 5.

Books for reading and reference for Semester I & II :-

- 1) Symbolic Logic : I.M.Copi and Cohen
- 2) Introduction to Logic : I.M.Copi
- 3) An Introduction to deductive Logic : Leblan H
- 4) Modern Introduction to Logic : Stebbing L.S.
- 5) Elements of formal Logic : Hughes and Londey.
- 6) Elements of Logic : Stephen Barker
- 7) Text book of Logic : Wolf

- 8) Introduction to Logic and Scientific method : Cotten and Nagel
- 9) The elements of Logic : Latta and Macbeath.
- 10) General Logic : Eaton R.M.
- 11) Beginning of Logic : Lemmon M.J.
- 12) Deductive form : An elementary Logic : Niedorf R
- 13) Elementary Logic : W.V.O. Quine.
- 14) An Introduction to Logic : Kilgore W.J.
- 15) Deductive Logic and descriptive Logic : Harrison F.R.
- 16) Principles of Logic : Mace C.A.
- 17) Introduction to Logic : Joseph H.W.
- 18) Logic (Three Parts) : Johnson W.E.
- 19) Elementary Logic : Resnik M.
- 20) Logic : Salmon W.C.
- 21) Traditional formal Logic : Sinclair W.A.
- 22) Introduction to Logic : Suppes P
- 23) An Intermediate Logic : Welton and Montlan

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- 24) I jy vxexu rdZ kkl= % i k- v' kkd d e k j o e k z ¼ i z k' k d % e k r h y k y c u k j l h n k l] f n Y y h ½
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- 26) fuxeu rdZ kkl= % i k s d n k j u k f k f r o k j h ¼ i z k' k d % e k r h y k y c u k j l h n k l] f n Y y h ½
- 27) I jy fuxeu rdZ kkl= ¼ i k' p k R; v l s H k k j r h; ½ % v' k k d d e k j o e k z ¼ i z k' k d % e k r h y k y c u k j l h n k l] f n Y y h ½
- 28) rdZ kkl= d h : i j s [k k % M k W c n h u k f k f l g , o a ¼ d e ½ v a t u k f l g ¼ v k' k k i z k' k u] o k j k . k l h ½
- 29) r d j s [k k % M k W , l - , l - c k j f y a s ¼ i z k' k d % j k t L F k k u f g a n h x f k v d k n e h] t ; i j ½

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- 30) r d j s [k k H k k x 1 % M k W , l - , l - c k j f y a s o M k W , e - i h - e j k B s
- 31) l q e v k d k f j d r d Z k k l = % M k W , l - v k j - d k o G s o M k W , y - M h - x k G s
- 32) v k d k f j d r d Z k k l = % i k - e s i e j s x s
- 33) r d h h f i d k % i k - f 0 g - f 0 g - v d k s y d j
- 34) r d Z k k l = ¼ f u x e u ½ % i k - J h f u o k l n h f { k r
- 35) r d Z k k l = i d s k % i k - g Y ; k G d j o i k - d k G s
- 36) r d e f t j h % i k - f 0 g - f 0 g - v d k s y d j
- 37) r d Z k k l = ¼ f u x e u ½ % i k - n s n - o k M d j o i k - y - c - g j k y h d j
- 38) l k d f r d r d Z k k l = o m n x e u % i k - f n - ; - n s k i k k l s
- 39) r d f o | k H k k x 1 % M k W c h - v k j - t k s k h] i k - , l - f 0 g - d y d . k h z o i k - b z - v k j - e B o k y s ¼ L o k r h i z k' k u] i w k k z 2
- 40) r d f o | k H k k x 2 % M k W c h - v k j - t k s k h] i k - , l - f 0 g - d y d . k h z o i k - b z - v k j - e B o k y s ¼ L o k r h i z k' k u] i w k k z 2
- 41) r d Z k k l = % i k - c h - d s l k o a x h d j
- 42) l k e k f t d ' k k l = k r h y l k k f l / n k r k p k l i " V h d j . k k R e d d k s k r u o K k u & r d Z k k l = % l a k n d % M k W c h - v k j - t k s k h] l g y s [k d % i k - , l - f 0 g - d y d . k h z ¼ d k W u s V y i z k' k u] i q k s 2
- 43) r u o K k u i n h i % i k - l k s e k / k o h d f o
- 44) l q e r d f o p k j % i k - e k / k o h d f o] i k - b z - v k j - e B o k y s ¼ f o | k i z k' k u] u k x i j ½

45) rdZ KL= % i k-ch-tt-drdj