This file contains a transcription of the translation by Aloys Sprenger of *Al-Risāla al-Shamsiyya*, a logic textbook by Najm al-Dīn 'Umar al-Qazwīnī al-Kātibī, who died in 1276.

Sprenger's translation was published in his *First Appendix to the Dictionary of Technical Terms used in the Sciences of the Mussalmans, containing the Logic of the Arabians*, Bengal Military Orphan Press, Calcutta 1854. I have left out Sprenger's footnotes. Sprenger himself leaves out some sections on modal logic; Nicholas Rescher published a translation of this missing part as an appendix to his *Temporal Modalities in Arabic Logic*, Reidel, Dordrecht 1967, pp. 39–45.

Sprenger's numbering of the sections is slightly different from the numbering of the Arabic text, which is in the same book as his translation.

There is some discussion of this text in Tony Street, 'Logic', in *The Cambridge Companion to Arabic Philosophy*, ed. Peter Adamson and Richard C. Taylor, Cambridge University Press, Cambridge 2005, pp. 247–265.

Wilfrid Hodges, December 2007

The Logic of the Arabians

§1. Praise be to God, who has created the system of the universe, who has produced the essences of things in conformity with their existence, who has made by His omnipotence the different species of mental substances (*i.e.* logoi or demiurgs), and who, in His bounty, has given motion to the heavenly bodies.

Blessings be upon those noble and holy essences (inspired persons) who are pure from human defilement, more particularly upon Mohammad, the doer of signs and miracles, and upon his family and his companions who followed him [and thereby became] his argument and demonstration.

§2. Whereas, agreeably to the opinion of all men of mind and liberal education, the sciences, more particularly the positive sciences, are the highest pursuits in life, and whereas the professors thereof are the most noble among human beings, their minds being sooner prepared to be absorbed into the angelic minds (that is to say, the demiurgs or logoi), and farther, whereas it is impossible to comprehend the subtilties of sciences and to preserve the acme of their verities except by the assistance of the science which is called Logic, and which teaches us how to discern between what is correct and erroneous, Shams aldyn Mohammad, a son of the Wazyr Bahá aldyn Mohammad, has desired me to write a book, which shall comprize the principles of Logic, and contain its fundamental doctrines and rules. Ready to follow his directions, I began to write a book on Logic, making it a rule not to omit any thing that belongs to it. I made some beautiful original additions and acute observations, avoided mere compilation and followed plain truths, which will never be controverted. I gave it the name of *Risálah Shamsyyah on the Principles of Logic*, and divided it into an Introduction, three Books and a Conclusion. My reliance is in God.

INTRODUCTION.
It contains two inquiries:

First Inquiry.
On what Logic is and its utility.

§3. Knowledge is either apprehension, and nothing further or apprehension together with judgment. Apprehension is the perception of the image of a thing in the mind. Judgment means referring (literally leaning) one thing to another /2/ affirmatively or negatively. The whole [apprehension and a judgment combined] is called declaration.

§4. Neither is the whole of either of these two things entirely intuitive, else there would be nothing we do not know; nor entirely deductive, else our reasoning would be a circle, or an [interminable] chain.

§5. Part of each is intuitive, and part is deductive, and the result of reasoning, *i.e.* of such an arrangement of known things [in the mind] that they lead to [the knowledge of] unknown things. But this arrangement is not always correct, for some thinkers contradict others as regards the results of their reasonings, nay the same person contradicts himself at different times; therefore a canon (a code of rules) is required, acquainting us with the ways of deriving deductive knowledge from self-/3/evident [knowledge], and marking the boundaries between sound and bad reasoning. This canon is Logic. It is described as the canonic organon, (*i.e.* an instrument consisting of rules), the observance of which guards our intellect from error in reasoning.

Logic is neither entirely intuitive, else there would be no need for learning it, not is it entirely deductive, else it would be a circle or [interminable] chain, but some [of its doctrines] are intuitive and others are deductive, and founded upon the intuitive ones.

Second Inquiry.
On the Subject of Logic.

§6. The subjects of a Science are those of its accidents which are inquired into, whether they belong to it immediately, that is to say, belong to its essence, or whether they belong to its parts or whether they belong to it [mediately, but are] co-extensive. The subjects of Logic are apprehensional and declarative notions, for the Logician inquires into them so far as they lead to unknown apprehensional or declarative [notions], and in

so far as there rests upon them that which leads to apprehension; he inquires, for instance, whether [such apprehensions as lead to other apprehensions] are universals, particulars, essentials, accidents, genera, species, or differences—and in so far as there rests upon them that which leads to declaration (assertion) whether it rests upon them proximately—they (the declarations which lead to other declarations) being, for instance, propositions or conversions of propositions, or contradictories of propositions; or remotely—they being, for instance, subjects and predicates.

§7. It is usual to call that which leads to apprehension *oratio explicans* [or mo'arrif "*definiens*"]; and that which leads to declaration, argument. It behoves us to premit the former to the latter in our system, because apprehension precedes declaration in nature, inasmuch as every declaration must contain [firstly] the apprehension of the subject itself, or of an assertion regarding it; and [secondly either the apprehension itself of the thing] whereby the judgment is formed, /4/ (predicate), or an assertion regarding it; and [thirdly] the judgment, for judgment is impossible if one of these (three) things [subject or predicate or judgment] is unknown.

FIRST BOOK.
It contains three Sections:
First Section.
On Words.

§8. That a word is the indication of a meaning (idea), by reason of [its] appointment for it (so as to represent that idea), is [called] coincidence, as, for instance, that "*homo*" is the indication of (is used to express the idea of) "rational animal." [That a word is the indication of an idea] by reason of its appointment for that in which it (the idea) is included is [called] implication, as for instance, that "*homo*" is an indication of an animal. [That a word is the indication of an idea] by reason of its appointment for that to which it (the idea) is external is [called] *nexus*; for instance, that "*homo*" is an indication of "capable of instruction" and of "acquiring the art of writing".

§9. It is necessary in the indication *per nexum* that the external thing be in such a condition that the apprehension thereof adhere in the intellect /5/ to the apprehension of the thing named, if this be not the case the word will not convey the meaning thereof. But it is not necessary that it be in such a condition that its actual existence be connected with the actual

existence of the thing named. For instance the word "blind" is (*per nexum*) the indication of sight, yet these two things are not connected in their actual existence.

§10. Coincidence does not (always) comprize implication, as, for instance, in indivisibles (*i.e.* things the quiddity of which is not composed of parts see notes 18, 19 and 27) and it may or may not comprize *nexus*; this is uncertain, for it is not known whether there exists an *adherens* (inseparable property) of every essence, the apprehension of which is connected with the apprehension of that essence. [The opinion of Imám Rázy] that the apprehension of every essence comprizes [*per nexum* at least if nothing else,] the apprehension that it is [that essence and] no other, is not admissible. From this it is clear that implication does not comprize *nexus*, they, in fact, are (only) found along with coincidence, for the *sequens* cannot possibly exist as *sequens* without something of which it is the *sequens*.

§11. If any part of the (term which is) *indicans* by coincidence, is intended to indicate a part of the total meaning, it (the term) is [called] complex, as a thrower of stones, else it is [called] simple. If the simple word is not by itself fit to be a predicable, it is [called] a tool (syncategorematic), as "in" and "not," and if it is fit to be a predicable, and indicates by its form one of the three times, it is a verb, else it is a noun.

§12. A noun has either one meaning or more than one. In the first case if it individuates that meaning it is called a proper-name, else (there are two cases possible: firstly), if its conceivable (literally intellective) and real individua are [all] equally represented by it, it is called univocal (literally agreeing, consentient,) as "*homo*," "sun;" [secondly,] if it applies to some of the individua] more forcibly, and in preference to others, it is called doubtful as existence in reference to the being which exists of necessity (God), and the beings of contingent existence (the creation.) In the second case, [if a noun has many meanings] it may be, by appointment, equally applicable to those several meanings, like spring [the spring of a clock, a spring of water],—in this case it is called equivocal: or it may have been appointed for one meaning and then have been transferred to a second. If the original meaning has become obsolete the noun is called a transferred word, it depends whether it has been transferred by common usage /6/ [as the word "omnibus"] or as a law term, or as a term of science; in the first case it is called "a conventionally transferred (word)," in the second "a juristically transferred (word)," and in the third "a technically transferred (word)." If

a word has not quitted its original subject (lost its original meaning), it is called, in relation to it, proper, and in relation (to the signification) to which it has been transferred, trop. Example, lion, in reference to the animal of that name and in reference to a brave man.

§13. A word is in reference to another word synonymous (literally riding on the same camel, one behind the other,) with it if they agree in meaning, and heteronymous (literally distinct) if they differ in meaning.

§14. A compound (*oratio*) is either complete, that is to say, it has a sense by itself (literally, silence after it is admissible) or incomplete. If a complete compound predicates something true or false, it is called information or proposition, and if it does not predicate any thing it is called interjection. If an interjection has by appointment the meaning of a request that a thing be done, and if (it be uttered) with an authoritative voice, it is an order (or an imperative) as, beat thou! if (it be uttered) in a humble voice it is a question or prayer, and if in a middling voice, a request. If it has not the meaning of a request that a thing be done, it is a warning (exclamation) expressive of whining, or weeping, or wondering, or exclaiming, or swearing. If a compound is not complete, it is either a limitation as "rational animal," or it is not a limitation, as if it consist of a noun and a tool, or of a verb and a tool (adverb).

Second Section.
On Simple Meanings (Predicables).

§15. A notion is particular (singular) if the apprehension thereof of itself excludes the taking place of association, and it is universal (common), if it does not exclude association. The terms indicating these two things are called particular and universal respectively.

§16. An universal [notion] is either the whole of the quiddity of the particulars under it, or is included in it (*i.e.* is part of it), or is external, [but joined] to it. The first is called species, whether it contains many individua [or only one, in the former case] it is said in answer to [the question], "what is it?" in regard both to association *and* peculiarity as *homo*, [in the latter case] if it does not contain several individua it is said in answer to [the question] "what is it," in regard to its peculiarity only, as "sun." Species is therefore an universal, which is /7/ said of one or several things which agree in their verities in answer to [the question] "what is it."

§17. In the second case [if the universal is part of the quiddity it must be one of two things, either a genus of the quiddity or its difference], it is called a genus if the universal is the totality of that part [of the quiddity] which is common to the quiddity and to another species. It is said in answer to [the question] "what is it?" in regard to association only. Genus is described as a universal, which is said of many things differing in their verities, in answer to [the question] "what is it."

§18. /8/ The genus is called near, if the answer [to the question] regarding a [given] quiddity and regarding certain [other species] which are associated with it under that genus is the immediate answer regarding that quiddity, and regarding *all* [the species] which are associated with the said quiddity, under the same genus, as animal in reference to man.

The genus is called remote, if the answer [to the question] regarding the quiddity and regarding certain [other species] which are associated with it under that genus, is different from the answer regarding the quiddity, and those other [species mentioned above as coming under the near genus]. If the genus is remote by one degree, two answers can be given, as living being in reference to man; and if it is remote by two degrees, three answers can be given, as body in reference to man; and if it is remote by three degrees, four answers can be given, as substance in reference to man, etc.

§19. If it (the universal notion) is not (or does not comprehend) the totality of that part [of the quiddity], which is common to it (the quiddity) and to another species [*i.e.* if it is not a genus, one of two things must be the case]; either it cannot be common [to both] at all [being peculiar to the quiddity as rational is according to the Arabs to man] or it [is only] a portion of the part which is common to both; although co-extensive therewith. Else (if it were more extensive it would follow that) it must be common to the quiddity and to some other species [not included in the genus] but, agreeably to the above supposition, it must, in reference to such other species, not comprehend the whole part which may be common [to the quiddity and that species], but only a portion of it [and so by assuming that the notion is part of the quiddity of another species we should only rise to a higher branch on the tree of Porphyry]. (This reasoning) does not lead to an [interminable] chain, but to something which is co-extensive with the totality of the part which is common (or genus). This [universal] consequently divides the genus, and whether it distinguish the quiddity from what is associated with it under a genus or under "existence," [which may be considered the *summum genus*] it is [called] difference (literally division).

§20. /10/ Difference is described as a universal predicated of a thing to the question "what thing is it in its substance?" It follows that if a verity is composed of two—or several—co-extensive things, each of these two things is its difference, for it distinguishes it from those things which are associated with it in "existence".

§21. The difference which distinguishes a species from what is associated with it in the genus, is called near (specific), provided it distinguishes it in the near genus *e.g.* "rational" is the difference of "man" [in the subaltern genus "animal," distinguishing it from other animals]. And it is called remote (generic) if it distinguishes a species from what is associated with it in the remote genus, *e.g.* "sensitive" is the difference of "man" [in the remote genus "living being"].

§22. The third [universal is external to the quiddity but joined to it.] If it is inseparable from the essence it is called adherent (property), else it is called separable accident. The adherent adheres to the existence [of a thing], as blackness to the negro, or it adheres to the quiddity, like being even to four. The adherent is [called] evident, if the apprehension of the adherent together with the apprehension of the thing to which it adheres, is sufficient to convince the intellect of the cohesion between the two, as the divisibility of four into two equal parts; and it is [called] not-evident, if a medium is required to convince the intellect of their cohesion, as the equality of the three angles of a triangle to two right angles. Some say that an adherent is evident, if the apprehension thereof adheres to the apprehension of the thing of which it is the adherent. The first [definition] is more general. The separable accident may either pass quickly, as the blushing of shame and flushing of anger, or slowly, like greyness of hair, [under the use of certain medicines which are supposed to have this effect], or youth.

§23. Both the adherent and separable [accident], if they are peculiar to singulars of the same verity, are called peculiar, as risible, else they are called general accident, as locomotion. The "peculiar" is described as a universal said, as a accident, only of things of the same verity. Common accident is described as a universal, said as an accident, of singulars of the same verity and of other things also in the way of accidentality. The universals therefore are five: species, genus, difference, peculiar (accident) and common accident.

/11/ Third Section.

Five Inquiries on Universals and Particulars.

First Inquiry

§24. [There are] universals, whose existence is impossible in reality, but not the conception thereof of itself, as "an equal to God." [There are universals] whose existence may be possible but they do not really exist, as "a griffon." [Under some universals] there is only one [individual], and it is impossible that there should be another, as God; or it is possible that there be others, as the sun; or there are many but they are limited in number, as the seven planets; or they are unlimited in number, as the rational souls.

Second Inquiry

§25. If we say of "animal" for instance, that it is a universal, three things are to be observed. Animal is to be considered in itself, and as a universal, and as the compound of these two things. The first is called a physical universal, the second a logical universal, and the third a mental (metaphysical) universal. The physical universal is existing in reality, for it (animality) is a part of every animal which exists, and a part of what exists has [of course] existence. In regard to the other two universals, opinions are divided as to their existence in reality. The inquiry on this subject does not belong to logic.

Third Inquiry

§26. Universals are co-extensive, if one is true of just as much (*i.e.* of as many individuals) as the other, as "*homo*" and "rational." There is absolute generality and peculiarity between them (*i.e.* one is more extensive than the other and contains it wholly), if one of the two, is true of all of which the other is true, but not *vice versa*; as "animal" and "man." There is generality and peculiarity between them in some respect if either is true only of a part of that of which the other is true; as man and white. And they are heterogeneous if neither of the two is true of any thing of which the other is true; as man and horse.

§27. The contradictories of two co-extensive [terms] are co-extensive; for else one of them (contradictories) would be true of that about which the

other is false, and it would follow that one of the two co-extensive [terms] is true of that about which the other is false—this is impossible. [*E.g.* every non-man is an irrational being and every irrational being is a non-man.] The contradictory of an absolutely more general [term] is more peculiar than the contradictory of an absolutely more peculiar [term,] for the contradictory of the more peculiar [term] is true of every thing of what the contradictory of the more general term is true, but not *vice versa*, [non-man contains more than non-animal]. Were the first [of these two assertions] not founded, the peculiar [term] itself [*i.e.* not its contradictory; man *e.g.*,] would be true of some things of which the contradictory of the more general [term *e.g.* non-animal] is true, and /12/ hence it would follow that the more peculiar is true [of certain things] and that the more general is not true [of the same things]—this is impossible. As to the second [assertion *viz.*, that the contradictory of a more general term contains less than the contradictory of a more peculiar term], were it unfounded the contradictory of the more general [term] would be true of every thing of which the contradictory of the more peculiar [term] is true, and hence it would follow that the more peculiar [term] is true of every thing of which the more general is true—this is impossible. There is no generality whatever between the contradictories of terms one of which is more general in 'some respect,' because it is certain that such a generality exists between the absolutely more general [term] itself [*e.g.* animal] and the contradictory of the more peculiar [term, as for instance non-man;] whilst there is universal heterogeneousness between the contradictory of the absolutely more general and the more peculiar [term] itself. The contradictories of two heterogeneous [terms] are heterogeneous, and their heterogeneousness is [called] particular heterogeneousness, for if [two terms] are in no case true simultaneously [of the same thing], as non-existence and non-nihilum (non-existence and existence), it is [called] universal heterogeneousness; and if they are true simultaneously, as non-man and non-horse, it is called particular heterogeneousness, because one of the two heterogeneous terms is necessarily true [of certain objects] of which the contradictory of the other heterogeneous term is true. Particular heterogeneousness is, therefore, surely an adherent [of the contradictories of two heterogeneous terms.]

Fourth Inquiry.

§28. [The term] "particular" is not only used in the abovementioned sense [see §15]—in which it is called "veritable particular"—but also to de-

note any more peculiar [term] which is under a more general one, and in this case it is called "relative particular." The latter term is more general than the former, for every veritable particular is a relative particular, but not *vice versa*. The former is the case (*i.e.* every veritable particular is a relative particular), because every individuum comes under its quiddity, which denudes [the individua under it] of their individuality, (*i.e.* which abstracts from the individuality of the individua); and the second is the case (*i.e.* the reverse is not true), because the relative particular may be a universal, but the veritable particular cannot be a universal.

Fifth Inquiry.

§29. The species which is of the description mentioned above [§16] is called the veritable species; but the term is also used of any quiddity, if to the question "what is it" regarding the said quiddity [*e.g.* what is "man?"] and some other quiddity [*e.g.* what is "horse"], the genus [*e.g.* "animal"] is primarily said in answer. This is called the relative species.

§30. /13/ Species has four degrees, for either it is the most general of all species, and in this case it is called the high species (*summa species*), as "body;" or it is the most peculiar, and in this case it is called the low species, as "man," this is also called the *species specierum*; or it is more general than the low species and more peculiar than the high, this is called the intermediate species, as "animal" and "living body;" or it is detached from all other species, this is called the singular (or solitary) species, as logos, if we say that substance is the genus of logos.

§31. Genus has the same four degrees, but the high genus (*summum genus*), *e.g.* "substance," and not the low genus, *e.g.* "animal," is called the *genus generum* in the gradation of the genera. Examples of the intermediate genus, are "living being" and "body," and an example of the singular genus is "logos," supposing that "substance" is not the genus of "logos."

§32. The relative species is to be found without the veritable species, as in the intermediate species. Again the veritable species is to be found without the relative one, *e.g.* in indivisible verities. These two kinds of species do not stand to each other in the relation of absolute generality and peculiarity, but either of the two is in some respects more general than the other, because they are both true of the low species.

§33. If [only] a part of what ought to be said in answer to the question "what is it" is said, and if that be [a] coincident [term,] it is called *jacens in via [questionis], quid est*, *e.g.* if we ask regarding man, "what is it," and receive the answer "animal" or "rational," in reference to (or instead of) "rational animal." If [only] a part is said in answer to the same question, and if, what is said, be a term for it by implication, it is called *inclusum in responsione* (*i.e. pars responsionis*) [*ad questionem*] *quid est*, as "living being," "sensitive," "endowed with voluntary motion," animal being indicated by these terms by implication.

§34. The *summum genus* may have a difference which establishes it (or is an essential part of it), for it may be composed of two or more co-extensivle things; but it must necessarily have a difference which divides it (separates its significates). The low species must necessarily have a difference which establishes it, but it can have no difference which divides it. The intermediate [genera] must have *differentiae* which establish them and *differentiae* which divide them. Every difference /14/ which establishes the *summum genus* establishes also the low genus, but not *vice versa*; again every difference which divides a lower genus divides also the *summum genus* but not *vice versa*.

Fourth Section.
On Definitions (i.e. *the ways of defining)*

§35. The *definiens* (definition) of a thing is [an expression] the apprehension of whcih involves the apprehension of the thing defined, or its distinction from every thing else. The *definiens* must not be the essence itself [*i.e. homo* is not a *definition* for man], for the *definiens* is known prior to the *definitum*, and a thing is not known prior to itself. It further must not be more general (more extensive) than the *definitum* else it does not answer the purpose of definition (or limiting), nor must it be more peculiar (more limited), else it conceals (or excludes some of the individua). The *definiens* must be co-extensive in generality and peculiarity.

§36. The *definiens* is called a *limes perfectus* (perfect boundary) if it consists of the near genus and near difference, [as rational animal for man]; and *limes imperfectus* (imperfect boundary) if it consists of the near difference only, [as *rationalis* for *homo*], or of the near difference and the distant genus, [as a rational body for man]. And it is called complete description

(literally sketch,) if it consists of the near genus and a property, [as the risible animal for man], and imperfect description, if it consists of the property alone, or of the property and the distant genus, [as risible body for man.]

§37. Care must be taken not to define a thing by what is equally known or unknown, as if we were to define "motion" by "absence of rest," or "couple" by "what is not single." Nor must a thing be defined by another thing, which is known only through the former. It is equally objectionable whether it be immediately known through it, *e.g.*, if we were to say "report" means an "account" and "account" means "report;" or mediately, *e.g.*, if we were to say the number two is the first pair; pair is what can be divided into two equal parts, two parts are called equal if neither exceed the other and the parts are two.

Care must also be taken not to use barbarous unusual words, whose indication (meaning) is not intelligible to the hearer, for in this case the purpose is lost sight of.

/15/ SECOND BOOK.
On propositions and rules regarding them.
This book is divided into an introduction and three chapters.
INTRODUCTION.
Definition of proposition and its primary division.

§38. Proposition (literally a decision) is a speech, which allows that he who utters it be told that he is true or false (right or wrong). It is called categorical, if its two extremities (terms) are resolvable into two simple [ideas], as Zayd is informed, or Zayd is not informed, [or from "the Sun is rising" follows "the day is approaching,"] and it is hypothetical, if they are not thus resolvable, [*e.g.* if the Sun rises day will approach].

§39. The hypothetical [proposition] is either conjunctive (conditional), or disjunctive. It is called conjunctive, if we pronounce in it a proposition (*i.e.* one of the two propositions of which it consists) to be true or untrue, under the assumption that another (the other) proposition be true. [Example of an affirmative conjunctive] "if this is a man, it is an animal." [Example of a negative conjunctive], "if this is a man, it cannot be a mineral."

A hypothetical proposition is called disjunctive if we pronounce in it that two propositions exclude (literally deny or refute) each other, either both in [case of] truth and [in case of] falsity or in one of the two only, or

that their mutual exclusion is denied, *e.g.* "this number is either even or odd." "That this man is either a writer or a negro, is not admissible."

First Section.
On the categorical (proposition).
First Inquiry.
Its parts and kinds.

§40. The categorical proposition consists of three parts: the part on which judgment is passed,—which is called subject; the one by which judgment is passed,—which /16/ is called predicate; the relation between the two, showing the bearing of the predicate to the subject—which is called judicial relation; and the word which expresses it is called copula, as "is" in the sentence "Zayd is informed." Such a proposition is called ternary. In some cases, which are very easily intelligible, the copula is omitted, and the proposition is called binary.

§41. If the relation is of such a description that you can say that the subject is in agreement [with the predicate], the proposition is called affirmative, as man is an animal; and if it is of such a description that you can say that it is not in agreement it is negative, as a man is not a horse.

§42. If the subject of a categorical proposition is a definite individuum, it (the proposition) is called peculiarized or individual (singular). If the subject is a universal, and if the quantity of the singulars (or individua) of which the judgment is true is shown in it, the word expressing the quantity is called wall and the proposition is called fenced or walled-in. It is of four kinds: if it is shown in it that the judgment [applies] to all the singulars, it is [called] an universal [categorical proposition]. This again is either affirmative [or negative: in the affirmative] the wall is "every one," *e.g.* every fire is hot. In the negative the wall is "no," "none," "not one," *e.g.* every fire is hot. In the negative the wall is "no," "none," "not one," *e.g.* no man is a mineral. If it is shown in it that the judgment [applies] to some things, it is particular, and [again it is] either affirmative, and [in this case] the wall is "some" "one," *e.g.* some animals are men, or one animal is a man; or it is negative and the wall is "not all," "some (are) not," *e.g.* not all animals are men, or some animals are not men.

§43. If the quantity of the singulars is not shown in it and if we can neither say that it is a universal nor that it is a particular proposition it is

called a physical proposition, *e.g.* "animal" is the genus and "*homo*" is the species. But if we can say it is universal or particular [but it is not stated] it is called ambiguous, *e.g.* man is at a loss, or man is not at a loss. Such a proposition is virtually a particular proposition, for if it predicates that man is at a loss, it predicates that some men are at a loss and *vice versa*.

Second Inquiry.
On the four fenced Propositions.

§44. The expression every C is B, is sometimes employed in reference to the verity, and its meaning is that every possible (imaginable) singular which may exist and is C, is B by reason of its existence; *i.e.* whatever is the substrate of C is also the substrate of B. [Such a proposition is called verity-proposition اَلقَضِيَّةُ الحَقِيقِيَّةُ] Sometimes the expression is used in reference to actual existence, and it means that every C in actual existence, be it at the time of the judgment or before or after /17/ it, is B in actual existence, [such a proposition is called actuality-proposition اَلقَضِيَّةُ الخَارِجِيَّةُ]. The difference between these two views is evident, for if no square exists in reality, still we are correct in saying every square is a figure in regard to the first view, but not in regard to the second. And if no figure did exist but squares, we would be correct in saying every figure is a square by the second view. From this you can deduce rules regarding the other fenced propositions.

/18/ Third Section.
On Privatives and Attributes

§45. If a negative particle is part of the subject, *e.g.* an inanimate being is a mineral; or of the predicate *e.g.* minerals are without intellect (unintellectual); or of both; the proposition is called privative whether it be affirmative or negative. But if no particle forms part of either extremity then the proposition, if it be affirmative, is called attributive and if it be negative indivisible.

§46. A proposition is affirmative or negative by reason of its affirmative or negative relation (copula) and not by reason of its extremities. If we say "every thing that is not living is without intellect," it is an affirmative

proposition though both extremities are nonentities, and if we say "a moving being is not at rest" it is a negative proposition though both extremities have [positive] existence.

§47. The indivisible negative proposition [*e.g.* the partner of God is not omnipotent] is more general (contains more) than the affirmative with privative predicate, [*e.g.* the partner of God is impotent], for the negation may be true though the subject is a nonentity (*i.e.* though there is no such thing as a partner of God, we can still say if there were one he could not be omnipotent), but the affirmation cannot be true (*i.e.* if we say the partner of God is impotent, we admit that there is a partner): because affirmation is admissible only in regard to a thing of ascertained (or acknowledged) existence, as for instance in propositions whose subject is an actually existing individuum or in regard to a thing of assumed existence as for instance in propositions whose subject is a verityl. If the subject does exist the indivisible negative and affirmative privative propositions are equivalent. The difference in the expression [between the indivisible negative and the affirmative with a privative predicate] is this: in the ternary, if it is affirmative, the copula stands before the negative particle, and, if it is negative, it stands after the particle, [as there are no binary propositions in English; the following sentence, of the text which refers to a peculiarity of the Arabic language is omitted].

Fourth Inquiry.
On Modal Propositions.

§48. The relation of the predicates to the subjects, be they affirmative or negative, must have a certain qualification as "necessarily," "perpetually," "not-necessarily" "not-perpetually." Such a qualification is called the *materia* of the proposition, and the word expressing it, is called the mode of the proposition.

§49. /19/ There are thirteen modal propositions into which it is usual to inquire. Some of them are simple, that is to say, their verity is simply an affirmation or negation; and some are compound, that is to say, their verity is composed at the same time of an affirmation and a negation.

§50. There are six simple modal propositions.

1. The absolute necessary [proposition]. It pronounces that the predicate is affirmed or denied of the subject of necessity as long as the

essence of the subject exists, as if we say, "every man is of necessity an animal" and "of necessity no man is a stone".

2. The absolute perpetual [proposition]. It pronounces that the predicate is affirmed or denied of the subject in perpetuity as long as the essence of the subject exists. The preceding affirmative and negative examples apply to this case.

3. The general conditioned [proposition]. It pronounces that the predicate is affirmed or denied of necessity under the condition of [the continuance of] a certain attribute of the subject, as if we say "every writer is of necessity moving the fingers as long as he writes." "A writer does not keep his fingers at rest as long as he writes."

4. The general conventional [proposition]. It pronounces that the predicate is affirmed or denied of the subject in perpetuity under the condition of [the continuance of] a certain attribute of the subject. The preceding affirmative and negative examples illustrate this case.

5. The general absolute [proposition]. It pronounces that the predicate is actually affirmed or denied of the subject, as if we say "every man without exception (literally with general absoluteness) is breathing." "Every man without exception (literally with general absoluteness) is not breathing."

6. The general possible [proposition]. It pronounces that there is no absolute necessity that what is contrary to the judgment should not be the case, as "by a general possibility fire may be hot." "By a general possibility what is warm is not cold."

§51. The compound modal propositions are seven in number.

1. The special conditioned. It is the same as the general conditioned with the restriction that the relation of the subject to the predicate is not [enounced to be] perpetual in regard to the essence [of the subject]. If it is affirmative, as "every writer of necessity moves his fingers as long as he writes, but not perpetually," it is composed of the affirmative general conditioned and of the negative general absolute propositions. And if it is negative, as "the fingers of a writer are necessarily not at rest as long as he writes, but not perpetually," it is composed of the negative general conditioned and of the general affirmative absolute.

2. The special conventional [proposition] is the same as the general conventional with the restriction that [the relation do] not [take place] perpetually in reference to the essence. If it is affirmative it is composed of the affirmative general conventional and of the negative general absolute, and if it is negative it is composed of the negative general conventional and of the affirmative general absolute. The preceding affirmative and negative examples illustrate this case.

3. /20/ The not-necessary existencial. It is the same as the general absolute with the restriction that [the relation do] not [take place] of necessity in reference to the essence. If it is affirmative, as "man is actually risible (or it happens that man is risible) but not of necessity (he would be man without that property;)" it is composed of the affirmative general absolute and the negative general possible. And if it is negative, as "man is not actually risible but not necessarily" it is composed of the negative general absolute and the affirmative general possible.

4. The non-perpetual existencial. It is the same as the general absolute with the restriction of non-perpetuity in reference to the essence [of the subject]. Whether it be affirmative or negative it is composed of two general absolute [propositions] one of which is affirmative and the other negative. The preceding affirmative and negative examples explain this case.

5. The temporal. It pronounces that the predicate is affirmed or denied of the subject of necessity during a definite period of the existence of the subject, under the restriction of non-perpetuity in regard to the essence [of the subject]. If it is affirmative, as "an eclipse of the moon takes of necessity place during the time the earth is placed between the sun and the moon but not perpetually," it is composed of the affirmative absolute temporal and the negative general absolute. And if it is negative, as "of necessity no eclipse of the moon takes place when the earth, moon and sun are at right angles but not perpetually," it is composed of the negative absolute temporal and the affirmative general absolute.

6. The spread [proposition]. It pronounces that the predicate is affirmed or denied of the subject of necessity and during an indefinite period of the existence of the subject, under the restriction of non-perpetuity in reference to the essence [of the subject]. If it is affirmative, as "every

man is of necessity breathing at times but not perpetually," it is composed of the affirmative absolute spread [proposition] and the negative general absolute. And if it is negative, as "man is of necessity not breathing at times but not perpetually," it is composed of the negative absolute spread [proposition] and the affirmative general absolute.

7. The particular possible [or contingent proposition]. It pronounces that there is no absolute necessity either for the existence or non-existence of the thing (or relation). It makes no difference whether it is affirmative, as "by peculiar possibility every man is a writer (*i.e.* every man can or may be a writer,)" or negative, as "by peculiar possibility every man is not a writer." It is composed of two general possible propositions, one of which is affirmative and the other negative.

The general rule is that, if a proposition is restricted by non-perpetuity, it indicates that it is a general absolute proposition, and if it is restricted by non-necessity, that it is a general possible proposition disagreeing in mode but agreeing in quantity.

Second Section.
On the different kinds of hypothetical Propositions.

§52. The first part (or the first proposition) of a hypothetical is called antecedent and the second consequent.

/21/ It (the hypothetical proposition) is either conjunctive or disjunctive. [See §39.]

The conjunctive (conditional) is either cogent (literally adhesive) [or contingent.] In the cogent the consequent is true under the supposition that the antecedent be true on account of the connexion between them, which is the cause thereof, as for instance, if the two propositions be connected by causation [*e.g.* if the sun rises day approaches, if day approaches the sun rises; if day approaches the world becomes illuminated—the cause of both phenomena being the rising of the sun;] or correlation [*e.g.* if Zayd is the father of Bakr, Bakr is his son]. In the contingent [the consequent is true if the antecedent is true] by merely accidental agreement of the two parts (or of the two propositions of which the hypothetical consists) in being true, *e.g.* if man is endowed with reason, the donkey is endowed with the faculty of braying.

§53. The disjunctive [hypothetical proposition] is divided into the veritable disjunctive proposition [the incompatible and the exclusive]. The veritable disjunctive proposition pronounces that its two parts exclude each other (literally deny or refute each other) both in [case of] truth and [in case of] falsity, [*i.e.* if the one is true the other must be false and also if the one is false the other must be true,] as "this number is either even or odd." The incompatible disjunctive (literally the hypothetical which excludes coexistence) pronounces that the two parts are opposed to each other in truth only, *e.g.* this thing is either a stone or a tree, [if it is a stone it cannot be a tree, but it may be neither of the two, and therefore if it is not a stone it does not follow that it is a tree]. The exclusive hypothetical (literally the hypothetical which leaves no *vacuum*) pronounces that the two parts are opposed to each other in falsity only, as "either Zayd is at sea or else he will not be drowned."

Each of these three kinds [of disjunctives] is either antagonistical [or coincidental]. A disjunctive is called antagonistical if the two parts exclude each other in their nature, as in the above examples; and it is called coincidental, if this exclusion is a mere coincidence as if we say "non-writer" of a black man. But if we say the man is either black or a writer it is a veritable disjunctive proposition; if, he is a not-black or a writer, it is an incompatible proposition; and if, he is either black or a not-writer, it is an exclusive proposition.

§54. Any of these eight [hypothetical] propositions is called negative if that [connexion or exclusion] which is pronounced [to exist] in the affirmative, is denied. If it negatives the cohesion, it is called negative-cogent, if it negatives antagonism it is called negative-antagonistic, and if it denies coincidence it is called negative-coincidental.

§55. The affirmative conjunctive proposition is true (*i.e.* the inference is correct) of two true and of two false [propositions, *e.g.* if Zayd is a man he is an animal; if Zayd is a stone he is a mineral]; and of one whose truth and falsity is not known [*e.g.* if Zayd be writing he is moving his fingers], and of a false antecedent and true consequent, [*e.g.* if Zayd be a donkey he is an animal,] but not the revers, because from a true [propositiion] does not follow a false one.

/22/ The affirmative conjunctive is false (nugatory) of two false parts (propositions) and of a false antecedent and true consequent and *vice versa*, and if it be cogent also of two true [propositiions], but if it is coincidental, it is impossible that it be false of two true [propositions].

The veritable affirmative disjunctive proposition is true of one true and one false [proposition], *e.g.* this number is either even or odd; and it is false (nugatory) of two true and of two false [propositions, *e.g.* four is either even or divisible by two; three is either pair or divisible by two]. The incompatible is true (holds) of two false [propositions, *e.g.* Zayd may be a tree or a stone]; and it is false (nugatory) of two true ones [*e.g.* Zayd may be a man or rational]. The exclusive is true of two true [propositions] and of a true one and a false one and it is false (nugatory) of two false ones. The negative is true of what the affirmative is false and it is false of what the affirmative is true.

§56. The universality of a hypothetical proposition consists in this, that (or a hypothetical proposition is called universal if) the consequent be adherent or antagonistic to the antecedent [at all times] and under all circumstances under which the antecedent *can* be, that is to say, such circumstances under which the antecedent may be placed by reason of its connexion with things which are compatible with it. The hypothetical proposition is particular if this is the case under some of those circumstances, and it is peculiarized if it is the case under a definite circumstance. The walls (terms indicative) of the affirmative universal are "whenever," "whatever," "when," [*e.g.* whenever the sun rises it is day], and of the disjunctive "always" [or "at any time," *e.g.* at any time either the sun is up or it is not day]. The wall of the negative universal is in both cases, (*i.e.* in the conjunctive and disjunctive) "certainly not" [*e.g.* when the sun is up it is certainly not night]. The wall of the affirmative particular is in both cases "it will then be," [*e.g.* it will then be day when the sun rises] and of the negative particular in both cases "it will then not be." An affirmative universal can be rendered negative by the introduction of the negative particle into the wall. The walls of the ambiguous conjunctive are simply "if" "when" and of the ambiguous disjunctive "either—or."

§57. The hypothetical [proposition] may be composed [1] of two categorical propositions or [2] of two conjunctive ones or [3] of two disjunctive ones or [4] of a categorical and of a conjunctive one or [5] of a categorical and disjunctive one or [6] of a conjunctive and a disjunctive one. Each of the last three kinds if it be conjunctive is sub-divided into two sorts on account of the natural distinction between their antecedent and consequent. But the disjunctives are not thus subdivided because their antecedent is distinguished from the consequent by appointment only. There are therefore nine divisions (or kinds) of conjunctive hypotheticals and six of disjunctive

hypotheticals. You will be able to form examples yourself.

/23/ Third Section.
Rules concerning propositions.
First Inquiry.
On Contradiction.

§58. Contradiction is defined as a difference between two propositions in affirming and denying of such a description, that it follows from the difference itself [without medium,] that the one be true and the other false, [*e.g.* Zayd is a man, Zayd is not a man. But, Zayd is a man, Zayd is irrational, are not included in this definition, because they are contradictory by a medium.]

§59. The contradiction of two peculiar (singular) propositions is not ascertained (established), unless the subject and predicate are identical, [example of the contrary: Zayd stands, Amr does not stand.] The identity of the former (subject) comprizes the unity of the condition, [example of the contrary: a body is visible, if it be white, a body is not visible, if it be black;] and the unity of "part" and "all" (quantity of the proposition,) [example of the contrary: Africans are black, that is to say some of them; the Africans are not black, that is to say not all of them.] The identity of the predicate comprizes unity of time and place, [example of the contrary: Zayd sleeps at night or in bed, Zayd wakes at day time or in the bázár,] unity of relation, [example of the contrary: Zayd is father, *i.e.* of 'Amr; Zayd is not father, *i.e.* of Bakr,] unity of possibility and reality, [example of the contrary: wine inebriates in a basin, *i.e.* it may inebriate; wine does not inebriate in a basin, it does not do so actually.]

If the two propositions be fenced, it is requisite, in addition to the above, that there be a difference in quantity, for two particulars are true, [*e.g.* some animals are men, some animals are not men,] and two universals are false [*e.g.* every animal is a man, no animal is a man,] in every matter in which the subject is more general /24/ (more extensive) than the predicate. In the "all" it is requisite that there be a difference in the mode; for two possible (contingent) propositions are true and two necessary propositions false in matter of possibility (contingency).

§60. The contradictory of the absolute necessary proposition is the general possible, for if the necessity is of necessity negatived, the two propo-

sitions will surely be contradictory. The contradictory of the absolute perpetual proposition is the general absolute; because the contradiction of the negative "at no time" is the affirmation "at some times", and *vice versa*. The contradictory of the general conditioned is the possible temporal, that is to say, the proposition which pronounces that necessity in reference to the attribute [see §50] is not applicable to the converse, *e.g.* every body affected with pleurisy will cough at times on account of his illness. The contradictory of the general conventional is the absolute temporal, *i.e.* the proposition which pronounces that the predicate is affirmed or denied of the subject at some times when the subject is under certain circumstances. The preceding examples illustrate this case.

§61. The contradictory of a compound proposition is the contradiction of its two parts. This will be evident to you after you have comprehended the verities of compound propositions and the contradictories of simple propositions, for after you have ascertained that the non-perpetual existential proposition is composed of two general absolute propositions, one of which is affirmative and the other negative, and that the contradictory of the absolute is the perpetual, you will understand, that its opposite is the opposite perpetual or the agreeing perpetual.

§62. If [the compound proposition] is particular, what we have mentioned will not be sufficient to contradict it, for it would be false, were we to say "some bodies are animals but not always." And it would be equally wrong, were we to employ the contradictory of either of the two parts [*e.g.* no body is ever an animal]. The correct way of forming the contradictory is to place the contradictories of the two parts universally into a dilemmatic sentence, that is to say, every one must be the contradictory of one of the two parts, *e.g.* every single *individuum* of the genus 'body' is ever either an animal or not an animal.

§63. The contradictory of the universal hypothetical is the particular which agrees with it in genus and species, but which is opposed to it in "*quale*" (quality) and "*quantum*" (quantity,) and *vice versa*.

Second Inquiry.
On even Conversion (Conversio simplex).

§64. Even conversion is an expression which means that the first part of a proposition be put second and the second part first, and that the truth and

quale remain unaltered, (*i.e.* that the converted proposition remain true, if the original proposition is true, and that it remain affirmative, if the original one is affirmative, and negative if (negative,) (*e.g.* every man is an animal—some animals are men; or no man is a stone, no stone is a man.)

§65. /25/ There are seven [modal] forms of negative universal propositions, which cannot be converted, *viz.*, the two temporals, the two existentials, the two possibles and the general absolute; because the most peculiar among them, the temporal, does not admit of conversion, and if the most peculiar cannot be converted the more general ones cannot be converted, for if the more general can be converted, surely the more peculiar can also be converted; for an *adhaerens* of the more general thing, of necessity, also adheres to the more peculiar. We are correct in saying, the moon can by no means be eclipsed, when she, the sun, and earth form a right angle, but not always; and we are wrong in saying, by general possibility some lunar eclipses may happen to [another celestial body and] not to the moon. In this example we have chosen the most general mode; for every lunar eclipse operates of necessity on the moon.

§66. The [negative] absolute necessary and absolute perpetual, become by conversion [negative] universal perpetual, for if it is of necessity, or always true, that no C is B, it is always true that no B is C, else some B would, by general absoluteness, be C, and this, together with the original proposition, would prove that some B is necessarily not B—in necessary propositions, and that some B is always not B—in perpetual propositions. This is absurd.

§67. The general conditioned and the general conventional become by conversion universal general conventional, for if it is of necessity or perpetually true that no C is B, as long as C exists; no B can ever be C, as long as B exists, else let us suppose that some B is C, whilst it is B, and it follows, if this is taken in connexion with the original proposition, that some B is not B whilst it is B. This is absurd.

The peculiar conditioned and the peculiar conventional are converted into the peculiar non-perpetual conventional. The reason of this process in reference to the general conventional is, that it is an adherent of both kinds of general propositions, (*i.e.* the general conventional and the general conditioned.) The reason why the converted proposition is peculiar non-perpetual, is, because it is not true that some B is absolutely and generally C, because it is true that no B is always C, and therefore it is converted into

"no C is always B," but the original proposition was that every C is B. We have therefore proved our thesis by *reductio ad absurdum*.

§§68–70. Paragraphs 68, 69 and 70, and again 72, 73 and 74, and again 84, 85 and 86, are omitted in the translation, because they contain details on modals which are of no interest. The last named four paragraphs are also omitted in most Arabic text books on Logic, and not studied in Mohammedan Schools.

Third Inquiry.
On Conversion by Contradiction.

§71. This expression means to place the contradictory of the second part of a proposition first, and the first part unaltered second. The *quale* of the new proposition will be the opposite of the original proposition, but it will be equally true, [*e.g.* every man is an animal, and no not-animal is a man.]

Fourth Inquiry.
On the Cohesion of Hypotheticals.

§75. /26/ The affirmative universal conjunctive must be convertible into an incompatible proposition, consisting of the antecedent unaltered and of the contradictory of the consequent, and into an exclusive proposition consisting of the contradictory of the antecedent and of the unaltered consequent, and should it not be thus convertible the adhesion and conjunction are unsound.

The veritable disjunctive proposition must be convertible into four conjunctive propositions. The antecedent of two of them is one of the parts [of the original proposition] unaltered and the consequent is the contradictory of the other part. The antecedent of the other two is the contradictory of one of the two parts and the consequent is the other part unaltered. Every other hypothetical proposition than the veritable must be convertible into another, composed of the contradictories of the two parts.

THIRD BOOK.
On Syllogism.
First Chapter.
Definition and division of Syllogism.

§76. Syllogism is a speech composed of propositions, [of such a nature, that] if they are admitted, there follows, from them, taken in themselves, another speech.

§77. A Syllogism is [called] interpellative (hypothetical), if the conclusion itself or its contrary is actually mentioned in it, as "if this be a body, it is spacial." Here the very conclusion is mentioned in it. And if we say "but it is not spacial" it follows that it is not a body. In this instance the contradictory is mentioned in it. A Syllogism is called conjugate if it is not like the preceding, *e.g.* "every body is composed of parts, every thing composed of parts is temporal," it follows "every body is temporal." Neither the conclusion nor its opposite are actually mentioned in it.

§78. /27/ The subject of the question is called minor [term,] and its predicate is called major, and a proposition which forms part of a Syllogism is called premiss, and the premiss which contains the minor [term] is called minor [premiss], and that which contains the major [term] major [premiss], and the repeated intermediate term is called the middle term, the conjugation (connexion) between the minor and major premisses is called the mood, and the shape resulting from the manner in which the middle term is placed in regard the other two terms is called figure. There are four figures: in the first figure the middle term is the predicate in the minor premiss and the subject in the major premiss; in the second figure it is the predicate in both; in the third figure it is the subject in both; and in the fourth figure it is the subject in the minor premiss and the predicate in the major premiss.

§79. In the first figure the minor premiss must be affirmative, for else the minor term is not contained in the middle term. The major premiss must be a universal (proposition), else it may be that some [things] predicated by the major term are not the same which are predicated of the minor term. It [this figure] admits of four conclusive moods. First, from two affirmative universals an affirmative universal conclusion is derived, as "every C is B; and every B is A; therefore every C is A."

Secondly.—From two universals, the minor premiss being affirmative and the major negative, a universal negative conclusion results as every C is B, no B is A, therefore no C is A.

Thirdly.—From two affirmatives, the minor premiss being a particular, results a particular affirmative conclusion, as some C is B, every B is A; therefore some C is A.

Fourthly.—From an affirmative particular minor premiss and a negative universal major premiss results a negative particular conclusion, as some C is B, no B is A; therefore some C is not A.

The conclusions of this figure are self-evident.

§80. In the second figure the two premisses must be different in *quale* (one must be affirmative and the other negative;) and the major premiss must be a universal: else (if either of these two conditions is not fulfilled) we get a non-identity which warrants no inference, *i.e.* from correct premisses, sometimes, you obtain a conclusion which you are able to affirm, and, at another, one which you are obliged to deny.

The conclusive moods are again four. *Firstly,*—From two universals, the minor premiss being affirmative, a negative universal conclusion is obtained, *e.g.*, every C [man] is B [animal;] no A [stone] is B [animal;] therefore no C [man] is A [a stone.] This can be shown by *reductio ad impossible*, *i.e.*, the contradictory of /28/ the conclusion is attached to the major premiss, producing the contradictory of the minor premiss as conclusion, [*e.g.*, if you deny that no man is a stone, let us suppose, some men are stones; under this supposition we have: some men are stones; no stone is an animal; therefore some men are not animals—this is contrary to the admission, that every man is an animal.] [It can also be demonstrated] by conversion of the major premiss, [*e.g.*, every animal is a not-stone,] whereby it is reduced to the first figure.

Secondly.—From two universals, the major premiss being affirmative a negative universal conclusion is obtained, *e.g.*, no C is B; and every A is B; therefore no C is A. This can be demonstrated by *reductio ad impossibile*; and also by converting the minor premiss, putting it into the place of the major [taking the major as the minor and converting of the conclusion].

Thirdly.—From an affirmative particular minor premiss and negative universal major a negative particular conclusion is deduced, as: some C [men] are B [fair]; no A [negro] is B; therefore some C are not A. This can be demonstrated by *reductio ad impossibile* and conversion of the major whereby it is reduced to the first figure. [It can also be demonstrated by supposition:] let us suppose for this purpose that the exact subject of the particular proposition be D [Caucasians], then every D is B, no A is B; therefore no D is A. Hence we say, some C is D; and no D is A; therefore some C is not A.

Fourthly.—From a negative particular minor and an affirmative universal major a negative particular conclusion is deduced, as: some C is not B; and every A is B; therefore some C is not A. It can be demonstrated by *re-*

ductio ad impossibile; and by supposition, if the negative be compound, (*i.e.* not indivisible, otherwise the subject might have no assignable significates; see §46.)

§81. In the third figure the minor must be affirmative, else there will be non-identity, and one of the two premisses must be universal, else some of the things of which the minor term is predicated may be different from some of the things of which the major is predicated, and consequently it leads to no result.

The conclusive moods of this figure are six: *First*.—From two universal affirmative premisses an affirmative particular conclusion is derived, as, every B is C; and every B is A; therefore some C is A. It can be demonstrated by *reductio ad impossibile*, *i.e.* the contradictory of the conclusion is [taken as major premiss and] added to the minor premiss to deduce the contradictory of the major; and [it can also be demonstrated by reduction to the first figure,] which is effected by the conversion of the minor.

Secondly.—From two universals the minor premiss being negative, a negative particular conclusion is deduced, as: every C is B, and no B is A; therefore some C is not A. [It can be demonstrated by *reductio ad impossibile* and] by conversion of the minor premiss.

Thirdly.—From two affirmative premisses, the major being a universal, an affirmative particular conclusion is deduced, as, some B is C, and every B is A; therefore some C is A. [This can be demonstrated] by *reductio ad impossibile* and by conversion of the minor, and by supposing the [exact] subject of the particular premiss to be D. Then: every D is B, and every B is A; therefore every D is A, then we say: D is C and every D is A; therefore some C is A; and this was to be demonstrated.

/29/ *Fourthly.*—From an affirmative particular minor premiss and a negative universal major a particular negative conclusion is deduced, as some B is C, and no B is A; therefore some C is not A. This can be demonstrated by *reductio ad impossibile* and by conversion of the minor and by supposition.

Fifthly.—From two affirmative premisses the minor being universal an affirmative particular is derived, as, every B is C, and some B is A; therefore some C is A. This can be shown by *reductio ad impossibile* and by using the converted major as minor and then converting the conclusion. It can also be shown by supposition.

Sixthly.—From an affirmative universal minor premiss and a negative particular major a negative particular conclusion is derived, as, every B is C, and some B is not A, therefore some C is not A. This can be shown by

reductio ad impossibile and by supposition if the negative be compound [see §46].

§82. Fourth figure. In regard to the quality, and quantity, it is necessary that the two premisses be affirmative and the minor premiss a universal; or the two premisses must differ from each other in quality and one of them must be a universal. If this be not the case there will be non-identity which renders it impossible to come to a conclusion. This figure has eight conclusive moods:—

First.—From two affirmative universal premisses an affirmative particular conclusion is deduced, as, every B is C, and every A is B; therefore some C is A. It is demonstrated by conversion of the arrangement which gives a converted conclusion, [*i.e.* every A is B, and every B is C; therefore every A is C.]

Secondly.—From two affirmative premisses, the major being a particular, follows an affirmative particular conclusion, as, every B is C, and some A is B; therefore some Cis A; the demonstration is the same as in the preceding mood.

Thirdly.—From two universal premisses, the minor being negative, follows a negative universal conclusion, as, no B is C, and every A is B; and therefore no C is A. The demonstration is the same as above.

Fourthly.—From two universal premisses, the minor being affirmative, follows a negative particular conclusion, as, every B is C, and no A is B; therefore some C is not A. It is demonstrated by the conversion of the two premisses; [*viz*. some C is B, and no B is A; therefore some C is not A.]

Fifthly.—From an affirmative particular minor and a negative universal major follows a negative particular conclusion, as, some B is C, and no A is B; therefore some C is not A. It is demonstrated like the preceding.

Sixthly.—From a negative particular minor and an affirmative universal major follows a negative particular conclusion, as, some B is not C, and every A is B; therefore some C is not A. By conversion of the minor it is reduced to the second [figure].

Seventhly.—From an affirmative universal minor and a negative particular major follows a negative particular conclusion, as, every B is C, and some A is not B; therefore some C is not A. By conversion of the major it is reduced to the third figure.

Eighthly.—From a negative universal minor and an affirmative particular major follows a negative particular conclusion, as, no B is C, and some A is B; therefore some C is not A. It is demonstrated by conversion of the arrangement whereby a converted conclusion is arrived to; the first five

moods can also be demonstrated by /30/ *reductio ad impossibile*, that is to say, the contradictory of the conclusion is added to one of the two premisses in order that a conclusion may be come to, which is the converse of the contradictory of the other premiss [*e.g.*, supposing it be not true that some C is A, then it must be true that no C is A; then let us take this as the major premiss and add, every B is C, as the minor; and it follows, no B is A, and by conversion no A is B]. The second and fifth mood can be demonstrated by supposition. We employ supposition for demonstrating the second mood, and the fifth can then be treated in the same manner. Let some individua of A be D, then it follows that every D is A and every D is B, therefore we say, every B is C, and every D is B, and some C is D, and every D is A, and some C is A; this was to be demonstrated.

§83. The ancients considered only the first five moods of this figure as conclusive and they held that owing to non-identity in the conclusion the remaining three were not conclusive, this is the case if both premisses are simple, we therefore make it a condition that the negative premiss be of one of the two kinds of peculiar propositions [*i.e.* the conditioned or the conventional]. This obviates non-identity.

Third Section.
Conjugate Syllogism containing hypothetical premisses.

§87. These are of five kinds.—The *first* is composed of conjunctive premisses. The norm of this class is a syllogism in which the two premisses have a complete part (term) in common and in reference to this term syllogisms of this kind are classed under the four figures. If the common term is the consequent in the minor premiss and the antecedent in the major, we have the first figure. If it is the consequent in both we have the second. If it is the antecedent in both we have the third figure. If it is the antecedent in the minor premiss and the consequent in the major we have the fourth figure. The conditions of arriving at conclusions, the number of moods and the quantity and quality of the conclusion of every figure are exactly the same as in the categorical. Example of the first mood: whenever A is B, C is D, and whenever C is D, E is Z, consequently whenever A is B, E is Z.

§88. *Second kind.* It is composed of two disjunctive premisses; the norm of this class is a syllogism in which the two premisses have not a complete part in common, as: invariably either every A is B or every C is D; again, either every D is E, or every D is Z, consequently, either every A is B or every

C is E or every D is Z. [This conclusion is correct,] on account of the exclusiveness which there exists between the two premisses of the composition [*i.e.*, every C is D and every D is E] and one of the other two premisses [*i.e.* every A is B and every E is Z].

§89. *Third kind.* It is composed of a categoric and conjunctive premiss. The norm of this class is a syllogism in which the categorical proposition is the major and has a term in common with the consequent of the conjunctive [minor]. The conclusion of the syllogism is a conjunctive proposition, the antecedent of which is the antecedent of the conjunctive premiss, and the consequent is the conclusion of the composition between the consequent [in the minor] and the categorical [premiss], *e.g.*, whenever A is B; C is D; farther D is E; therefore, whenever A is B, every C is E.

§90. /31/ *Fourth kind.* It is composed of a categorical and a disjunctive premiss and it is of two descriptions. *First.*—The number of categorical propositions is the same as the number of disjunctions, and each categorical proposition has one term with the parts of the disjunction in common, and the composition is either identical or there is a difference of composition in the conclusion. Example of a case in which the composition is identical: Every C is either B or D or E, and every B is T and every D is T and every E is T; hence it follows that every C is T, because the parts of the disjunction [B, D, E] are true of that term of the categoric premiss which it has in common with the disjunctive premiss. Example in which there is a difference of composition in the conclusion, every C is either B or D or E; but every B is C and every D is T and every E is Z, hence it follows that every C is either C or T or Z, for the reasons just mentioned.

Secondly.—If there are fewer categoric propositions than there are parts of the disjunction, let us suppose there be a categorical proposition of one part and a disjunctive one of two parts, and the categoric proposition have a term in common with the latter, *e.g.* either, every A is T, or every C is B, but every B is D, hence it follows that either every A is T, or every C is D, on account of the exclusiveness which there is between the premisses of the composition and the term which they have not in common. [If there is no such exclusiveness, the conclusion is not of necessity correct.]

§91. *Fifth kind.* It is composed of a conjunctive and of a disjunctive proposition, and the two premisses have either a complete part in common or an incomplete part. In either case only a syllogism in which the conjunctive proposition forms the minor and the disjunctive, the major, is

conclusive. Example of the first case: Whenever A is B, C is D, but invariably either every C is D, or E is Z, hence it follows that invariably either, every A is B or E is Z. If the disjunctive proposition, [either C is D or E is Z] is incompatible, the conclusion is equally incompatible, because if a thing is incompatible with the adherent, either perpetually, or only now and then, it follows of necessity that it be also incompatible with the substrate either perpetually or now and then, (*i.e.* under certain circumstances;) and if the disjunctive is exclusive, the conclusion is "it happens sometimes;" for if A is not B, then E is Z, for the contradictory of the middle term [C is D] requires the two terms [of the conclusion to be "E is Z" and "the contradictory of A is B."] The question is demonstrated by the third figure.

Secondly.—[If the two premisses have an incomplete part in common, we say] whenever A is B, every C is D, and perpetually either, every D is E, or D is Z; if the disjunctive proposition is exclusive, the conclusion is, whenever A is B, either every C or E, or D is Z.

Fourth Section.
On the Interpellative Syllogism.

§92. It is composed of two antecedents; one of the two is hypothetical and the other is an assertion that one of its two parts is or is not, and from this assertion follows that the other part is or is not. [In order that such a syllogism be conclu-/32/sive] it is necessary: [*First*] that the hypotheticals be affirmative; [*Secondly*] that if the hypothetical is conjunctive, it be cogent (literally adhesive,) [and that, if it is disjunctive,] it be antagonistic; [*Thirdly*] that either the hypotheticals be universal or that the assertion that one of the parts is or is not be universal (*i.e.* that it be asserted it is or is not at all times and under all circumstances); unless the time of conjunction or disjunction is also the time regarding which it is asserted that the part is or is not, [*e.g.* whenever Zayd comes with Bakr in the afternoon, I receive him with honor, he did come with Bakr in the afternoon and therefore he was received by me with honor.]

If the hypothetical which forms part of the interpellative syllogism is conjunctive, from the interpellation of the antecedent follows the consequent as conclusion, and from the interpellation of the contradictory of the consequent follows the contradictory of the antecedent as conclusion. If this is not the case the adhesion is not established. The reverse is not admissible in either of the above two cases, for the consequent may be more general than the antecedent.

If the hypothetical is a veritable disjunctive proposition, [see §53] and if, in the interpellation any part, whichsoever, is asserted, there follows from it the contradictory of the other part on account of their incompatibility, but if the interpellation consists of the contradictory of any part, whichsoever, there follows from it the other part on account of their exclusiveness.

If the disjunctive hypothetical is incompatible, the conclusion is as in the first case only, (*i.e.* there follows from it the contradictory of one part, if the other is asserted with interpellation;) because the two parts are incompatible but not exclusive; and if the disjunctive is exclusive, the conclusion is as in the second case only, because the two parts are exclusive but not incompatible, (*e.g.* either Zayd is on the sea or he is not drowned; but he is not at sea therefore he is not drowned).

Fifth Section.
Pendents of the Syllogism.

§93. These are four. *First*.—The compound syllogism (the Sorites). It is composed of several premisses, some (two) of which lead to a conclusion, which (conclusion) with another premiss leads to another conclusion, and so on until we arrive at the question. The conclusions are either connected, as every C is B, and every B is D, therefore every C is D; again every C is D and every D is A, and therefore every C is A; again every C is A and every A is E, therefore every C is E; or the conclusions are disconnected, as, every C is B and every B is D and every D is A and every A is E; therefore every C is E.

§94. *Second*.—*Reductio ad absurdum*. The question is proved by disproving the contradictory thereof; *e.g.* If you deny that some C is not B, let every C be B and let every B be A. Now if this proposition (every B is A) is true, we say if you deny that some C is not B, you must allow that every C is A; but not every C is A, and therefore your assertion is absurd, and there follows not every C is B. This was to be demonstrated.

§95. /33/ *Third*.—Induction is a judgment that, what is found in most of the parts (dividing members) is universal, *e.g.* all animals move the lower jaw in eating because oxen, tiger, etc. move it. This does not enable us to arrive at certainty on account of the presumption, that not all are like those, as is the case (in regard to the above example) with the crocodile. [If a thing is found in *all* the dividing members, it is called اَلقِيَاسُ المُقَسَّمُ *enumeratio partium*.]

§96. *Fourth*.—Example. A judgment is affirmed of a particular (singular) which is applicable to another particular, because they have a meaning [see note 11] in common, *e.g.* the world is composed of parts and therefore, as in the case of a house, it does not exist from eternity. That the meaning which the two particulars have in common has the nature of a cause is demonstrated by the argument of "concomitancy" and of "division." This last however does not amount to a dilemmatic judgment, such that if one part is false the other must be true, *e.g.* the cause of destructibility is either composition or such a thing or such a thing; the futility of the two latter assumptions is shown by *reductio ad absurdum*, and thereby the first is established. Both these arguments are weak. The former because the last [of the four] parts of a complete cause together with all the conditions is called the madár of an effect, but it cannot be called its cause. Division forms a weak argument, because it is impossible to say that nothing else [than the parts enumerated] is the cause, and supposing it be admitted that, what the two things which are analogous, have in common, is the cause in the case cited, it does not follow that it is also the cause of the thing to be proved, for it may happen that a peculiarity of the case cited is the condition for the operations of the cause or that a peculiarity of the thing to be proved renders it impossible that the same cause should be in operation.

CONCLUSION.
First Inquiry.
On the matter of Syllogisms.

§97. The matter of a syllogism is either a certainty or a non-certainty. There are six certainties. [1] *Axioms* (or first principles). These are propositions the apprehension of whose two terms is by itself sufficient to convey conviction, *e.g.* the total is greater than the part. [2] *Observata*; these are propositions in which we pronounce on the strength of the perception of our external or internal faculties, *e.g.* /34/ that the sun is giving light, or that we feel fear and anger, [the former propositions of this call are called حِسِّيَاتُ *sensualia*, and the latter وجدَانِيَاتُ *sensa*.] [3] *Experta*, these are propositions which are the result of repeated observation enabling us to arrive to certainly *e.g.* scamony is a purgative. [4] *Acumenalia* (guesses); these are propositions which are arrived at by superior acuteness which leads to knowledge, *e.g.* the light of the moon is reflected from the sun. Acuteness means quickness in passing from [general] principles to results. [5] *Testata*;

these are propositions which rest on abundant testimony regarding a subject of which we know that it is not impossible. Such testimony must be free from suspicion of a conspiracy of the witnesses, *e.g.* the existence of Makkah and Baghdád. The number of witnesses required to make a fact certain cannot be laid down; but we ought to have a number sufficient to destroy all doubt. Knowledge acquired by experience, acuteness and testimony cannot be an argument against other knowledge. [6]. Propositions accompanied by their demonstrations; in these propositions we come to a judgment by a medium which is not concealed from our intellect at the time we apprehend the terms of the proposition, *e.g.* four is an even number because it is divisible into two equal parts.

The syllogism which is composed of these kinds of propositions is called demonstration. It is of two kinds: it is called propteric (from *propter quid*, *dioti*,) if the middle term is the cause of the relation [of the two terms] both in the intellect and in reality, (*i.e.* subjectively and objectively,) *e.g.* the humors of this person are putrid, every person whose humors are putrid suffers from fever, therefore this person suffers from fever. It is called quiatic (from *quia*,) if the middle term is the cause of the relation in the intellect only, (*i.e.* merely subjectively,) *e.g.* this man has fever, every person who suffers from fever has putrid humors, therefore this person has putrid humors, [the presence of fever is the cause of our conviction that the humors are putrid; but in reality it is the effect of the putridity of the humors.]

§98. There are six non-certainties. [1] *Nota*; these are propositions which are acknowledged by all men, on the ground of general expediency [*e.g.* justice is good, oppression is bad,] or on the ground of sympathy, [*e.g.* to protect the weak is praise-worthy], or on account of propriety, [*e.g.* exposing the pudenda is wrong,] or on the ground of popular habits, [*e.g.* the killing of animals is not right with the Hindús,] or on the ground of divine law and humanity. We can distinguish conventional principles from axioms by divesting ourselves of every thing which is not in the mind itself; by doing so we arrive to axioms but not to conventional principles. Some of these principles are true and others are false. Every nation and every profession has its own conventional principles. [2] *Admissa*; these are propositions which have been admitted by the opponent and upon which the disputation is founded with a view of refuting him, [they may be generally admitted or merely by the disputant,] *e.g.* the questions regarding the sources of the law with divines. A syllogism (argument) composed of these two classes is called disputation. Its object is to satisfy an opponent who fails to see the force of an exact demonstration. [3] *Accepta*, these are propo-

sitions which are taken on the authority of a person on faith, on account of his being [supposed to be] endowed with supernatural powers or superior knowledge or religiousness, *e.g.* maxims which we take from learned or holy /35/ men. [4] Presumptions, these are propositions founded on belief, *e.g.* a man who sneaks about at night is a thief. A syllogism (argument), composed of these two kinds of propositions is called oratorial. Its object is to exhort the hearer to things useful for him, such as good morals and religiousness. [5] *Imaginativa*, these, are propositions which produce wonderful effects on the mind such as melancholy, joy, etc., *e.g.* wine is fluid ruby, honey is bitter and nauseous. A syllogism composed of such propositions is called poetry and its object is to impress the soul with a desire or dislike, and it is accompanied by metre and a sweet voice. [6] Preconceptions; being judgments of wahm (and not of reason) they are false propositions regarding things, which are not objects of the senses, *e.g.* what we can see is all that exists and beyond the world is infinite space. Preconceptions if they were not refuted by reason or revelation would pass for axioms, but their falsity can be recognized by this that reason assents to them as mere premisses of a syllogism; yet upon finding that they lead to a conclusion contradictory of its judgment, it cannot but deny and reject the result. A syllogism consisting of preconceptions is called sophistry, and its object is to silence the opponent.

§99. Fallacy means an error in the form of syllogism, which renders it inconclusive on account a violation of some important condition in reference to quantity or quality or mode, or of an error in the matter. In a fallacy one of the premisses and the question may be identical, the words used being synonymous, *e.g.* every man is a person, and every person is risible, therefore every man is risible. Or one of the premisses may be false but resembling truth, owing to the improper use of a word *e.g.* if we were to say of a painted horse; every horse neighs, this is a horse; therefore it neighs. Or the falsity of the premisses may be owing to a mistake in the meaning, *e.g.* all what is man and horse is man and all what is horse and man is horse; therefore some men are horse. Or a physical [universal] may be used instead of a [logical] universal, *e.g.* man is an animal, animal is a genus; therefore man is a genus. Or a conception of the intellect may be taken for a real thing and *vice versa*. You must observe all these things that you may not fall into error. He who makes use of fallacies is called sophist, if he meets a philosopher with them; but if he meets a disputant with them, he is called eristicos.

Second Inquiry.
On the parts of which Sciences consist.

§100. They are: [*First*] the subjects (or topics of the science) of which we have spoken above [§6]; [*Secondly*] the principles, that is to say, the descriptions (or definitions) of the subjects and their parts and essential accidents and the premisses [of the sciences. These are of two kinds,] either they are not self-evident and taken by the way of appointment [*i.e.* taken as granted; regarding "appointment" see §8.] *e.g.* connecting any two parts by a straight line; drawing a circle at any distance round any point—or they are self-evident, *e.g.* quantities equal to another quantity are equal among themselves. [*Thirdly*] the theorems; these are propositions by which the relation of the predicates to their subjects in the respective science is investigated. Their subjects are either identical with the subjects of the science, *e.g.* every quantity either has something in common with another quantity or it is heterogeneous. Or they are identical, but contain in addition an essential accident, *e.g.* every mean quantity is a side which is surrounded by the two extremes; or the subject is in the species, [and the subject of the science is the genus,] *e.g.* every line can be divided into two halves; or it is the species together with an essential accident, *e.g.* if a line stands upon another, the angles on either side are either two right angles or equal to two right angles; or it is an essential accident, *e.g.* the angles of every triangle are equal to two right angles. The predicates of theorems are external to their subjects, for it is inadmissible that it should be necessary to establish a part of a thing by demonstration. Here ends the Risálah Shamsyyah.