In the name of Allah, the Compassionate, the Merciful

CHAPTER 5

CONCLUSION
Islam is the divine and eternal religion that guides the whole mankind to the Right Path. It is a complete code of life. It stands for complete submission and surrender to the Will of Allah, the almighty. Besides other dimensions, Islam encourages the man to ponder over his own creation and the creation of the āfaq (universe) and whatever is therein. The man being the best creation (الإنسان) is bestowed with the gift of intellect, reasoning, power and logic besides other inevitable requirements by his Creator (الخالق).

Allah (S.W.T.) is the Ultimate Reality. The world being His creation, He is constantly supervising and overseeing it. Man being His vicegerent owes accountability to Him for all his deeds related to Him, his fellow beings and many other things around. Revealed knowledge, the Qur'an, is the book of guidance for him and he has to understand and assimilate the ideas ingrained in it and pattern his life within its parameters. The series of guidelines in the Qur'an is the perfect and supreme form of knowledge – unchangeable and unquestionable. The objects of the vast expanse around us are some of His signs. Man is duty bound to study them in the light of his relations with environment. Of course, the nature of the relationship is to be determined and explained by the holy Qur'an.

The Qur'an inspires the man to study his nafs (self) and āfaq (universe) in a scientific and objective manner. This study can generate operational Muslim science that reflects our needs, norms,
hopes, values and true vision. Thus, eventually leads to the emergence of true and real consciousness in the Muslim Ummah that can contribute to the revival of Islamic culture, science, and finally value based civilization.

We must sincerely present Islamic science in all its intellectuality and make no unwarranted and servile compromises with modern valueless ideologies. Islam prompts to seek the knowledge of the essence of things in relation to their divine origin.

The introduction of Islamic ethics and values in the science, technology, education, professional practice, policy-formulations, etc needs to be thought out, planned, and implemented with great care, wisdom, and in an organized manner.

The legacy of Muslims is, however, subject to critical scrutiny on the basis of the Qur'an and the Sunnah. True objectives cannot be realized unless Muslims fulfill certain preconditions. People, including the average Muslims, generally imagine contemporary era as a new age, an age of advancement and enlightenment. They commit the mistake of judging the worth of this era in the light of material considerations instead of spiritual and intellectual ones.

In the contemporary scenario the Muslim world is confronted with complex challenges. Muslim science centers, in the light of their experience during last two decades, need to become more vibrant institutions in their respective fields, and they need to adopt
appropriate policies and take relevant decisions in this connection, in such a way as to open new vistas for the Muslim world.

Muslims must channelize their energies in three effective directions in the Muslim world, namely increased interest in Internet-assisted distance education, promotion of education throughout the world even in the remotest areas, consolidation of the bases of the Muslim culture, development of libraries, further interest in the civilizational heritage of the Islamic world and endeavors to ensure an active presence in the culture of sciences. The Arabic language which is the historical language of Islamic scientific and cultural ethos and is broadly spoken in large parts of the Muslim world needs due recognition and patronage.

The fields of competence of the Islamic Organizations, namely; education, sciences, culture and communication, are the bridges to the future and the means of elevating our Islamic Ummah. The Islamic scientific and technological reference deserves serious attention for its accommodation in the entire future planning's of the Islamic Organizations. It can consequently ensure to integrate the efforts of Muslims and enable the Muslim Ummah to achieve its objectives in the future as well.

The Muslim world today is at the cross roads. In fact, it is struggling with developmental problems and their repercussions, facing global challenges and complications, rejecting false accusations and warding off tendentious campaigns. At the same time, it is
endeavouring to improve its conditions and build up its entity amidst adverse international and regional circumstances, and within a global atmosphere mobilized against its vital interests, the stability of its societies, as well as against the security, sovereignty and territorial safety of its countries. The Muslim world cannot aspire to a high status in this atmosphere without efficient solidarity, beneficial cooperation, well-devised integration and precise coordination within the framework embodied in the lofty Islamic principles.

It is imperative to enrich knowledge in the Muslim States by updating curricula and generalize schooling so that Muslim societies are empowered to enter the age of information and communication. Consolidating the relations of cooperation and exchange of experiences among Muslim States is the key to success. The Qur'anic world-view, the Qur'anic methodology, and the Qur'anic epistemology need to be emphasized by all standards. The Qur'an guides that 'ilm (knowledge) begins with iman (belief) which is firmly based upon tawhid.

Thus, whatever is obtained through revelation, observation, experimentation, experience and measurement has to be collated in the Qur'an to seek intelligence and wisdom. If the world is studied with this methodology and the knowledge thus obtained is developed in correspondence with the Qur'anic world-view then it is highly appreciable, significant and inevitable for establishing man's khilafah on the earth.
For a Muslim, science is purpose-oriented, just as all his activities are purpose oriented. A Muslim is a discriminating person in the sense that he must always endeavor to distinguish \textit{Haqq} (right) from \textit{bā'īl} (wrong) and beneficial from harmful. In the words of Prophet Muhammad (S.A.W.S) “He who is not merciful to others, will not be treated mercifully.”\textsuperscript{1} Science simply for the sake of science, with no thought given to its purpose or its consequences does not fit into the Muslim scientists' world-view. Islamic science is real, and different.

The world is embarking on an era where the advocates of racism, religious fanaticism, and intellectual and civilization isolation are spreading allegations and fallacies that only kindle the fires of hatred and enmity among the human beings. They deliberately promote unrest and purposefully cast doubts about historical facts and moral values. Those who do not know these facts and values find themselves in a quandary, torn between the radiance of faith, conviction and knowledge, and the darkness of doubt, fanaticism and ignorance, between tolerance, mutual understanding and dialogue and cooperation on the one hand, and hatred, racism, sectarian conflict and intellectual disputes on the other. This situation is of great concern and reflects the defectiveness of the international relations, the chaos of intellectual safety and cultural peace, and the dangerous

discrepancy between the values, principles, ideals and theories addressed today and adopted by the international community, and a reality that is replete with deviations in thought, erratic behaviour and an inclination for misleading minds, distorting the truth and baffling the international public opinion. Such a situation is unprecedented in world history, not only in its scope but also in that strange perseverance to promote evil, committing cruel injustice, and overusing deception and betrayal under pretexts that were used in the past to impress and befuddle the minds of the people who are devoid of any bias and prejudice.

Science, be it theoretical or experimental, has a special place in the Islam. Muslims' interest in experimental science throughout the golden age of Islam reached to such heights that were never achieved by any other civilization. This may be ascribed to a host of reasons among which is Islam's concern in its basic teachings regarding the status of man who is considered the noblest of all creatures. Other reasons are related to the scientific and empirical methods which Muslim scientists initiated. Therefore, the efforts exerted by different Islamic centers in this field constitute the modern new extension of an old cultural endeavour.

We turn to our past not to be locked up in it but to take from it provision for our future. In other words, we do not look back to our yesterday in order just to glorify it, but to benefit from it. Even in the field of empirical science, our scholars dive deep into the
tradition then come up with new pearls that enrich the present. Our heritage of scientific knowledge still has a lot to give even today when science has reached the zenith of its advancement.

May Allah the Almighty bestow on us success in order to achieve progress and prosperity for our glorious *Unmah* and to humanity at large.
GLOSSARY

Aerodynamics: Branch of fluid mechanics that deals with the motion of air and other gaseous fluids, and with the forces acting on bodies in motion relative to such fluids. The motion of an airplane through the air, the wind forces exerted on a structure, and the operation of a windmill are all examples of aerodynamic action.

Algorithm: Systematic procedure that produces – in a finite number of steps – the answer to a question or the solution of a problem.

Amputation: Process of cutting off a limb or other appendage of the body, especially in a surgical operation.

Anaesthetic: A substance that reduces sensitivity to pain and may cause unconsciousness, especially a drug used in medicine.

Annular eclipses: A solar eclipse in which all but the outermost rim of the sun is blocked by the moon, leaving a ring of sunlight visible around the moon.

Apogee: farthest point from the earth.

Apsides: In astronomy, either of the two points on an elliptical orbit that are nearest to, and farthest from, the focus, or centre of attraction.

Artificial Satellite: Any object purposely placed into orbit around Earth, other planets, or the Sun. Since the launching of the first
artificial satellite in 1957, thousands of these “man-made moons” have been rocketed into Earth orbit. Today, artificial satellites play key roles in the communications industry, in military intelligence, and in the scientific study of both Earth and outer space.

**Background Radiation:** Long wavelength electromagnetic radiation that hits the earth uniformly from all directions. Background radiation represents energy left over from the “big bang,” the explosion at the beginning of the universe. Electromagnetic radiation is energy that moves in oscillating waves at the speed of light, and it includes light, radio waves, and microwaves. Background radiation is most intense at microwave wavelengths. The microwave part of the electromagnetic spectrum is equivalent to the shortest wavelength radio waves. Microwaves have considerably longer wavelengths than visible light. In addition to microwave background radiation, radio and infrared (shorter than microwave) background radiation also exist.

**Calculus:** Branch of mathematics.

**Cauterization:** Process of sealing or destroy abnormal or infected tissue, with a heated instrument, a laser, an electric current, or a caustic substance.

**Chord:** Geometry line through arc.

**Comet:** (Latin stella cometa, “hairy star”), relatively small, icy celestial body revolving around the Sun. When a comet nears the Sun, some of the ice in the comet turns into gas. The gas and loose
dust freed from the ice create a long, luminous tail that streams
behind the comet.

**Computer:** Machine that performs tasks, such as calculations or
electronic communication, under the control of a set of
instructions called a program. Programs usually reside within the
computer and are retrieved and processed by the computer's
electronics. The program results are stored or routed to output
devices, such as video display monitors or printers. Computers
perform a wide variety of activities reliably, accurately, and
quickly.

**Cotangent:** A trigonometric function that for an acute angle is the
ratio between the leg adjacent to the angle when it is considered
part of a right triangle and the leg opposite.

**Cretaceous Period:** In geology, latest time period of the Mesozoic
era, lasting from about 138 million to about 65 million years
before present. The name alludes to the abundance of chalk
(Latin creta) strata deposited during the latter part of the period
in England and France and now exposed at sites such as Dover.
In Europe and North America, geologists divide the period into
an Early (144 to 97 million years ago) and a Late Cretaceous (97
to 65 million years ago).

**Dead Sea:** Salt lake in southwestern Asia. Bounded on the west by
Israel and the West Bank and on the east by Jordan, the Dead
Sea forms part of the Israeli-Jordanian border. The surface of
the Dead Sea, 408 m (1,340 ft) below sea level as of 1996, is the
lowest water surface on earth. The lake is 80 km (50 mi) long and has a maximum width of 18 km (11 mi); its area is 1,020 sq km (394 sq mi). The Dead Sea occupies a north portion of the Great Rift Valley. On the east the high plateau of Moab rises about 1,340 m (about 4,400 ft) above the sea; on the west the plateau of Judea rises to half that height. From the eastern shore a peninsula juts out into the lake. To the south of this peninsula the lake is shallow, less than 6 m (less than 20 ft) deep; in the north it reaches its greatest depth of 399 m (about 1,309 ft) below surface level, and 799 m (about 2,621 ft) below sea level.

**Decantation:** Process of pouring a liquid gently and carefully from one container to another so as not to disturb sediment.

**Dinosaur:** One of a group of extinct reptiles that lived from about 230 million to about 65 million years ago. The word dinosaur was coined in 1842 by British anatomist Sir Richard Owen, derived from the Greek words deinos, meaning “marvelous” or “terrible,” and sauros, meaning “lizard.” For more than 140 million years, dinosaurs reigned as the dominant animals on land. Owen distinguished dinosaurs from other prehistoric reptiles by their upright rather than sprawling legs and by the presence of three or more vertebrae supporting the pelvis, or hipbone. Dinosaurs are classified into two orders according to differences in pelvic structure: Saurischia, or lizard-hipped dinosaurs, and Ornithischia, or bird-hipped dinosaurs. Dinosaur bones occur in sediments that were deposited during the
Mesozoic Era, the so-called era of middle animals, also known as the age of reptiles. This era is divided into three periods: the Triassic (240 million to 205 million years ago), the Jurassic (205 million to 138 million years ago), and the Cretaceous (138 million to 65 million years ago).

**Ellipse**: Geometry shape resembling oval.

**Equinox**: 1: either of the two points on the celestial sphere where the celestial equator intersects the ecliptic. 2: either of the two times each year (as about March 21 and September 23) when the sun crosses the equator and day and night are everywhere of equal length.

**Estuary**: semi enclosed coastal area, where seawater mixes with fresh water from rivers; also, the tidal area of the lower part of a river. There are usually three overlapping zones in an estuary: an open connection with the sea where marine water preponderates, a middle area where strong salt water and fresh water mix, and a tidal river zone where fresh water preponderates. Tidal forces create variable estuarine characteristics in sea inlets. Variation in the seasonal discharge of rivers causes the limits of these zones to shift, and this increases the overall ecological complexity of estuaries. Estuaries are highly productive ecosystems, accounting for one-half of the living matter of the world's oceans.

**Euclid**: He was the most prominent mathematician of Greco-Roman antiquity, best known for his treatise on geometry, the *Elements*. He flourished in c. 300 BC, Alexandria, Egypt.
**Imponderability:** Phenomenon which cannot be weighed physically.

**Khilafah:** Signifies man’s vicegerency of Allah’s attributes. Man is charged with the responsibility of sustaining himself and other creatures of the globe faithfully according to the divine characteristics of Allah. The faithful execution of this sublime responsibility is, in fact, the true nature of *ibadat* (worship) in Islam.

**Latent heat:** A number of physical changes are associated with the change of temperature of a substance. Almost all substances expand in volume when heated and contract when cooled. The behavior of water between 0° and 4° C (32° and 39° F) constitutes an important exception to this rule. The phase of a substance refers to its occurrence as either a solid, liquid, or gas, and phase changes in pure substances occur at definite temperatures and pressures. The process of changing from solid to gas is referred to as sublimation, from solid to liquid as melting, and from liquid to vapor as vaporization. If the pressure is constant, these processes occur at constant temperature. The amount of heat required to produce a change of phase is called latent heat, and hence, latent heats of sublimation, melting, and vaporization exist. If water is boiled in an open vessel at a pressure of 1 atm, the temperature does not rise above 100° C (212° F), no matter how much heat is added. The heat that is absorbed without changing the
temperature of the water is the latent heat; it is not lost but is
expended in changing the water to steam and is then stored as
energy in the steam; it is again released when the steam is
condensed to form water. Similarly, if a mixture of water and
ice in a glass is heated, its temperature will not change until all
the ice is melted. The latent heat absorbed is used up in
overcoming the forces holding the particles of ice together and
is stored as energy in the water. To melt 1 g of ice, 79.7 cal are
needed, and to convert 1 g of water to steam at 100° C, 541 cal
are needed.

**Lunar eclipse:** Eclipse of the moon – an eclipse of the moon caused
by the earth passing between the sun and the moon and casting
its shadow on the moon.

**Midwifery:** The technique or practice of helping to deliver babies
and offering advice and support to pregnant women.

**Milky Way:** The large, disk-shaped aggregation of stars, or galaxy,
that includes the Sun and its solar system. In addition to the Sun,
the Milky Way contains about a trillion other stars. Its name is
derived from its appearance as a faintly luminous band that
stretches across earth’s sky at night. This band is the disk in
which the solar system lies. Its hazy appearance results from the
combined light of stars too far away to be distinguished
individually by the unaided eye. The individual stars that are
distinct in the sky are those in the Milky Way Galaxy that lie
sufficiently close to the solar system to be discerned separately.
**Nebula:** In astronomy, a localized conglomerate of the gaseous and finely divided dust particles that are spread throughout interstellar space. Before the invention of the telescope, the term nebula (Latin, "cloud") was applied to all celestial objects of a diffuse appearance. As a result, many objects now known to be star clusters or galaxies were called nebulas.

**Obliquity of the ecliptic:** The angle between the planes of the earth's equator and orbit having a value of about $23^\circ27'$.

**Orthographic:** Graph composed of vertical lines.

**Paraboloid:** Geometric surface: a mathematical surface in which intersections with planes produce parabolas, ellipses, or hyperbolas.

**Phlogiston:** In early chemical theory, hypothetical principle of fire, of which every combustible substance was in part composed. In this view, the phenomena of burning, now called oxidation, was caused by the liberation of phlogiston, with the dephlogisticated substance left as an ash or residue.

**Ptolemy:** Egyptian astronomer, mathematician, and geographer of Greek descent who flourished in Alexandria during the 2nd century AD. In several fields his writings represent the culminating achievement of Greco-Roman science, particularly his geocentric (Earth-centered) model of the universe now known as the Ptolemaic system. Virtually nothing is known about Ptolemy's life except what can be inferred from his writings. His first major astronomical work, the Almagest, was completed about AD 150.
and contains reports of astronomical observations that Ptolemy had made over the preceding quarter of a century. The size and content of his subsequent literary production suggests that he lived until about AD 170.

**Prostate Gland:** Chestnut-shaped male organ located next to the bladder and surrounding the urethra (the tube that carries urine from the bladder to the penis). The prostate gland produces a secretion known as prostate fluid that makes up most of the liquid part of semen, which is discharged from the penis during sexual orgasm. Measuring about 3 cm (about 1.2 in) across, the prostate gland is composed of both glandular tissue that produces prostate fluid and muscle tissue that helps in male ejaculation. Prostate fluid also helps to keep sperm, which is found in semen, healthy and lively, thereby increasing the chances that fertilization will occur.

**Quasars:** A compact object in space, usually with a large red shift indicating extreme remoteness, that emits huge amounts of energy, sometimes equal to the energy output of an entire galaxy.

**Redshift:** Change or shift, in the light radiated by an object, such as a star or galaxy that indicates the object's motion. Scientists have used redshifts to measure the velocities (speed and direction) of distant galaxies. Knowing the velocities of galaxies helps astronomers understand how the universe is changing. This
knowledge allows scientists to interpret the distant past of the universe and to predict the universe's distant future.

**Richter Scale:** Method of ranking the strength or size of an earthquake. The Richter scale, also known as the local magnitude scale, was devised in 1935 by the American seismologist Charles F. Richter to rank earthquakes occurring in California. Richter and his associates later modified it to apply to earthquakes anywhere in the world.

**Rocket:** Self-propelled device that carries its own fuel, as well as the oxygen, or other chemical agent, needed to burn its fuel. Most rockets move by burning their fuel and expelling the hot exhaust gases that result. The force of these hot gases shooting out in one direction causes the rocket to move in the opposite direction. A rocket engine is the most powerful engine for its weight. Other forms of propulsion, such as jet-powered and propeller-driven engines, cannot match its power. Rockets can operate in space, because they carry their own oxygen for burning their fuel. Rockets are presently the only vehicles that can launch into and move around in space.

**Seminal vesicles:** are small sacs that hold semen.

**Solar eclipse:** An eclipse in which the moon blocks all or part of the sun's light from reaching the earth's surface, because it passes directly between the earth and the sun.
Solar System: The Sun and the celestial bodies orbiting the Sun, including the nine planets and their satellites; the asteroids and comets; and interplanetary dust and gas. The term may also refer to a group of celestial bodies orbiting another star.

Space Station: Any facility that enables humans to live in space for long periods of time. Space stations are used as laboratories where scientific and engineering experiments are conducted and as servicing centers where spacecraft can be repaired, upgraded, or even constructed. Space stations are expected to one day act as spaceports where spacecraft can pick up and deliver people, cargo, and fuel on the way to or returning from distant destinations, such as Mars.

Statics: In physics, the subdivision of mechanics that is concerned with the forces that act on bodies at rest under equilibrium conditions. The methods and results of the science of statics have proved especially useful in designing buildings, bridges, and dams, as well as cranes and other similar mechanical devices. To be able to calculate the dimensions of such structures and machines, architects and engineers must first determine the forces that act on their interconnected parts. Statics provides the analytical and graphical procedures needed to identify and describe these unknown forces.

Stypics: Able to stop bleeding.
Sublimation: Conversion of substance from the solid to vapor state with its becoming liquid e.g., vaporization of frozen $\text{CO}_2$ (dry ice) at ordinary atmospheric pressure and temperature.

Sundials: The earliest type of timekeeping device which indicates the time of day by the position of the shadow of some object exposed to the sun's rays.

Testis: Also called testicle, one of a pair of male sex glands that produce sperm cells. Testes are present in most animals. In backboned animals the testes produce male sex hormones, called androgens, as well as sperm. In man the testis is an oval organ about 5 cm (about 2 in) long. During embryonic development it is located in the abdominal cavity, but about a month before birth it normally descends into a pouch of skin called the scrotum. Each testis contains about 800 narrow twisting tubes, called seminiferous tubules that are lined with cells that, upon maturation, divide to form the sperm. The seminiferous tubules merge and form a larger tube, the epididymis. Sperm travels from the testis through the epididymis to the vas deferens, which carries the sperm to the urethra. Sperm exits from the urethra during ejaculation (the release of semen during orgasm). In man the sex hormone produced by the testis is testosterone, which controls the growth of the male reproductive system and stimulates the development of the male secondary sexual characteristics, such
as the growth of the beard, the deepening of the voice, and the male contours of the body. It also influences male sexual behavior.

**Trepidation:** A tremulous motion, a discrete small movement.

**Ummah:** The ensemble of Muslim individuals and communities forming a entity of common culture, legal system, jurisprudence etc. and a certain self-consciousness but not necessarily a coincident common polity.