

HISTORY & PHILOSOPHY OF SCIENCE

COMMON COURSE IN ENGLISH

**For
BA/B.Sc. IV SEMESTER
BBA I SEMESTER**

(2012 Admission)



**UNIVERSITY OF CALICUT
SCHOOL OF DISTANCE EDUCATION**

CALICUT UNIVERSITY P.O., MALAPPURAM, KERALA, INDIA - 673 635

106 (A)

UNIVERSITY OF CALICUT
SCHOOL OF DISTANCE EDUCATION

STUDY MATERIAL
COMMON COURSE IN ENGLISH

For
BA/B.Sc. IV SEMESTER
BBA I SEMESTER

Prepared By

Ms. Neethu Baby
Assistant Professor
Department of English
St. Joseph's College, Devagiri.

Scrutinized by

Dr. M.A Sajitha
Assistant Professor,
Centre for Advanced Studies and Research in English
Farook College, Calicut – 673632.

©
Reserved

CONTENT

<u>CHAPTER</u>	<u>PAGE NOS.</u>
1. GENERAL HISTORY OF SCIENCE	5 – 11
2. THE ACTUALITY OF THE HISTORY OF SCIENCES	12 -14
3. THE NEED FOR STUDIES IN HISTORY OF SCIENCE	15 – 20
4. THE WORLD AS I SEE IT	21 – 24
5. SOME MEMORIES	25 – 28
6. ALFRED NOBEL	29 – 35
7. SCIENCE & SOCIETY	36 – 39
8. PUBLIC KNOWLEDGE	40 – 46
9. ARE MEN OF SCIENCE SCIENTIFIC	47 – 50
10. THE TWO CULTURES	51 – 57
11. DOVER BEACH	58 – 60
12. THE PYLONS	61 – 62
13. MY SON, THE PHYSICIST	63 - 65

CHAPTER I

GENERAL HISTORY OF SCIENCES

GLOSSARY

Mode	:	Method
owe	:	Indebted to
Pronounced	:	declared
Predominance	:	Being more powerful than others
Legitimately	:	Legally
Facilitate	:	Make easy
Orientation	:	Direction
Entirety	:	Whole or complete
Glaring	:	Shining
Apparent	:	Clearly seen or understood
Michel Chasles	:	a French mathematician
Variable	:	Real
Erudition	:	Knowledge
Posterity	:	Future generation
M.Berthelot	:	Pierre Engene Marcellin Berthelot was a French chemist and politician famous for Thomas-Berthelot principle of Thermo Chemistry. He synthesized many organic and inorganic compounds
Alchemy	:	Chemistry
Sagacity	:	Good judgment
Illustrious	:	Celebrated
Compatriot	:	Fellow countryman
Disconcerting	:	Not properly planned
Enigmas	:	Mysterious
Milieu	:	Social surrounding
Content	:	Satisfied
Suffice	:	be enough for
Auxiliaries	:	Supporting

Concert	: Designed
Affiliation	: enter into an association
Desideratum	: requirement
Predecessors	: former holders of a position
In contestable	: Undebatable
Pompous	: showing self importance
Compilations	: to collect and arrange information
Conceive	: to form or make an idea or plan
Synthesis	: Combination of separate parts
Vague	: Not clear
Obscure	: Dark or hidden
Etymology	: Studying of history of words
Proportion	: Relation of one thing to another in quality or size
Matrix	: Mould into which hot metal or liquid is put to get shape
Lacunae	: Missing portion
Rapprochement	: coming back together
Conjectures	: to put forward an opinion formed without facts as proof
Lexicon	: dictionary
Explicate	: Analyse and develop
Lacuna	: Unfilled space
Sundering	: to keep apart

Paul Tannery in his lecture written in the form of an introduction to a book, talks of the history of science, its significances, the need for general history and specific histories of sciences and how to synthesize history of science from the evidences available to us.

Science has been from its origin an essential factor of progress of human civilization. Hence it should be studied like the history of Art or history of Literature. But unlike other histories, history of science has not properly been studied. It's difficult to find a historian of science as a scholar capable of explaining science as a whole is rare as scholars learn only specific histories needed for their topic. But there have been examples of some scientists trying to compose History of Science. Tannery takes examples from French. Laplace's "Exposition du systeme du monde" is an example. French Mathematician, Michel Chasles's "Apercu historique sur origine et le development" is another example. Engine Marcellin Berthelot's work on the origins of alchemy reveals to us an entirely unknown past. These examples prove that to be a good historian of science one should not only be a scholar but should devote oneself to history and develop a historical sensibility, one different from scientific sensibility. Special types of knowledges are necessary for a historian and this makes it difficult to compose history of Science. The scholar of science is interested only in particular history and they specialize only in their topics.

The pure historian who does not have a scientific temperament cannot thus make a general history of science. The philosopher who attempts to answer the have and why of science would want more technical details than a pure historian.

Attempts have been made in France to compose the history and philosophy of science. When we search for the answer to the question, "What is the general history of science?", we find that the various books on science cannot answer this.

Paul Tannery attempts to synthesis a history of science. Synthesis- etymologically means composition. Tannery attempts to create a general history of science through analysis or decomposition. He feels that a historian usually obtains the elements which he wishes to use following his own tastes and neglecting others. History should be independent of personal choice. When different chemicals combine we get various products according to the quality and quantity of the chemicals used. Likewise history of

science should be composed in a balanced manner giving equal importance to all elements. Thus general history of science should be synthesized from specific histories which have taken raw materials from original sources. The specific histories of pure mathematics, astronomy and rational mechanics are sufficiently developed and medicine is studied but not history of physics, chemistry and biological sciences. Science is progressing rapidly and technology updates every second. So it is difficult to synthesis particular histories. It is faculty to generalize from the existing evidences. We need to verify them and reach conclusions. A historian should be aware of his composition and its demerits when composing a history. A history is an individual's articulation. So a historian should be careful of his work. When selecting matter from a general source he should know that an original or ancient source has

- 1) General details about a topic that every person can understand
- 2) Special details intelligible to those who are familiar with the topics

But if a secondary source is used for composing history we know that the details are retold by another and would be less analytical than the original.

Specific histories thus are formed of details needed to prove a scientific phenomenon, but a general history of science of a particular civilization arranged chronologically, explains the general history of a civilization.

General history of science would give a different perspective of science, a total view of science and its progress. In addition to the biographies of scientists, the ideas resulting in a discovery and the influences of intellectual, economical and social factors on science should also be topics of study.

General history would give a chronological order of arrangement of the development of human civilization and recreation of specific histories aims at reconstruction of history from a different view point. Thus study of general history of science and specific history of science are distinct.

Answer the following

1. Wrote on the origins of alchemy?

- a) Berthelot b) Paul Tannery
- b) Michel Chasles d) Laplace

2.....French mathematician and historian of mathematics

- a) Paul Tannery b) M.Berthelot
- b) Michel Chasles d) Laplace

Answer in 2 or 3 sentences

1. What are the unfavourable conditions in writing the history of science?
2. How is general history of science different from specific history of science?
3. What are the limitations of a scholar to be a historian?

Paragraph

1. How can history be synthesized?
2. What is the significance of history of science?

Essay

1. What are the factors affecting the synthesis of history of science?

ANSWERS

1.(a) 2.(b)

Answer in 2 or 3 sentences

1. A good historian of science, should not only be a scholar but should devote oneself to history and develop a historical sensibility, one different from scientific sensibility. Special types of knowledge are necessary for a historian and this makes it difficult to compose history of Science. The scholar of science is interested only in particular history and they specialize only in their topics.

2. General history would give a chronological order of arrangement of the development of human civilization and recreation. Specific histories aims at reconstruction of history from a different view point. Thus study of general history of science and specific history of science are distinct.
3. Special types of knowledge are necessary for a historian and this makes it difficult to compose history of Science. The scholar of science is interested only in particular history and they specialize only in their topics.

Paragraph

1. Paul Tannery attempts to synthesis a history of science. Synthesis- etymologically means composition. Tannery attempts to create a general history of science through analysis or decomposition. He feels that a historian usually obtains the elements which he wishes to use following his own tastes and neglecting others. History should be independent of personal choice. When different chemicals combine we get various products according to the quality and quantity of the chemicals used. Likewise history of science should be composed in a balanced manner giving equal importance to all elements. Thus general history of science should be synthesized from specific histories which have taken raw materials from original sources. The specific histories of pure mathematics, astronomy and rational mechanics are sufficiently developed and medicine is studied but not history of physics, chemistry and biological sciences. Science is progressing rapidly and technology updates every second. So it is difficult to synthesis particular histories. It is faculty to generalize from the existing evidences. We need to verify them and reach conclusions. A historian should be aware of his composition and its demerits when composing a history. A history is an individual's articulation. So a historian should be careful of his work. When selecting matter from a general source he should know that an original or ancient source has

- 3) General details about a topic that every person can understand
- 4) Special details intelligible to those who are familiar with the topics

But if a secondary source is used for composing history, we know that the details are retold by another and would be less analytical than the original.

2. Specific histories thus are formed of details needed to prove a scientific phenomenon but a general history of science of a particular civilization arranged chronologically explains the general history of a civilization.

General history of science would give a different perspective of science, a total view of science and its progress. In addition to the biographies of scientists, the ideas resulting in a discovery and the influences of intellectual, economical and social factors on science should also be topics of study.

General history would give a chronological order of arrangement of the development of human civilization and recreation of specific histories aims at reconstruction of history from a different view point. Thus study of general history of science and specific history of science are distinct.

CHAPTER 2

THE ACTUALITY OF THE HISTORY OF SCIENCES

GLOSSARY

Epistemology	:	the theory of knowledge, especially with regard to its methods, validity etc.
Veritable	:	used for emphasis
Relegate	:	assign an inferior rank(make less important)
Decadence	:	moral or cultural decline
Regression	:	former or less developed state

Gaston Bachelard talks of the progress of science. When we learn the history of science we talk of the history of ideas. There is never decadence of intelligence but there is decadence of nation, people and culture. Sometimes a badly utilized scientific thought can cause stagnation. Sometimes a theory would be forgotten and years later would be explained with further evidence. There is no absolute truth but various experiments are needed to reach a conclusion in science. There is a course of development of science – change of Cartesian world (where there is clear separation between subject and object) to the modern world order where the subject and object are part of a system. Thus study of the history of science helps to gain deep knowledge of modern science.

It's fascinating to note the progress of science. When we enter the Palais de la Deconvertre,(a science museum located in Grand. Palais, Paris) which contains permanent exhibits of Mathematics, physics, astronomy, chemistry etc. one wonders whether coming to see the past inventions is a crime. Some times history of science is learned for curiosity as a relaxed investigation to have a knowledge of past.

This essay, the Actually of Sciences, talks of the positive effects scientific thoughts can contribute to contemporary society.

History of science is different from all other histories. We don't think of decadence of scientific thought. But we talk of decadence of a people, nation or culture. When

civilizations decline there is stagnation of knowledge, due to deterioration in customs, intellectual and moral poverty. Science as we know can have periods of inactivity. A badly utilized scientific thought can be a cause of stagnation. During periods of general regression truth awaits renaissance. For a historian this is the end of particular line research from which a new line of research begins. Sometimes a particular line of thought can remain dormant until it rejuvenates to form a new idea. History of science always talks of progress of human civilization.

When we talk of decadence, science never declines but it enters another axis of thought. Unlike Science, Art of every period has a sense of eternity, kind of primitive perfection even in its first attempt. The history of philosophy recognizes the various contributions in their isolations. There are numerous contributions made and one final result is attained in a specific stream of thought in Science. Science is not an individual's work but combined activity.

Answer the following

- 1) The formation of scientific mind is a work by.....
- a) Gaston Bachelard b) Isaac Newton
 - b) C) Albert Einstein d) None of the above

Answer in 2 or 3 sentences

1. How is history of art different from history of science?
2. A history of science cannot simply be a recorded history why?

Answer in a paragraph?

1. Why is history of science always described as history of progress?
2. Knowledge has no decadence. Why?

Essay

1. What does the author mean by actuality of the history of science?

ANSWERS

1. (a)

Answer in 2 or 3 sentences

1. Art of every period has a sense of eternity, kind of primitive perfection even in its first attempt. When we talk of decadence, science never declines but it enters another axis of thought.
2. History of science is different from all other histories. We don't think of decadence of scientific thought. But we talk of decadence of a people, nation or culture. When civilizations decline there is stagnation of knowledge due to deterioration in customs, intellectual and moral poverty.

Answer in a paragraph

1. When we learn the history of science we talk of the history of ideas. There is never decadence of intelligence but there is decadence of nation, people and culture. Sometimes a badly utilized scientific thought can cause stagnation. Sometimes a theory would be forgotten and years later would be explained with further evidence. There is no absolute truth but various experiments are needed to reach a conclusion in science. There is a course of development of science –change of Cartesian world (where there is clear separation between subject and object) to the modern world order where the subject and object are part of a system . Thus study of the history of science helps to gain deep knowledge of modern science.

2. History of science is different from all other histories. We don't think of decadence of scientific thought. But we talk of decadence of a people, nation or culture. When civilizations decline there is stagnation of knowledge, due to deterioration in customs, intellectual and moral poverty. Science as we know can have periods of inactivity. A badly utilized scientific thought can be a cause of stagnation. During periods of general regression truth awaits renaissance. For a historian this is the end of particular line research from which a new line of research begins. Sometimes a particular line of thought can remain dormant until it rejuvenates to form a new idea. History of science always talks of progress of human civilization.

CHAPTER-3

THE NEED FOR STUDIES IN HISTORY OF SCIENCE

GLOSSARY

Eminent	:	great (remarkable)
Forte	:	Strong point (advantage)
Stupendous	:	large (huge in size)
Disseminating	:	Spread out (give away)
Culmination	:	The highest or climatic point (peak)
Erudite	:	Scholar (person of great knowledge)
Exponential	:	become more and more rapid
Edifice	:	imposing and large building
Bernal	:	John Desmond Bernal is an Irish born scientist and Communist
Nominal	:	for name sake (small amount)
Imbued	:	Inspire or permeate with a quality or feeling
Replete	:	filled with
Ceramics	:	Objects made by shaping clay through heating clay.
Headway	:	progress
Enigmas	:	Something that is mysterious
Unfathom	:	Bottomless (difficult to measure)
Kaaba	:	mosque built by the orders of prophet.
Praxis	:	Practice (something that is done practically)
Needham	:	Joseph Needham is a Chinese Historian on Science, Techonology and Medicine.
Per se	:	by itself or in itself (intrinsically)

The course on History of Science was launched in 1994 by the Asiatic society as the result of the attempts made by late Samarendra Nath Sen, an Indian historian of science.

The writer, Professor Sushil Kumar Mukhejee tries to find answer to the question Why we should learn the history of science. Science unlike many other phenomenons has a continuous growth. Science has brought revolutionary changes in world order. A scientific revolution enabled mankind to get out of the feudal system. With industrial revolution, science assumed a high position as the most productive force of society. Science thus became powerful than political and economical forces. John Bernal, an Irish scientist states, “If capitalism made science possible, Science in its turn was to make capitalism unnecessary.”

By 17th century, science made a new world order. Aristotle’s world was replaced by Newton’s world. Though industrial revolution was a result of scientific revolution, there was a slowing down of science after industrial revolution as industries concentrated in certain locations. At the initial stage of revolution the contribution to science was nominal. The steam engine was a great contribution of the period. Later, industries demanded more and more. The spirit of science led to exchange of information between scientists to improve and develop the quality of the products.

Unlike Europe, countries like Babylonia, Egypt, China, India, Greece and Arabia have a much earlier history of scientific activities.

History of science in India after the Harappan civilization was that of the Vedic people. During the Post-Vedic period there emerged Ayurveda and industries such as ceramics, iron, glass and agriculture also made rapid progress.

During 400-900 A.D., different branches of science such as mathematics, astronomy, medicine, chemistry, alchemy, atomism, agriculture etc. made great progress.

During medieval period astronomy, mathematics, medicine etc. made progress. Both China and India made wonderful inventions long before scientific revolution. But modern science did not develop in these countries. The mystery behind this will only be answered if we learn the history of the social conditions of these countries.

Greeks and Babylonians too have great history of science. But these cultures could not contribute to modern science.

The culture, myths and historical and philosophical aspects contributed to this. Europeans concentrated on the laws of nature. Japanese believed that science and technology was aimed at material progress. Japanese aimed at developing physical and applied science and not biological science. They were not concerned with philosophical and theoretical details where as Europe was. Japanese considered science as a political faculty rather than a cultural system.

Islamic civilization used science for regulation of religious functions. They concentrated on astronomy and geography to regulate their prayers and religious practices.

Looking at the history of science we can see that science do not have a linear progression. It developed in various cultures at various time periods. Greeks owe their development to Babylonians and Egyptians and Indian science contributed to the scientific spirit of Arabians and they spread science in Europe.

Science has duality. There is scientific aspect of science-experimentation, observation and verification-the subjectivity and universality of science. There other aspect of science is the cultural, economic and political forces that contribute to science. The development of a particular branch of science in preference to another, should science be used as a source of power either for oneself or for dominating over others etc. depends on the society's will. The progress of science depends an social, cultural, philosophical, religious, economical and political factors.

Joseph Needham, a historian of Chinese Science, Technology and Medicine, in his foreword to D.P Chattopadhyaya's "Science and Technology in Ancient India" wrote that there are attempts made to free science from religious and societal laws. But Needham commented that today ethics is needed more than ever in science irrespective of one's attitude to religion.

John Bernal points out that capitalism prevented science from being used for human progress. We are now afraid of the destruction science is capable of doing to mankind.

Science is an inevitable part of civilization. During wars new sciences developed. This raises the question whether wars are needed for the progress of science. The study of the history of science can possibly answer many questions on the development of science and hence history of science should be studied with due respect.

Answer the following

1. Barishal is a place in
(a) India (b) Pakistan
(c) Bangladesh (d) None of these
2. _____ is the founder president of the west Bengal academy of science and technology.
(a) Prof. N.R Dhar (b) J.C Ghosh
(c) J.N Mukherjee (d) Sushil Kumar Mukharjee
3. _____ made science possible
(a) Feudalism (b) capitalism
(c) poverty (d) Political reasons
4. Ayurveda emerged during _____ period
(a) Post-vedic period (b) Vedic period
(c) Indus valley (d) Modern
5. Samurais are war lords of _____
(a) China (b) Japan
(c) Korea (d) India

Answer in 2 or 3 sentences

1. What is duality of science?
2. What is the need for ethics in science?
3. How did Islamic civilization use science?
4. What is the difference between European science and ancient science?

Answer in a paragraph

1. Science depends on culture, economy and politics of a society. Comment.
2. Trace the evolution of science in early India?
3. Why couldn't china and India contribute to modern science?

Essay

1. Why should we study the history of science?
2. Why science is called inevitable part of civilization?

ANSWER

1. (c) 2. (d) 3. (a) 5. (b)

Answer in 2 or 3 sentences

1. Science has duality. There is scientific aspect of science-experimentation, observation and verification-the subjectivity and universality of science. The other aspects of science are the cultural, economic and political forces that contribute to science.

2. John Bernal points out that capitalism prevented science from being used for human progress. We are now afraid of the destruction science is capable of doing to mankind. Needham commented that today ethics is needed more than ever in science irrespective of one's attitude to religion.

3. Islamic civilization used science for regulation of religious functions. They concentrated on astronomy and geography to regulate their prayers and religious practices.

4. The culture, myths and historical and philosophical aspects contributed to this. Europeans concentrated on the laws of nature. Japanese believed that science and technology was aimed at material progress. Japanese aimed at developing physical and applied science and not biological science. They were not concerned with philosophical and theoretical details where as Europe was. Japanese considered science as a political faculty rather than a cultural system.

Answer in a paragraph

1. Looking at the history of science we can see that science do not have a linear progression. It developed in various cultures at various time periods. Greeks owe their development to Babylonians and Egyptians and Indian science contributed to the scientific spirit of Arabians and they spread science in Europe.

Science has duality. There is scientific aspect of science-experimentation, observation and verification-the subjectivity and universality of science. There other aspects of science are the cultural, economic and political forces that contribute to science. The development of a particular branch of science in preference to another, should science be

used as a source of power either for oneself or for dominating over others etc. depends on the society's will. The progress of science depends on social, cultural, philosophical, religious, economical and political factors.

2. History of science in India after the Harappan civilization was that of the Vedic people. During the post-vedic period there emerged Ayurveda and industries such as ceramics, iron, glass and agriculture also made rapid progress.

During 400-900 A.D., different branches of science such as mathematics, astronomy, medicine, chemistry, alchemy, atomism, agriculture etc. made great progress.

3. History of science in India after the Harappan civilization was that of the Vedic people. During the Post-Vedic period there emerged, Ayurveda and Industries such as ceramics, iron, glass and agriculture also made rapid progress.

During 400-900 A.D., different branches of science such as mathematics, astronomy, medicine, chemistry, alchemy, atomism, agriculture etc. made great progress.

During medieval period astronomy, mathematics, medicine etc. made progress. Both China and India made wonderful inventions long before scientific revolution. But modern science did not develop in these countries.

CHAPTER-4

The World As I See It

GLOSSARY

Pivotal	:	Important
Strategy	:	art of planning actions in a war
Dwelling	:	home (place of stay)
Solitude	:	loneliness
Awe	:	respect combined with fear and reverence
Cognate	:	related or connected
Sojourn	:	journey
Exert	:	to force
Frugal	:	worthless (little money)
Engrossing	:	to take up time or attention
Mitigate	:	make something less serious or painful
Absurd	:	meaningless
Endeavor	:	task or job
Ethical	:	system of moral principles
Pigsty	:	a pen or enclosure for pigs
Kinship	:	blood relation
Contemptible	:	condition of being looked down
Trite	:	idea lacking originality or freshness
Consonance	:	agreement or co-ordination of actions.
Reverence	:	respect
Feeble	:	weak or mild
Coerced	:	to force somebody to do things
Pageant	:	something that is a series of varied and interesting events
Sentient	:	able to feel things
Outcrop	:	that part of the vein that can be seen above the surface
Abhor	:	distrustful or hateful

Vile	:	evil
Despicable	:	deserving hatred
Pogey	:	score that a good player makes for a series and which becomes a standard for others
Penetrate	:	to enter into, see into or make way into
Profound	:	deep
Schopenhauer	:	Arthur Schopenhauer is a German philosopher known for his pessimism and philosophical clarity

Albert Einstein, the world famous scientist shares his views on democracy, politics, war and God through this short passage.

Albert Einstein wonders at humans. Humans think of the purpose of one's life and sometimes one feels that he knows it. We know that humans depend on each other for survival. We get the fruits of other people's hard work. Einstein feels that the division of society into various classes is unjustifiable and is done with force. According to Einstein, man should have simple and unassuming life.

Einstein was inspired by the German philosopher, Arthur Schopenhauer's words that "man can do what he wants, but not want what he wants." Tolerating fellow human beings makes life comfortable and humorous and less severe.

It's meaningless to search the meaning of one's life. Kindness, Beauty and Truth are the qualities which make life possible. Kinship with fellow beings is necessary for peaceful living. Material and physical wealth are trivial and unimportant.

Einstein feels that his passionate sense of social justice and social responsibility has contrasted with his lack of direct contact with other human beings and human communities. Einstein was a lonely traveler who enjoyed solitude and kept a distance from family and friends. But he always had a sense of social responsibility and commitment. A person who lives in harmony with society gains knowledge and is concerned about fellow beings. Man should be independent of his opinions, habits and judgment but should live in harmony with the society. Einstein believes in democracy where every person has his freedom. An

autocratic government degenerates. The political system of the U.S (democracy) is better than that of Germany (dictatorship). Citizens have personal freedom in a Democracy. The individual's passions, feelings and personality are important than the political system.

The military system which is the surface projection of our political system is irritable for Einstein. He calls it the disease (plague) of a civilization. He prefers to die rather than take part in a war. Human kind would have attained more progress if it were not corrupted by press and politics.

According to Einstein the most beautiful experience of life is faith in God. He admits that he is a religious man with little knowledge about God. Einstein do not believe in a God who rewards and punishes his creation, nor God as a man who survived death. Einstein wonders at the magical design of nature and is happy to discover natural laws and takes pleasure in demystifying them.

Answer the following

1. Einstein received Nobel Prize for physics in
(a) 1919 (b) 1920 (c) 1921 (d)1922
2. Class distinctions is based on
(a) money (b) force (c) power (d) none of the above.

Answer in 2 or 3 sentences

1. What makes life tolerable according to Einstein?
2. What is important in human's life?
3. What is the most beautiful experience one can have?

Answer in a paragraph

1. What are Einstein's views on religion and on God?
2. Why does he call man's life absurd?

Essay

1. How does Einstein define life?
2. What are Einstein's views on politics, religion and society?

ANSWERS

1.(c) 2. (b)

Answer in 2 or 3 sentences

1. Kinship with fellow beings is necessary for peaceful living. Material and physical wealth are trivial and unimportant.

2. The individual's passions, feelings and personality is important than the political system.

3. According to Einstein the most beautiful experience of life is faith in God. He admits that he is a religious man with little knowledge about God. Einstein does not believe in a God who rewards and punishes his creation, or God as a man who survived death.

Answer in a paragraph

1. According to Einstein the most beautiful experience of life is faith in God. He admits that he is a religious man with little knowledge about God. Einstein does not believe in a God who rewards and punishes his creation, or God as a man who survived death. Einstein wonders at the magical design of nature and is happy to discover natural laws and takes pleasure in demystifying them.

2. Albert Einstein wonders at humans. Humans think of the purpose of one's life and sometimes one feels that he knows it. We know that humans depend on each other for survival. We get the fruits of other people's hard work. Einstein feels that the division of society into various classes is unjustifiable and done with force. According to Einstein man should have simple and unassuming life.

Einstein was inspired by the German philosopher, Arthur Schopenhauer's words that "man can do what he wants, but not want what he wants." Tolerating fellow human beings makes life comfortable and humorous and less severe.

It's meaningless to search the meaning of one's life. Kindness, Beauty and Truth are the qualities which make life possible. Kinship with fellow beings is necessary for peaceful living. Material and physical wealth are trivial and unimportant.

CHAPTER 5

SOME MEMORIES

GLOSSARY

Excerpt	:	Short piece of writing
Vivid	:	Clear
Adhere	:	To stick to
Intrinsic	:	Inherent
Triples	:	Minor acts (unimportant matter)
Loin Cloth	:	Piece of cloth worn around hips (mundu)
Affirmative	:	Confirmation
Formidable	:	Impressive and powerful
Strenuously	:	Needing great energy and effort
Ebullition	:	Energy
Whiff	:	A smell especially one that you only smell for a short time
Meteorologist	:	A scientist who studies about atmosphere and weather conditions.
Decreed	:	Official order from ruler or government
Lure	:	To persuade or to trick
Aesthetics	:	science of beauty
Fabry- Perot	:	Fabry and Perot designed an optical instrument called Interferometer
Panorama	:	Unbroken view
Taoramina	:	The theatre built by ancient Greeks, situated in the east of Sicily, Italy and foot of Mount Etna.
Ionian Sea	:	Part of Mediterranean Sea between Italy and Greece Surrounding the Ionian Sea
Mount Etna	:	volcanic Mountain on the east of Sicily
Infuse	:	To instill
Sprightliness	:	Liveliness

Ariel	:	A character of Shakespeare's play The Tempest Ariel is a lively spirit
Miranda	:	A Young lady, character of Shakespeare's the Tempest
Expounded	:	explained
Un effaceable	:	Un removable
Ignominy	:	Disgrace

C.V Raman is the first Asian to win the Nobel Prize in Physics. He was awarded the Nobel Prize for discovering that energy of Light can change according to matter through which the Light wave travels. This was later named as Raman Effect. The phenomenon-Raman Effect later resulted in the discovery of the Theory of Relativity by Albert Einstein. This chapter is the recollections made by Raman on his life at Madras Presidency College and the influence of his teachers in the making of C.V Raman, the scientist.

C.V Raman talks of his childhood memories which are vivid. Those little struggles and efforts of childhood helped him to choose his career.

C.V Raman remembers with gratitude the kindness and consideration he got from his European teachers. Raman was a small boy with traditional upbringing and due to his small size he was often mistook as a school lad who accidently stepped in to college.

Dr. W.H Wilson was a commendable figure who gave lectures in Chemistry. He began lectures at 2 'O' clock in the afternoon and went on till the topic exhausted. He was a strict disciplinarian who did not tolerate foolishness in class. He once asked the definition of 'boiling point' and Raman answered the question to become a favorite student of the Chemistry teacher.

If Dr. Wilson had the German tradition, Prof. R.LI. Jones of the school of Physics represented the Cambridge tradition. He compelled the students to conduct experiments in the lab and promoted experimentation. Professor Bilderbeck and Elliot taught English. The classroom overlooked the sea and the students could gaze at the roaring waves in the English classroom. They were taught Shakespeare and the fine aspects of English language.

C.V Raman had Sanskrit lessons as a compulsory subject and Raman studied English and Sanskrit as compulsory papers. His Sanskrit teachers, Pandit Narasingacharya and Prof. Rangacharya were scholars. Raman concludes by saying that he was fortunate to have such good, scholarly masters.

Answer the following

1. C.V Raman won Nobel Prize for
(a) Literature (b) Chemistry (c) Physics (d) Peace
2. Raman s sharing his experiences of
(a) Cambridge (b) Presidency College (c) St. Xavier's (d) None of the above
3. _____ was teacher of chemistry
(a) Dr. W.H Wilson (b) Elliot (c) Rangacharya (d) R.L.T Jones

Answer in 2 or 3 sentences

1. What are Raman's memories of his Chemistry classes at Presidency College?
2. The poetic spirit of Raman is evident in his description of English classes. Explain?
3. Why did Einstein acknowledge Raman when he discovered the theory of Relativity?

Answer in a paragraph

1. What helped Raman to acquire a command over English language?
2. How did the training of Prof. R.LI Jones help Raman in his future career.

Essay

1. The training at Madras Presidency College helped Raman to built his career as a scientist. Comment.
2. The essay is a vivid description of C.V Raman's College life. Comment.

ANSWERS

- 1.(c) 2.(b) 3.(a)

Answer in 2 or 3 sentences

1. Dr. W.H Wilson was a commendable figure who gave lectures in Chemistry. He began lectures at 2 'O' clock in the afternoon and went on till the topic exhausted. He was a strict disciplinarian who did not tolerate foolishness in class. He once asked the definition of 'boiling point' and Raman answered the question to become a favorite student of the Chemistry teacher.
2. Professor Bilderbeck and Elliot taught English. The classroom overlooked the sea and the students could gaze at the roaring waves in the English classroom. They were taught Shakespeare and the fine aspects of English language.
3. Raman discovered that Energy of Light can change according to matter through which the Light wave travels. This was later named as Raman Effect. The phenomenon-Raman Effect later resulted in the discovery of the Theory of Relativity by Albert Einstein.

CHAPTER 6

ALFRED NOBEL

GLOSSARY

Arbiter	:	someone who makes a judgement
Debris	:	left over (residue)
Doffed	:	to remove
Inconspicuous	:	unattractive
Puzzled	:	confused
Frail	:	thin and fragile
Cynic	:	a person who view others critically
Smouldering	:	to burn without flames
To be on the rocks	:	to be in destruction.
Callous	:	insensitive
Harbor	:	to conceal
Shelley	:	Percy Bysshe Shelley is a romantic poet of England
Hamburg	:	a city in West Germany
Copenhager	:	capital of Denmark
Hide park	:	famous park of London
Crimean war	:	war between Russia along with Turkey fighting England with France on other side
Armaments	:	military forces and their equipments
Clamouring	:	demanding
St Peterburg	:	place in Russia now called Leningrade
Inevitable	:	unavoidable
Chaplinesque	:	like Charlie chaplin
Inquest	:	inquiry on death
Detonate	:	explode with a loud noise
Percussion cap	:	small metal cap containing gun powder
Extermination	:	elimination, destruction

Reprisal	:	act of revenge
Annihilate	:	destroy completely
Arbitration	:	setting disputes
Revert	:	to go back to former condition
Realm	:	field of interest, kingdom
San Remo	:	A health resort & seaport in Italy
Italian Riviera	:	Mediterranean coast of Italy and France famous for health resorts
Kroner	:	Unit of currency of Norway

In this essay, Egan Larsen, a popular biographer of scientists, describes the life of Alfred Nobel. Nobel family earned money by selling explosives and how finally Alfred Nobel became a lover of peace is explained.

One afternoon in 1864, there was a terrific explosion in a subway in Stockholm. It occurred at the Nobels house and people knew that they had a laboratory in the house. Five shapeless bodies were recovered. Alfred's brother was killed by the explosion and his hopes for developing his invention in Sweden were gone. The license to make explosives was withdrawn and the family went to ruins.

Alfred Nobel was a small, average looking man with pale complexion. Except for his burning large eyes he was lifeless and some people thought that he was mad. He was shy and outspoken, sociable and aloof, idealist and cynic and all these contributed to his career.

Alfred's father Immanuel Nobel was once called "Merchant of Death". They were rich. But when Alfred was nine the family lost its fortune and had to move from Sweden to Russia. This meant that Alfred had to leave his school. His mother gave lessons at home after that.

When Nobels migrated to Russia, Immanuel was in search of a job. Russia was worried about its naval defenses. Immanuel designed a new type of mine, the idea was accepted by Tsar and Immanuel began to make profit. Nobel's mines were like square boxes filled with gun powder, with long iron poles, stick into the sides, when these were hit

by a ship the impact broke a glass tube which acted as a fuse in the mine, allowing Sulphuric acid to pour onto a mixture of potassium chlorate, sugar and sulphur. The mines did little damage to British and French ships. Alfred always had the fear of a stronger explosive in his mind.

In 1856 Tsar Nicholas died and his son Alexander was a good leader who made friends with the Western world. The Nobles contract expired. A fire destroyed their works and creditors surrounded Immanuel and wife took their youngest son, Emil, with them to Sweden and left Alfred in the care of Alfred's brother. His father asked Alfred to do research on explosives.

When the explosion in 1864 in Stockholm killed 4 people, 21 year old Alfred was blamed. Alfred knew that a new explosive could not be made without loss of life.

After the explosion he lost the license to make explosives in Sweden, moved to Hamburg to set up a factory for producing nitroglycerine. Within 8 years Alfred Nobel, notorious in Helenbrog police files for not paying creditors became a synonym for physical power.

Nitroglycerine was transported in zinc can containers packed in wooden crates stuffed with saw dust. The impurities of the oil often reacted with zinc and some causality were caused. The press and public of America were angry about it and passed a bill according to which the manufacturer of nitroglycerine would in the event of an accident would be charged with murder and liable to be sentenced to death. Britain banned importing and manufacturer of nitroglycerine. France and Belgium made possession of nitroglycerine a crime.

When once again the Nobels business was about to collapse Alfred found out a clay which reacted exactly like nitroglycerine. This clay was finally named dynamite.

The Atlantic Giant powder company was started in America, Latin Nobel Trust in Europe and money rolled into Alfred's pockets. The first dynamitic shells were used by Germany at the populated Paris quarter of Montmartre and people were surprised by this new weapon.

Baroness Bertha von Sutter, who had been Alfred's secretary for a week, wrote book 'Lay Dawn Arms', on the extent of destruction dynamite can cause. People and nations discussed about the book but Alfred had the opinion that nations would dismantle their tools as they were aware of the destruction it can cause. Baroness replied that people wouldn't stop, but go in search for advanced weapons capable of mass destruction. They debated for years. Nobel parted with her in Zurich. In 1893 he wrote to her that he liked to allot a part of his fortune for any man or woman who tried to make peace in Europe. He was sure that in later years world peace would be threatened completely. In 1895 Alfred Nobel entrusted his fortune to a trust consisting of Norwegian and Swedish trustees. The fortune would be divided into five parts and every year a prize would be given to the greatest contribution to physics, chemistry, physiology or medicine and literature by Swedish academy and the peace prize would be awarded by a committee of persons selected by the Norwegian parliament-all prizes were to be distributed to the worthiest, without regard to nationality, whether Scandinavian or not.

Nobel settled down in San Remo, on the Italian Riviera and wrote a Swedish tragedy entitled Nemesis. The play was a bad one. Alfred later went to Stockholm patent office, to the chief engineer's office and offered him 60,000 kroner and told him to seek the fund for a journey to North pole in a balloon to the king Oscar II. Alfred took keen interest in the mission and the chief engineer Andee and his two companions never returned from their voyage in 1897, but Alfred passed away in 1896. Alfred's Butler found him dead on his desk struck down by a heart attack. In 1910 Bertha von Sutter was Nobel Peace Prize. Bertha died on 20 June 1914 and a week later the Archduke of Austria and his wife were shot down in Sarajevo. The first World War began and as Bertha had predicted peace was buried.

Answer the following

1. _____ is youngest brother of Alfred
(a) Emil (b) John (c) Tom (d) Immanuel

2. The explosion in _____ resulted in the cancellation of the License of Nobles to make explosive
(a) 1861 (b) 1862 (c)1863 (d)1864
3. _____ won Nobel peace prize in 1910.
(a) Alfred Nobel (b) Bertha von Sutter
(c) Oscar II (d) none of the above

Answer in 2 or 3 sentences

1. Why Immanuel Nobel was called “The Merchant of Death?”
2. What did Bertha von Sutter write in her book “Lay Dawn Arms?”
3. Why was the Nobles license for making explosives cancelled in 1864?

Answer in a paragraph

1. Nobel’s childhood life is chaplinesque. Explain.
2. Why did Nobel form Nobel Trust?

Essay

1. Nobel’s transformation from the son of the merchant of death to a lover of peace is wonderful. Explain.

Answer the following

1.(a) 2.(d) 3.(b)

Answer in 2 or 3 sentences

1. Immanuel designed a new type of mine, the idea was accepted by Tsar and Immanuel began to make profit. Nobel’s mines were like square boxes filled with gun powder, with long iron poles, stick into the sides, when these were hit by a ship the impact broke a glass tube which acted as a fuse in the mine, allowing Sulphuric acid to pour onto a mixture of potassium chlorate, sugar and sulphur.
2. Baroness Bertha von Sutter, who had been Alfred’s secretary for a week, wrote book ‘Lay Dawn Arms’, on the extent of destruction dynamite can cause. People and nations

discussed about the book but Alfred had the opinion that nations would dismantle their tools as they were aware of the destruction it can cause.

3. When the explosion in 1864 in Stockholm killed 4 people, 21 year old Alfred was blamed. Alfred knew that a new explosive could not be made without loss of life.

After the explosion he lost the license to make explosives in Sweden,

Answer in a paragraph

1. Alfred Nobel was a small, average looking man with pale complexion. Except for his burning large eyes he was lifeless and some people thought that he was mad. He was shy and outspoken, sociable and aloof, idealist and cynic and all these contributed to his career.

Alfred's father Immanuel Nobel was once called "Merchant of Death". They were rich. But when Alfred was nine the family lost its fortune and had to move from Sweden to Russia. This meant that Alfred had to leave his school. His mother gave lessons at home after that.

When Nobels migrated to Russia, Immanuel was in search of a job. Russia was worried about its naval defenses. Immanuel designed a new type of mine, the idea was accepted by Tsar and Immanuel began to make profit. Nobel's mines were like square boxes filled with gun powder, with long iron poles, stick into the sides, when these were hit by a ship the impact broke a glass tube which acted as a fuse in the mine, allowing Sulphuric acid to pour onto a mixture of potassium chlorate, sugar and sulphur. The mines did little damage to British and French ships. Alfred always had the fear of a stronger explosive in his mind.

In 1856 Tsar Nicholas died and his son Alexander was a good leader who made friends with the Western world. The Nobles contract expired. A fire destroyed their works and creditors surrounded Immanuel and wife took their youngest son, Emil, with them to Sweden and left Alfred in the care of Alfred's brother. His father asked Alfred to do research on explosives.

When the explosion in 1864 in Stockholm killed 4 people, 21 year old Alfred was blamed. Alfred knew that a new explosive could not be made without loss of life.

After the explosion he lost the license to make explosives in Sweden, moved to Hamburg to set up a factory for producing nitroglycerine. Within 8 years Alfred Nobel, notorious in Helenbrog police files for not paying creditors became a synonym for physical power.

2. Baroness Bertha von Sutter, who had been Alfred's secretary for a week, wrote book 'Lay Dawn Arms', on the extent of destruction dynamite can cause. People and nations discussed about the book but Alfred had the opinion that nations would dismantle their tools as they were aware of the destruction it can cause. Baroness replied that people wouldn't stop, but go in search for advanced weapons capable of mass destruction. They debated for years. Nobel parted with her in Zurich. In 1893 he wrote to her that he liked to allot a part of his fortune for any man or women who tried to make peace in Europe. He was sure that in later years world peace would be threatened completely. In 1895 Alfred Nobel entrusted his fortune to a trust consisting of Norwegian and Swedish trustees. The fortune would be divided into five parts and every year a prize would be given to the greatest contribution to physics, chemistry, physiology or medicine and literature by Swedish academy and the peace prize would be awarded by a committee of persons selected by the Norwegian parliament-all prizes were to be distributed to the worthiest, without regard to nationality, whether Scandinavian or not.

CHAPTER 7

SCIENCE AND SOCIETY

GLOSSARY

Anti-Semitism	:	hate for Jews
Applauds	:	appreciate
Wary	:	to be tired of
Cursory	:	fast and superficial
Conspicuous	:	attracting attention
Contriving	:	inventing
Pain relievers	:	pain killers
Preservative	:	substance used to keep food safe from spoil or damage
Confer	:	to give a title (to do a favour)
Drudgery	:	misery (hard work)
Indispensable	:	something that cannot be omitted
Abolished	:	banned by law
Profound gravity	:	serious matter
Inexorable	:	unchanging
Wrought	:	to create (to make)
Renaissance	:	the 14 th century movement which started in Italy. It is called the period of enlightenment because numerous changes in art, literature and science were made in the period.
Jeopardize	:	to threaten (to undermine)

Albert Einstein talks of the blessings and the threats of science. Science and technology has helped in the material prosperity of human society. The mass production of machines have resulted in economic circulation. Technology and mass communication have far reaching consequences. It is not controlled by a central authority and the threats and

dangers that science can cause is yet to be discovered. Einstein concludes by saying that Natural laws are Universal and humans can depend on science which explain these laws.

Albert Einstein feels that science affects human affairs directly and indirectly. Science has enriched human life but some inventions like steam engine, railway, electric power and light, the telegraph, radio, automobile, airplane, dynamite etc, have complicated human living. Life preserving medicines and pain relievers are a boon to human. Technology liberated human from excessive muscular work. The invention of machines made possible the abolition of slavery (excessive use of human muscle power).

Technology or applied science has created many problems for man. If these problems are not treated properly and unless proper solutions are obtained, it will bring disaster to human kind.

Mass production of tools resulted in devaluation of labour and weakening of purchasing power. Private ownership became popular and the consumers simply were thrown out to be victims of industrialization. The contemporary society is in a struggle to adapt to this phenomenon.

Technology despite its advantages is a means of destruction in the hands of nations providing unrestricted freedom of action. If there is no central power to control technology it will result in mass destruction of the human kind.

Mass communication or media communication should also be checked. There should be international agreements on exploiting the fruits of science and its misuse..

Science was a baffling subject for primitive man, who has a constant fear, of intervention of supernatural forces, in his destiny. Science now has become an inevitable part of human life. When Greeks brought mathematics to the world it resulted in the invention of number system from which no one could escape. During Renaissance period this scientific objectivity was added to mathematical method to form the contemporary science. Since that time science has grown up as a system to explain natural laws.

Ordinary men may not understand the extent of progress man has made through scientific research. Einstein concludes by saying that humans can proudly taste the fruits of science which is capable of explaining natural laws that are universal.

Answer the following

1. Abolition of slavery is a consequences of
(a) Law (b)science (c) humanism (d) none of these
2. The immediate consequences of mechanical means of production is
(a) Weakening of purchasing power (b) devaluation of labours
(c) both (a) and (b) (d) none of these.

Answer in 2 or 3 sentences

1. Why was primitive man afraid of nature?
2. Mechanical mass production has resulted in a new world order. How?

Answer in a paragraph

1. What are the disadvantages of technological development and the growth of means of communication?
2. How did science evolve as a system to explain natural laws?

Essay

1. Trace the evolution of science in human society.
2. Science has direct and indirect influence on human society. Comment.

ANSWERS

- 1. (b) 2.(c)**

Answer in 2 or 3 sentences

1. Primitive man, had a constant fear, of intervention of supernatural forces, in his destiny. He was always at the mercy of nature.
2. Mass production of tools resulted in devaluation of labour and weakening of purchasing power. Private ownership became popular and the consumers simply were thrown out to be victims of industrialization. The contemporary society is in a struggle to adapt to this phenomenon

Answer in a paragraph

1. Mass production of tools resulted in devaluation of labour and weakening of purchasing power. Private ownership became popular and the consumers simply were thrown out to be

victims of industrialization. The contemporary society is in a struggle to adapt to this phenomenon.

Technology despite its advantages is a means of destruction in the hands of nations providing unrestricted freedom of action. If there is no central power to control technology it will result in mass destruction of the human kind.

Mass communication or media communication should also be checked. There should be international agreements on exploiting the fruits of science and its misuse..

Science was a baffling subject for primitive man, who has a constant fear, of intervention of supernatural forces, in his destiny. Science now has become an inevitable part of human life. When Greeks brought mathematics to the world it resulted in the invention of number system from which no one could escape. During Renaissance period this scientific objectivity was added to mathematical method to form the contemporary science. Since that time science has grown up as a system to explain natural laws.

2. Albert Einstein talks of the blessings and the threats of science. Science and technology has helped in the material prosperity of human society. The mass production of machines have resulted in economic circulation. Technology and mass communication have far reaching consequences. It is not controlled by a central authority and the threats and dangers that science can cause is yet to be discovered. Einstein concludes by saying that Natural laws are Universal and humans can depend on science which explain these laws. Science was a baffling subject for primitive man, who has a constant fear, of intervention of supernatural forces, in his destiny. Science now has become an inevitable part of human life. When Greeks brought mathematics to the world it resulted in the invention of number system from which no one could escape. During Renaissance period this scientific objectivity was added to mathematical method to form the contemporary science. Since that time science has grown up as a system to explain natural laws.

Ordinary men may not understand the extent of progress man has made through scientific research. Einstein concludes by saying that humans can proudly taste the fruits of science which is capable of explaining natural laws that are universal.

CHAPTER 8

PUBLIC KNOWLEDGE

GLOSSARY

Expositor	:	a person who uncovers (discovers)
Patronage	:	to become the guardian or patron
Schematic	:	to keep in order
Marshland	:	low-lying wet land
Presumptuous	:	assuming without proof
Exponent	:	a person who interprets
Ineffable	:	Too great to be described in words (unable to express)
Bard	:	poet
Anointed	:	The religious ceremony of rubbing oil to be appointed to the office.
Kith and kin	:	friends and relatives
Coherent	:	arranged
Concede	:	to admit that something is truth
Realm	:	an area of activity or interest
Demarcation	:	to mark the limits
Daunting	:	seeming difficult to deal with
Crudely	:	roughly
Vulgar	:	wild
Confounds	:	to be annoyed with (to be angry about)
Cosmology	:	study of universe and its evolution
Recipe	:	method of making food (instructions on ingredients)
Territory	:	land under the control of a particular ruler.
Dichotomy	:	two things those are entirely different
Obsolete	:	out of date (old-fashioned)
Hypothesis	:	an assumption on which the experiment begins
Axiom	:	A statement that is true

Francis Bacon (English writer, philosopher, scientist of 17th Century who introduced the scientific method of inquiry which insisted on providing evidence for argument)

Cognizance	:	formal knowledge
Astronomy	:	study of heavenly bodies.
Geology	:	study of earth
Sinews	:	The parts of a structure or organization that give it strength or bind it together.
Airier	:	heavier in appearance
Speculative	:	based on guessing
Empirical	:	knowledge from experience or experiments
Deduce	:	to form an opinion based on information or evidence
Curbed	:	to control
To confirm	:	to stick to
Metaphysics	:	branch of philosophy that deals with the nature of existence, truth and knowledge.
Amenable	:	something that is controllable
Inference	:	something that is assumed from already existing facts.
Plausible	:	to find an excuse
Gainsay	:	to disagree
Taciturn	:	reserved person who fails to communicate
Hey Presto	:	An expression which means something unexpected has happened.
Cliché	:	a phrase or opinion that is overused.

Science is an integral part of our life. It furnishes our surroundings. “What is science” is a confusing question. We know the evolution of science and its development through numerous scientists. Its difficult to define poetry, as poetry has no definition and a poet is a person who assumes the crown of a poet by himself. Contrary to it science is methodical and logical. Its very hard and finite and an essential ingredient for human’s survival.

Like religion, art, philosophy, law etc. science is also a discipline of study. It is a set of ideas. Science is an intellectual activity. Religion, art and literature appeals to human emotions and it is difficult to express them in words as they affect the emotionality of humans. So all these forms are different from science. How Science is different from Humanities is a debated topic. The crudest definition for science is “science is the mastery of Man’s environment”. This definition projects the discoveries of Science that will ensure material and mechanical aid to human society. But this definition has its drawbacks. Here science becomes synonym (equal to) technology. This definition talks of the applications of science or testifies for the discoveries and inventions in science. Science like mathematics and cosmology interprets the mysteries of the universe. Any invention or discovery is an application of a theory of science. It is like a food item prepared from a recipe. For example- Penicillin is like a building made from the blueprints of architect named science.

The popular definition of science is that “Science is the study of material world”. By this definition we mean that science is the study of matter and religion is the study of the spirit. This differentiation between science and Religion is faulty as psychology and sociology are subjects of science that points to topics beyond the physical matter. It is true that spiritual questions cannot be answered through Science. But there are similarities between religion and science. Pure mathematics goes beyond the definition of Science. Religion explores a set of hypothesis (what we call belief in religion) to reach conclusions but these hypotheses like in science have no solid proofs.

Science uses the experimental method. Francis Bacon talks of the importance of evidence in science. The scientific method is an objective method to explore the secrets of nature. Scientists begin from a hypothesis, experiment with tools, make an inference, search for evidences and reach a conclusion. Science arrives at truth by logical inferences from empirical observations. There is no ultimate truth in science. Science is always in the process of evolution. It is not easy to reach a conclusion in science. A fact is accepted as ‘truth’ in science if any experiment done on the same grounds assume the same result from similar circumstances every time the experiment is repeated. A theory should be universally

accepted to be called a scientific discovery. Science is objective and should give an ultimate result for a particular question. Thus science is a method to attain ultimate truth.

Conventional definition of science explains it as an individual's attempt to define the secrets of nature. Science is not an individual activity but a cooperate action of numerous scientists of various ages. Thus scientific research is a social activity like law. But Technology, art and religion is an individual's field where an individual can contribute. Scientists work in an organized manner, pass information and contribute to the system of science.

Professor J.M Zinan argues that scientists contribute to the consensus of universally accepted knowledge. He explains the philosophical, psychological and sociological contributions of science. He calls science a group activity evolved from the hard work of numerous scientists of various centuries.

Answer the following

1. True goal of scientific research is
 - a. Experimentation
 - b. theorization
 - c. contribute to knowledge
 - d. material prosperity.
2. _____ is a discovery of Alexander Fleming.
 - a. Pencillin
 - b. radio
 - c. television
 - d. small-pox vaccine
3. Science is _____ activity.
 - a. Individual
 - b. social
 - c. mandatory
 - d. none of the above

Answer in 2 or 3 sentences

1. Why is scientific research a social activity?
2. What are the similarities between science and religion?
3. Differentiate between science and technology?
4. What are the differences between science and poetry.

Answer in paragraph

1. A scientist is a master of environment. Explain.
2. Why is there a dichotomy between matter and spirit in definition?
3. What is experimental method of science?

Essay

1. How is science defined in the essay public knowledge?
2. Comment on the philosophical, psychological and sociological aspects of science?

ANSWERS

1. (c) 2.(a) 3.(b)

Answer in 2 or 3 sentences

1. Science is not an individual activity but a cooperate action of numerous scientists of various ages. Thus scientific research is a social activity like law. But Technology, art and religion is an individual's field where an individual can contribute. Scientists work in an organized manner, pass information and contribute to the system of science.
2. Religion explores a set of hypothesis (what we call belief in religion) to reach conclusions but these hypotheses like in science have no solid proofs.
3. Science is the mastery of Man's 'environment'. This definition projects the discoveries of Science that will ensure material and mechanical aid to human society.
4. Poetry has no definition and a poet is a person who assumes the crown of a poet by himself. Contrary to it science is methodical and logical. Its very hard and finite and an essential ingredient for human's survival.

Answer in paragraph

1. "science is the mastery of Man's 'environment'. This definition projects the discoveries of Science that will ensure material and mechanical aid to human society. But

this definition has its drawbacks. Here science becomes synonym (equal to) technology. This definition talks of the applications of science or testifies for the discoveries and inventions in science. Science like mathematics and cosmology interprets the mysteries of the universe. Any invention or discovery is an application of a theory of science. It is like a food item prepared from a recipe. For example- Penicillin is like a building made from the blueprints of architect named science.

The popular definition of science is that “Science is the study of material world”. By this definition we mean that science is the study of matter and religion is the study of the spirit. This differentiation between science and Religion is faulty as psychology and sociology are subjects of science that points to topics beyond the physical matter. It is true that spiritual questions cannot be answered through Science. But there are similarities between religion and science. Pure mathematics goes beyond the definition of Science. Religion explores a set of hypothesis (what we call belief in religion) to reach conclusions but these hypotheses like in science have no solid proofs.

Science uses the experimental method. Francis Bacon talks of the importance of evidence in science. The scientific method is an objective method to explore the secrets of nature. Scientists begin from a hypothesis, experiment with tools, make an inference, search for evidences and reach a conclusion. Science arrives at truth by logical inferences from empirical observations. There is no ultimate truth in science. Science is always in the process of evolution. It is not easy to reach a conclusion in science. A fact is accepted as ‘truth’ in science if any experiment done on the same grounds assume the same result from similar circumstances every time the experiment is repeated. A theory should be universally accepted to be called a scientific discovery. Science is objective and should give an ultimate result for a particular question. Thus science is a method to attain ultimate truth. Scientists work in an organized manner, pass information and contribute to the system of science.

2. science is the study of matter and religion is the study of the spirit. This differentiation between science and Religion is faulty as psychology and sociology are subjects of science that points to topics beyond the physical matter. It is true that spiritual questions cannot be answered through Science. But there are similarities between religion

and science. Pure mathematics goes beyond the definition of Science. Religion explores a set of hypothesis (what we call belief in religion) to reach conclusions but these hypotheses like in science have no solid proofs.

3. Science uses the experimental method. Francis Bacon talks of the importance of evidence in science. The scientific method is an objective method to explore the secrets of nature. Scientists begin from a hypothesis, experiment with tools, make an inference, search for evidences and reach a conclusion. Science arrives at truth by logical inferences from empirical observations. There is no ultimate truth in science. Science is always in the process of evolution. It is not easy to reach a conclusion in science. A fact is accepted as 'truth' in science if any experiment done on the same grounds assume the same result from similar circumstances every time the experiment is repeated. A theory should be universally accepted to be called a scientific discovery. Science is objective and should give an ultimate result for a particular question. Thus science is a method to attain ultimate truth.

CHAPTER-9

ARE MEN OF SCIENCE SCIENTIFIC?

GLOSSARY

Pacifist	:	maker of peace (peace loving)
Antagonist	:	opponent (enemy)
Fount	:	source of desirable quality
Savages	:	illiterate
Loath	:	unwilling
Pronouncement	:	declaration
Eugenics	:	science of study of methods to improve genetic qualities
Flimsy	:	silly
Liable	:	likely
Nordics	:	a tribe of people found in Scandinavia, Finland & Ireland
Alleghenies	:	a mountain range in Eastern U.S
Skeptical	:	having doubt
Mendel	:	Gregor Mendel is a priest who studied about hereditary qualities in pea plant. He is known as father of genetics.
Erudite	:	scholarly

Men and women know that their personal judgment is not reliable and they look for evidences to reach conclusions. Early men trusted in the medicine man of the tribe who later became priest, power of the priest was later acquired by physician and in the modern world, man of science assumes a high position . The man of science enjoys this honor and comment on any topic of social or political cause.

Russell says he has high opinion on men of science who are constructive and revolutionary. Man of science is unchallengeable on technical matters but may not always judge rationally. Russell gives the example of a debate on the topic of men's brains. It was

found that women's brain weighs less than men and argued that man is superior to woman. But when it was found that elephant's brain weighs more, scientists came with the argument that mass of brain should be compared to mass of body which disastrously pointed out that women are cleverer than men. Then scientists argued that it's not the mass of the brain but the delicacy of organization of the brain is important and scientists concluded that male are superior to females in this.

There are more examples of irrationality of science. Nordics (people of Scandinavia) are highly professional. It resulted in the belief that Nordics are intelligently superior. Alleghenies (tribe of Eastern U.S) is the purest of the races. But they did not do as well as the Jews in the intelligence tests and scientists. It was reasoned that moral quality is to be taken to account which supports the argument that Jews (through not wholly a pure race) is superior in intelligence than Alleghenies(who are comparatively purer race).

The study of heredity has become complicated. Inheritance and its laws were explained in varied terms. Scientists joined politicians to define rules for society. These pseudo-scientists misrepresented scientific facts. A scientist should be skeptical .He should question evidences before blindly following it. Every human should have this skeptical approach. Science is in the process of evolution . It can be faulty. A scientist should form a theory from evidences that he collected and should be able to prove his point from the evidences he collected. A genuine man of science should use his talents to improve human conditions.

Answer the following.

1. Russell was awarded the Nobel Prize for
(a) Peace (b) literature (c) physics (d) chemistry
2. "Mortals and others" is an essay collection by
(a) Aldus Huxley (b) Robert Benchley (c) Bertrand Russell (d) none of these
3. The priests were succeeded by.....
(a) physicians (b) medicine man (c) men of science (d) none of these
4. Average weight of man's brain isthan woman's.
(a) Greater (b) lesser (c) equal to (d) none of the above

5. is the father of genetics
(a) Charles Darwin (b) Gustavo Kernel (c) Gregor Mendel (d) Isaac Asimov

Answer the following in 2 or 3 sentences

1. Who are pseudo –scientists?
2. What are the qualities of a genuine man of science?
3. Why Nordics were considered superior to other races?
4. Why should public be skeptical about facts provided by scientists?

Answer in a paragraph

1. Give examples of some mistakes make by scientists in explaining science?
2. Trace the evolution of the position of men of science in society?

Essay

1. Why does Russell say that all men of science are not skeptical?

ANSWERS

- 1.(b) 2.(c) 3.(c) 4.(b) 5.(c)

Answer the following in 2 or 3 sentences

1. Scientists joined politicians to define rules for society. These scientists are called pseudo-scientists as they misrepresented scientific facts for their welfare.
2. A scientist should be skeptical. A scientist should form a theory from evidences that he collected and should be able to prove his point from the evidences he collected. A genuine man of science should use his talents to improve human conditions.
3. Nordics (people of Scandinavia) are highly professional. It resulted in the belief that Nordics are intelligently superior.
4. Pseudo-scientists can misrepresent scientific facts. A scientist should be skeptical .He should question evidences before blindly following it. Every human should have this skeptical approach. Science is in the process of evolution . It can be faulty. A scientist should form a theory from evidences that he collected and should be able to prove his point from the evidences he collected.

Answer in a paragraph

1. Russell gives the example of a debate on the topic of men's brains. It was found that women's brain weighs less than men and argued that man is superior to woman. But when it was found that elephant's brain weighs more, scientists came with the argument that mass of brain should be compared to mass of body which disastrously pointed out that women are cleverer than men. Then scientists argued that it's not the mass of the brain but the delicacy of organization of the brain is important and scientists concluded that male are superior to females in this. Nordics (people of Scandinavia) are highly professional. It resulted in the belief that Nordics are intelligently superior. Alleghenies (tribe of Eastern U.S) is the purest of the races. But they did not do as well as the Jews in the intelligence tests and scientists. It was reasoned that moral quality is to be taken to account which supports the argument that Jews (through not wholly a pure race) is superior in intelligence than Alleghenies (who are comparatively purer race).

2. Early men trusted in the medicine man of the tribe who later became priest, power of the priest was later acquired by physician and in the modern world, man of science assumes a high position. The man of science enjoys this honor and comment on any topic of social or political cause.

Russell says he has high opinion on men of science who are constructive and revolutionary. Man of science is unchallengeable on technical matters but may not always judge rationally.

CHAPTER-10

THE TWO CULTURES

GLOSSARY

Titular	:	title
Hindrance	:	obstruction
Contemptuous	:	to look down on
Sketch	:	drawing
Credentials	:	papers showing claim
Ruminate	:	meditate
Vocation	:	profession
Ringside view	:	close observation
Fluke	:	fortune resulting from an accident
Colleagues	:	people working together
Grossly	:	largely
Idiosyncrasies	:	way of thinking or behaving
Convivial	:	fond of chatting
Oxonion	:	student of oxford
Grunt	:	make a low, rough sound
Emollient	:	attempting to avoid confrontation
M.I.T.	:	Massachusetts Institute of Technology
G .H.Hardy	:	famous mathematician from England
Hostility	:	lack of friendship
Distorted	:	disfigured
Brash	:	hasty and rash
Boastful	:	people who talk high of themselves
Invective	:	abusive language
Whimper	:	complaining sound

Crest of a wave	:	most fortunate position
Platitude	:	statement that is obviously true.
Complacent	:	satisfied
Facile	:	easily obtained or easily done
Démodé	:	old-fashioned
Plantagenet's	:	a race of British kings with French origin. They decorated their crowns with certain leaves and hence called Plantagenet's.
Auschwitz	:	Hitler's Nazi camp where Jews were brutally murdered
Magnanimous	:	huge or large
Culpably	:	worthy of blame
Imbecile	:	weak-minded
Corralled	:	to be shut into
Refinement	:	to improve
Anthropology	:	study of human civilization
Proletarian	:	working class
To probe	:	to enquire
Esoteric	:	indented for a small group
Rigorous	:	hard
Vainer	:	lean or thin
Edifice	:	large building
Gusto	:	to enjoy one's doing
Sputnik	:	Russian space vehicle
Parity	:	equality
Default	:	failure to act
Bizarre	:	strange
Fanatical	:	mad
Disgruntlement	:	unhappiness
Archetypal	:	typical (best example)
Burlington house	:	a building in London

W .L.Bragg	:	Australian born English physicist who discovered Bragg's law of x-ray diffraction.
Rutherford	:	earnest Rutherford was a New Zealand born chemist who is known for structure of atom.
Edenton	:	sir Arthur Stanley Edenton was as astrophysicist.
Dirac	:	Paul Adrian Dirac was an English physicist who contributed to Quantum Mechanics.
T.S.Eliot	:	Thomas Stearns Eliot is the popular English literary figure known for the poem "The Wasteland"
Kyd	:	Thomas Kyd is an English dramatist known for his work "The Spanish Tragedy"
Greene	:	Graham Greene is an English writer and critic
Repartee	:	Quick, witty comments

C .P. Snow says he had been thinking of a problem since last three years and anyone who had some experiences like him would think similarly. Snow is talking about the conflict between science and literature .C. P. Snow was a physicist who is known for his literary contributions.

C. P. Snow was a scientist at a time of major scientific activity. He was also a writer who had many friends who belonged to the literary circle. The close association with scientists and literary figures gave him a realization that both of them had their own culture. But C. P. Snow is of the opinion that scientist and humanists have comparable intelligence, identical in race, similar social origins, earn comparable wages but one hates the other. This conflict between science and humanities is not the problem of England alone but of the West.

To show the hostility between science and humanities Snow, quotes a story of A.L. Smith (a literary figure) when he came to Cambridge to dine could not understand what is fellow mates were talking and the Vice-Master explained that they were mathematicians whom the humanists did not make friends with.

Snow observes that the intellectual life of the western society is divided into two polar groups-one literary intellectuals and the other group-scientists .Once upon a time intellectuals referred to literary intellectuals alone but recently intellectuals refer to scientists. The hostility between the two groups has increased and the youth particularly fails to communicate and both have distorted image of the other.Non-scientists believe that scientists are less optimistic, unaware of man's condition. On the other hand scientists believe that literary intellectuals lack foresight, they are unconcerned about fellow beings, anti-intellectual and that they restrict literature to existentialism (a condition, or school of literature which believes that life is meaningless). Scientists believe that literature can be made by anyone who has a little ability to chat.

Snow agrees that scientists are optimistic. Scientists work as a group and the group energy is carried on to everyone. They are aware of poverty and other human miseries and are determined to work for it. But literary intellectuals do not work for fellow beings and are hated by scientists.

Some scientists have criticized the social and political attitudes of literary figures. Snow argues that this is partially true and this has resulted in people losing faith in literature. Some sociologists argue that they are not to be grouped with humanists as some disciplines of humanities have scientific approach. The division of knowledge into science and humanities is faulty. Snow argues that a botanist having little knowledge of physics is termed as a scientist but a humanist does not belong to the group. Though scientists and humanists see them as different groups there are so many common features for them. But the distinctions between science and humanities have become so large that scientists have no taste for literature and literary figures do not even learn the basic science. This polarization has created intolerance between the two. Snow points out that in England school education is too specialized .This will increase the conflict between science and humanities. The U.S.S.R has detected problems in specialized school education and has changed their education system. Snow wants a change in the England schooling system which is specialized educations that distinguishes science from humanities and places them in opposite poles.

Answer the following

1. is a problem of the entire West
 - (a) Poverty
 - (b) illiteracy
 - (c) the gulf between arts and science
 - (d) language
2. Which are the 2 cultures mentioned by C.P.Snow?
 - (a) Science and religion
 - (b) arts and sport
 - (c) arts and science
 - (d) philosophy and history
3. is the beginning of all scientific activities of England
 - (a) Elizabethan period
 - (b) Victorian age
 - (c) Modern period
 - (d) Jacobean period

Answer in 2 or 3 sentences.

1. What are the similarities between scientists and humanists?
2. What does Snow mean by the term “intellectuals”?
3. What increased the polarization between scientists and humanists?
4. Why does Snow criticize British school education?
5. Which are the two cultures mentioned by Snow?
6. Why do scientists have more optimism than humanists?

Answer in a paragraph

1. Which are the two cultures mentioned by Snow?
2. The polarization between scientists and humanists is a loss to society. Why?
3. How could Snow develop an acquaintance between both cultures?

Essays

1. What are the similarities and differences between scientists and humanists?
2. What results in polarization between scientists and artists in England?

Answers

ANSWERS

- 1.(c) 2.(c) 3.(b)

Answer in 2 or 3 sentences

1. C. P. Snow is of the opinion that scientist and humanists have comparable intelligence, identical in race, similar social origins, earn comparable wages but one hates the other.
2. Human's capacity to interpret the World and to utilize the resources for humans progress is called intelligence.
3. The distinctions between science and humanities have become so large that scientists have no taste for literature and literary figures do not even learn the basic science.
4. Snow wants a change in the England schooling system which is specialized educations that distinguishes science from humanities and places them in opposite poles.
5. C. P. Snow is of the opinion that scientist and humanists have comparable intelligence, identical in race, similar social origins, earn comparable wages but one hates the other. This conflict between science and humanities is not the problem of England alone but of the West.
6. Snow agrees that scientists are optimistic. Scientists work as a group and the group energy is carried on to everyone. They are aware of poverty and other human miseries and are determined to work for it.

Answer in a paragraph

1. C .P. Snow says he had been thinking of a problem since last three years and anyone who had some experiences like him would think similarly. Snow is talking about the conflict between science and literature .C. P. Snow was a physicist who is known for his literary contributions.

C. P. Snow was a scientist at a time of major scientific activity. He was also a writer who had many friends who belonged to the literary circle. The close association with scientists and literary figures gave him a realization that both of them had their own culture. But C. P. Snow is of the opinion that scientist and humanists have comparable intelligence, identical in race, similar social origins, earn comparable wages but one hates the other. This

conflict between science and humanities is not the problem of England alone but of the West.

To show the hostility between science and humanities Snow, quotes a story of A.L.Smith (a literary figure) when he came to Cambridge to dine could not understand what his fellow mates were talking and the Vice-Master explained that they were mathematicians whom the humanists did not make friends with.

2. Some scientists have criticized the social and political attitudes of literary figures. Snow argues that this is partially true and this has resulted in people losing faith in literature. Some sociologists argue that they are not to be grouped with humanists as some disciplines of humanities have scientific approach. The division of knowledge into science and humanities is faulty. Snow argues that a botanist having little knowledge of physics is termed as a scientist but a humanist does not belong to the group. Though scientists and humanists see them as different groups there are so many common features for them. But the distinctions between science and humanities have become so large that scientists have no taste for literature and literary figures do not even learn the basic science. This polarization has created intolerance between the two.

3. C. P. Snow was a scientist at a time of major scientific activity. He was also a writer who had many friends who belonged to the literary circle. The close association with scientists and literary figures gave him a realization that both of them had their own culture. But C. P. Snow is of the opinion that scientist and humanists have comparable intelligence, identical in race, similar social origins, earn comparable wages but one hates the other. This conflict between science and humanities is not the problem of England alone but of the West.

CHAPTER -11

DOVER BEACH

GLOSSARY

Dover	:	Beach in South Eastern England, close to France
Tide	:	regular rise and fall of water caused by the attraction of moon
Strait	:	a narrow channel of the sea linking two larger areas of sea
Gleam	:	ray of soft light that comes and goes
Glimmering	:	send out weak, uncertain light
Vast	:	huge
Tranquil	:	calm
Bay	:	part of the sea enclosed by a wide curve of the shore
Blanched	:	to turn white
Grating	:	sound of air flowing through wooden frames
Pebbles	:	round stones
Fling	:	to throw
Tremulous	:	trembling (shaking)
Cadence	:	rhythm
Sophocles	:	Ancient Greek dramatist who wrote great tragedies.
Turbid	:	disordered (confused)
Ebb	:	to become weak or pale
Girdle	:	belt
Furled	:	rolled up
Melancholy	:	sad
Drear	:	dismal (gloomy or sad)
Shingles	:	round stones found in beach
Hath	:	has
Certitude	:	certainty

Stanza 1: The poet Mathew Arnold is calling his wife Frances Lucy Wightman to observe the sea through the windows. Arnold tells his wife that the sea is calm with full tide and the moon lies over the French coast where rays of light come and go. England stands in uncertain light on the opposite shore. The poet is asking his beloved to come and watch the beauty of Dover Beach through the windows. The night air is sweet and one can hear the roar of pebbles which the waves fling from where the sea meets the land. The noise of the pebbles begins and stops in a shaking rhythm of eternal sadness.

Stanza 2: Sophocles, the master Greek tragedian, heard this song in Aegean (land of Oedipus) and it brought into Sophocles mind the disoriented flow of human misery which Sophocles collected in his tragedies. Hearing this sound in the distant Northern Sea, Arnold is reminded off the Victorian Dilemma (the fight between religion and science).Arnold points out that religion was once like a belt which supported the earth and faith empowered humans but in the Victorian period people have lost faith and the poet could hear the long withdrawing roar of the waves of faith down to the edges of the earth.

Stanza 3: Arnold is asking his beloved to be true in love for the world which lies before them has no joy, no life, no light, no certainty or peace or relief from pain. People around are confused and ignorant, bewildered between the choice of religion or science.

Dover Beach is a typical Victorian poem which presents the conflict between faith and science. The publication of Darwin’s ‘Theory of Evolution’ challenged centuries old religious faith and people lost hope in religion. The Victorian trio-Robert Browning, Mathew Arnold and Alfred Tennyson have their own perspectives. Browning supported science and Tennyson regained faith but Mathew Arnold, the son of Rugby school Principal was confused like most people of the period. Mathew Arnold’s solution to the conflict is to be true in love and he asks his wife to be true in their relation ad he finds neither joy nor relief from pain or peace in the world.

Answer the following

1. ‘Origin of species ‘s a work by
(a) Mathew Arnold (b) Charles Darwin
(c) Albert Einstein (d) Sigmund Freud

2. conflicted with faith in the Victorian period

(a) Science

(b) Philosophy

(c) Mathematics

(d) none of these

Answer in 2 or 3 sentences

1. What brings the eternal note of sadness to the sea's song?
2. Why is the speaker sad?
3. What is the conflict presented in the poem?
4. What is the solution Arnold finds for the Victorian dilemma?
5. What are the symbols used to show melancholy and sorrow in the poem?

Answer in a paragraph

1. Dover Beach is a poem on the Victorian conflict. Comment.
2. Why does the sea of faith recede in England?

Essay

1. Dover Beach is an elegy on the loss of faith in the Victorian conflict. Comment.
2. Faith and science of the Victorian Age.

Answer the following

1. (b) 2. (a)

CHAPTER -12

THE PYLONS

GLOSSARY

Pylons	:	large steel towers supporting electrical cables
Crumbling	:	breaking
Gilt	:	treasure
Customary	:	sharp edged
Mocked	:	printed dry
Parched bed	:	writing surface made from sheep or goat skin
Brook	:	small stream
Endures	:	farthest or last part
Whips	:	strips of leather
Emerald	:	precious stone of green color
Trek	:	make a long, hard journey

The Pylons

The Pylons is a poem on the loss of rural beauty of England. Spender talks of the rural life of England and how in near future England will be mechanized. He sees the pylon as a symbol of modernization (mechanization) which will destroy the natural life of rural England. He compares rural England to an emerald and the poet weeps for the loss of rural innocence which is the result of modernization.

Stanza 1: speaks of the villages of England full of hills of stone, and of cottages made of stone which lies on broken roads.

Stanza 2: The villages are filled with pylons (steel bars for supporting electrical cables) those steel pillars stand like nude girls who have no secrets.

Stanza 3: The valley which was bright red color, the chestnut tree all dried up due to the concrete and chemicals and machines used for modernization.

Stanza 4: far above, the poet can see the electric cables which appear like whips of anger with threatening looks and the poet is alarmed at the speed with which natural life is replaced by machines.

Stanza 5: the poet weeps at the loss of natural resources. Mechanisation dwarfs the dream of England to be a world power. He describes town as place where clouds strain their neck like swans to see beyond.

Answer the following

1. The poem is about

(a) evening (b) a brook (c) loss of rural life in England (d) cities

2. England is compared to

(a) Sapphire (b) ruby (c) emerald (d) diamond

Answer in 2 or 3 sentences

1. What do pylons stand for?

2. Why is the poet weeping for rural England?

3. How does the poet describe rural England in the poem?

Answer in a paragraph

1. "The Pylons" as an elegy on the loss of rural life of England?

2. 'The pylon' is a symbol of modernization .Comment.

Essay

1. 'The pylon' is a poem on the loss of rural life of England. Comment.

Answer the following

1.(c) 2.(c)

CHAPTER -13

MY SON, THE PHYSICIST

GLOSSARY

Streak	:	long, thin mark made on hair to color hair.
Stipple	:	to paint dots on hair (a style of hair –coloring)
Shrieking	:	high-pitched sound (here it means to stand different in a crowd)
Enfolded	:	covered
Volubly	:	talk casually in easy manner
Vouch	:	testify
Planetoid	:	planet and surrounding heavenly bodies
Ganymede	:	satellite of Jupiter
Clenched	:	close tightly
To put out on a limb	:	to make a guess
Twitched	:	turned
Semantics	:	study of language (study of meanings of words)
Devise	:	make
Bits	:	basic unit of computer memory
Strategy	:	plan
Hysterical edge	:	madness due to anger
Snorted	:	to blow out air forcefully through nose (sign of impatience)
Take a nap	:	sleep
Stratowire	:	telephone

A very old fashioned lady with her hair colored green, with a sweet smile and calm look entered the government building enfolded with confusion. Her appearance made her stand out in the surroundings and a girl crossed her in a half run. She stopped and stared at

the old lady with astonishment. The girl questioned her and the old lady told her that she came to look for her son Dr. Cremona, a senior physicist. The girl pointed towards Dr. Cremona's office and she left in a hurry. The old lady grew anxious but when she heard her son's voice she was happy.

Her son was talking to an army officer and from their talk she understood that it was a casual one. When the son saw his mother he asked her why she was there and the old lady replied that she came to see her son. The army officer asked Dr. Cremona whether she was permitted there and Dr. Cremona replied that even if they chatted in front of their mother she won't reveal any secret to the public as she has little knowledge of science.

When the mother (old lady) entered the room, the General and Dr. Cremona had been discussing on how they could communicate with their fellow scientists who are in Pluto. Dr. Cremona wanted to communicate with scientists in Pluto but since radio signals can travel with the speed of light, it took 12 hours for communication. Dr. Cremona and General Reiner were thinking of solving this problem and the mother came up with an idea. She suggested that the scientists should talk continuously and there should be some other scientists who can listen for signals from Pluto or their replies by which there will be continuous conversations between the scientists from Dr. Cremona's office and the scientists of Pluto. Dr. Cremona was happy about the suggestion and thanks his mother. Mother says that females do that all the time. She says that females talk without listening.

Dr. Cremona goes out of his office to meet his fellow scientists to tell this idea and the mother laughs at her son who however grown up he respects his mother's practical knowledge.

Answer the following

1. Asimov coined the term "Robotics" in his story
(a) Rob land (b) Hunger (c) Liar (d) The Sea
2. What are the qualities of the mother?
(a) Stylish and talkative (b) affection and practical knowledge
(c) love and care (d) none of these

3. What is the name of the General?
(a)Reiner (b) Gerard (c) Michel (d) Cremona
4. Largest satellite of Jupiter?
(a)Ganymede (b) Tollymeda (c) Straus (d) none of the above

Answer in 2 or 3 sentences

1. What is the solution offered by the mother?
2. What was the mother's answer to the son's question "what made you suggest this, mother?"
3. Why does the mother stand out when she enters the government building?
4. What is the problem encountered in the story?

Answer in a paragraph

1. Comment about the character of the mother in "my son the physicist".
2. What aspects of the pursuit of science are criticized in the story "my son the physicist"?

Essay

1. Analyze "my son the physicist" as a science fiction.

Answer the following

1.(c) 2.(b) 3.(a) 4.(a)