

Science, Technology, and Society

Exam Reviewer

I. Early Science and Human Knowledge

1\ Why people pursued knowledge

Early people tried to understand:

The universe and humanity's place in it

Human behavior and society

Nature and the environment

The preservation of human life

The causes of illness and disease

This led to the development of different fields:

Arts and Philosophy —Meaning, knowledge, beauty, and human existence.

Psychology —Human behavior and mental processes.

Sociology — Human behavior in society

Biology — Living organisms

Chemistry —Matter and its transformations.

Medicine — Prevention and treatment of disease.

Mathematics —Numbers, measurement, patterns, and problem-solving

Astronomy—Objects and events in space

•Philosophy, psychology, and sociology study humanity and behavior, while biology, chemistry, and medicine focus more on life and the physical world.

II. Religion, Spiritualism, and Early Knowledge

In early societies, knowledge was often connected with religion and spiritual beliefs.

The people considered authorities of knowledge included:

Temple men

Priests

Shamans

Because science was strongly influenced by spiritualism, people often explained natural events through rituals, magic, and supernatural beliefs.

Examples of popular forms of witchcraft

Love spells

Healing

Money spells

Banishing

Binding

Protection

Hexing

These practices reflected how early communities used rituals to address personal, social, and health-related concerns.

III. Mathematics and Early Engineering

Mathematics was considered an important field because it was useful in:

Arithmetic

Economics

War

Geometry

Architecture

Engineering

Mathematical principles helped early civilizations construct buildings, organize trade, measure land, and plan military activities. Mathematics also became one of the foundations of early science and technology.

IV. Alchemy

Definition

Alchemy was an ancient art and system of thought that attempted to:

Purify the soul

Achieve immortality

Transform chemical elements

Turn ordinary metals into gold

Gold symbolized perfection.

Important concepts

Prima materia

“Prima materia” means the original or basic material believed to be the source of all matter.

Philosopher’s Stone

The Philosopher’s Stone was believed to be a substance capable of transforming base metals into gold and helping achieve perfection.

Inner alchemy

Inner alchemy refers to the spiritual transformation of a person. “Turning emotional lead into gold” symbolizes changing negative emotions, weakness, or ignorance into wisdom, self-control, and enlightenment.

Alchemy and modern science

Although alchemy was mixed with spiritual beliefs, it contributed to the development of:

Chemistry

Metallurgy

Laboratory techniques

Experimental practices

The study of chemical substances

Alchemy was also described in the photos as influential in the formulation of Isaac Newton's theory of gravity.

Important clarification

Alchemy did not scientifically prove that lead could be transformed into gold. Its importance is that it helped develop early laboratory practices and ideas that later contributed to chemistry.

V. Babaylan in Precolonial Philippines

Definition

A babaylan was a spiritual leader or shaman in many precolonial Philippine communities.

Babaylan were believed to communicate with, appease, or harness the spirits of:

Dead ancestors

Nature

Deities

The spirit world

They were also believed to have spirit guides that helped them interact with anito or diwata.

Roles of the babaylan

Babaylan were highly respected members of the community. Their roles included:

Healer – treated illness using herbs, rituals, and traditional knowledge

Diviner – interpreted signs and attempted to predict or understand events

Sorcerer or ritual specialist – performed spiritual practices and rituals

Spiritual mediator – acted as a connection between the community and the spirit world

Importance of the babaylan

The babaylan preserved and passed on knowledge about:

Healing

Plants and nature

Community traditions

Spiritual practices

Social values

They demonstrate that precolonial Filipinos already possessed systems of knowledge before Western colonization.

VI. Spanish Period in the Philippines

Effects of Spanish colonization

The Spanish introduced or expanded:

Formal education

Christianity and religion

New foods and delicacies

The Spanish language

Schools and institutions

Scientific knowledge and practices

The Spanish later established colleges and universities in the archipelago, including the University of Santo Tomas (UST).

Opening of the Suez Canal

The opening of the Suez Canal increased contact between the Philippines and Europe.

Its effects included:

Greater movement of European visitors

Faster travel between Europe and Asia

Increased exchange of ideas

More opportunities for Filipinos to study in Europe

Exposure to Enlightenment ideas and scientific developments

Some Filipinos who studied in Europe were influenced by the rapid development of scientific ideals during the Age of Enlightenment.

VII. Engineering, Architecture, and Medicine

During the Spanish period, developments were visible in:

Engineering and architecture

Spanish-era architecture included:

Churches

Government buildings

Schools

Bridges

Stone structures

Fortifications

Architecture reflected the influence of Spanish design, religion, local materials, and colonial administration.

Medicine

Medicine developed through:

Formal education

Religious and charitable institutions

Hospitals

European medical knowledge

The study of anatomy and disease

The photos emphasize medicine as one of the fields that developed as scientific knowledge expanded.

VIII. American Period in the Philippines

Science during the American period became more focused on practical and applied fields, especially:

Agriculture

Food processing

Medicine

Pharmacy

The goal was to use science to improve public health, food production, industry, and the economy.

IX. Important Names

Aristotle

A Greek philosopher whose work influenced logic, philosophy, biology, and the study of nature.

Hippocrates

Often called the “Father of Medicine.” He promoted the idea that diseases have natural causes rather than being caused only by supernatural forces.

Galen

A physician whose writings influenced medical knowledge for many centuries.

Isaac Newton

A scientist associated with the theory of gravity. The photos connect the development of his ideas with the influence of alchemical thought.

X. Key Comparisons

Babaylan vs. Western alchemist

Babaylan	Alchemist
Spiritual leader in the community	Early experimenter and philosopher
Communicated with spirits and deities	Studied matter and chemical transformation
Served as healer, diviner, and ritual specialist.	Sought the Philosopher's Stone and transformation of metals
Used indigenous knowledge and spiritual practices.	Combined laboratory work with spiritual beliefs

Spanish vs. American period

Spanish Period	American Period
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Formal education and religion were introduced	

Science became more practical and applied

| Colleges and universities were established

Greater focus on agriculture and food processing

| European knowledge influenced Filipino education

| Medicine and pharmacy were emphasized

| UST was established during this period

Science was connected with public development and industry

XI. Terms to Memorize

Alchemy – ancient practice seeking the transformation of matter and spiritual perfection

Prima materia – original or basic matter

Philosopher's Stone – mythical substance believed to create gold and perfection

Inner alchemy – spiritual transformation from emotional “lead” into “gold”

Babaylan – precolonial Filipino spiritual leader or shaman

Anito – spirits or supernatural beings in Filipino indigenous belief

Diwata – nature spirits or deities

Suez Canal – waterway connecting the Mediterranean Sea and the Red Sea

Enlightenment – intellectual movement emphasizing reason, knowledge, and scientific inquiry

Pharmacy – field concerned with medicines and their preparation

XII. Practice Questions

Multiple Choice

What was the main goal of alchemy?

- A. To create machines
- B. To transform metals and achieve perfection
- C. To study human society
- D. To develop agriculture

What did gold symbolize in alchemy?

- A. War
- B. Wealth only
- C. Perfection
- D. Sickness

What is inner alchemy?

- A. The study of stars
- B. Spiritual and emotional transformation
- C. The construction of buildings
- D. The use of herbs only

Who served as spiritual leaders in many precolonial Philippine communities?

- A. Gobernadors
- B. Babaylan
- C. Merchants

D. Soldiers

Which was one role of a babaylan?

- A. Engineer
- B. Diviner
- C. Ship captain
- D. Governor

What did the opening of the Suez Canal promote?

- A. Isolation of the Philippines
- B. Greater contact between Europe and the Philippines
- C. The end of education
- D. The disappearance of religion

Which institution was established during the Spanish period?

- A. University of Santo Tomas
- B. NASA
- C. Philippine Coconut Research Institute
- D. PAGASA

During the American period, science focused strongly on:

- A. Agriculture, food processing, medicine, and pharmacy
- B. Witchcraft and divination
- C. Astrology only
- D. Church architecture only

Answer Key

B

C

B

B

B

B

A

A

Identification

The spiritual leader or shaman in precolonial Philippine communities. [babaylan](#)

The mythical substance believed to turn base metals into gold. [philosopher stone](#)

The original material in alchemical thought. [Prima materia](#)

The waterway that increased contact between Europe and the Philippines. [Suez canal](#)

The Greek physician known as the Father of Medicine. [Hippocrates](#)

The university established during the Spanish period. [University of santo tomas](#)

The study of human behavior in society. [Sociology](#)

The field concerned with medicines. [Pharmacy](#)

XIII. Short-Answer Questions

1\ Why was the babaylan important in precolonial Filipino society?

The babaylan was important because they served as a healer, diviner, spiritual mediator, and protector of traditional knowledge. They connected the community with spirits, ancestors, and nature.

2\ How did the Suez Canal affect the Philippines?

It made travel and communication between Europe and Asia easier. This encouraged European visitors, allowed some Filipinos to study in Europe, and introduced new scientific and Enlightenment ideas.

3\ How did alchemy contribute to modern science?

Alchemy encouraged experimentation, the use of laboratory equipment, the study of substances, and techniques related to metallurgy and chemistry. Although many alchemical beliefs were not scientifically correct, they helped lay foundations for modern chemistry.

4\ What was the difference between science during the Spanish and American periods?

During the Spanish period, science was connected with religion, education, architecture, and European influence. During the American period, science became more practical, focusing on agriculture, food processing, medicine, and pharmacy.

XIV. Quick Memory Guide

Remember:

Alchemy = Matter + Spiritual Perfection

Babaylan = Healer + Diviner + Spiritual Leader

Suez Canal = Europe and Philippines Connected

Spanish Period = Education, Religion, UST

American Period = Agriculture, Food, Medicine, Pharmacy

Mathematics = Economy, War, Architecture, Engineering

Hippocrates = Father of Medicine

Aristotle = Philosophy and Nature

Galen = Classical Medicine

Newton = Gravity

Reviewer: Science, Technology, and Society

Chapter 2: Intellectual Revolutions

Global Paradigm Shifts

1\ Copernican Revolution

Proposed the heliocentric model.

The Sun, not the Earth, is at the center of the solar system.

Shifted humanity's view from being central in the universe to occupying a smaller, peripheral position.

Associated with Nicolaus Copernicus.

2\ Darwinian Revolution

Explained the diversity of life through evolution by natural selection.

Challenged the belief that species remain unchanged.

Emphasized the shared biological origins and interconnectedness of living organisms.

Associated with Charles Darwin.

3\ Freudian Revolution

Introduced the importance of the unconscious mind.

Proposed that human behavior is influenced by hidden thoughts, desires, memories, and conflicts.

Challenged the idea that people are always fully rational and consciously in control.

Associated with Sigmund Freud.

The Information Age

Driven by the invention of the microprocessor.

Transformed communication, computing, business, education, and global society.

Extended human brainpower and connected people worldwide.

Created challenges such as:

Cybercrime

Loss of privacy

Dependence on technology

Rapid social and economic change

Philippine Science and Technology Agenda

1\ DOST Leadership

The Department of Science and Technology guides national science and technology policies.

It manages projects that support scientific advancement and national development.

2\ Technological Self-Reliance

A major goal of the National Science and Technology Plan.

Encourages the Philippines to develop its own technologies and reduce dependence on foreign systems.

3\ Centers of Excellence

Government-funded facilities that support advanced research.

Important fields include:

Biotechnology

Nanotechnology

Genomics

4\ Harmonized Agenda

Focuses science and technology on urgent national concerns.

Key concerns include:

Inclusive economic growth

Disaster risk reduction

National development

Improved public services

Empowering Human Capital

Tech Transfer Act

Creates a framework for the ownership and commercialization of intellectual property from government-funded research.

Helps research institutions convert discoveries into useful products and services.

S\&T Scholarships

Expands funding for science and mathematics students.

Encourages talented students to pursue careers in science, technology, engineering, and mathematics.

Strengthens the country's future scientific workforce.

PSHS System

Provides specialized, high-quality education for gifted students in science and mathematics.

Develops future researchers, engineers, innovators, and technology professionals.

Supports students through government-funded education and scholarships.

Chapter 3: Science and Technology for National Development

Human Flourishing and the Pursuit of the Good Life

Science and technology should not only produce inventions or economic growth. They should improve human life, promote social welfare, and help people reach their full potential.

Science for Change Program (S4CP)

The Science for Change Program aims to use science, technology, and innovation to solve national problems and strengthen Philippine research and development.

NICER and RDLead

Build the research capacity of higher-education institutions.

Bring institutions closer to top-tier research standards.

Strengthen regional research and development capabilities.

CRADLE Program

Encourages collaboration between academic institutions and private companies.

Supports research partnerships that address real-world industry problems.

Helps transform academic research into practical innovations.

BIST Program

Builds the technological capacity of businesses.

Helps private companies acquire strategic technologies and advanced equipment.

Promotes innovation and improves industrial competitiveness.

Advanced Transportation

Hybrid Electric Road Train (HERT)

A trackless hybrid transportation system.

Designed to improve public transportation efficiency.

Offers a potentially cleaner and more flexible alternative to traditional transport.

Automated Guideway Transit (AGT)

A proposed automated transportation system.

Designed to reduce:

Heavy traffic

Travel time

Air pollution in Metro Manila

Cost-Effective Innovation

Functions similarly to a standard monorail.

Designed to cost only a fraction of conventional monorail systems.

Can connect with and feed existing transportation lines.

The Essence of Eudaimonia

Aristotle's Concept

Eudaimonia means human flourishing or living a truly good and fulfilling life.

According to Aristotle, happiness is not simply pleasure or temporary enjoyment. It is achieved by pursuing, throughout one's lifetime, the goods and virtues that perfect human nature and enrich human life.

Important Ideas

Happiness is a lifelong process.

It involves developing one's abilities and virtues.

It requires living according to reason and moral excellence.

It focuses on meaningful fulfillment rather than short-term pleasure.

Flourishing in the Modern World

To achieve eudaimonia today, people must engage deeply with science and technology in order to:

Understand and navigate complex modern problems.

Use knowledge responsibly.

Develop their potential.

Contribute to society.

Balance technological progress with human values.

Promote well-being, justice, and meaningful living.

Key Connections

The Copernican Revolution changed humanity's view of its place in the universe.

The Darwinian Revolution changed humanity's understanding of biological origins.

The Freudian Revolution changed humanity's understanding of the mind.

The Information Age changed how people communicate, work, and live.

Philippine science and technology programs apply knowledge to national development.

Eudaimonia reminds us that science and technology should ultimately serve human flourishing.

Quick Recall

C-D-F-I

Copernican — heliocentric universe

Darwinian — evolution and natural selection

Freudian — unconscious mind

Information Age — microprocessor and global connectivity

S4CP Programs

NICER/RDLead — strengthen research institutions

CRADLE — academic–industry collaboration

BIST — support business innovation and technology acquisition

Main principle:

Science and technology are valuable when they help people, strengthen society, and support human flourishing.