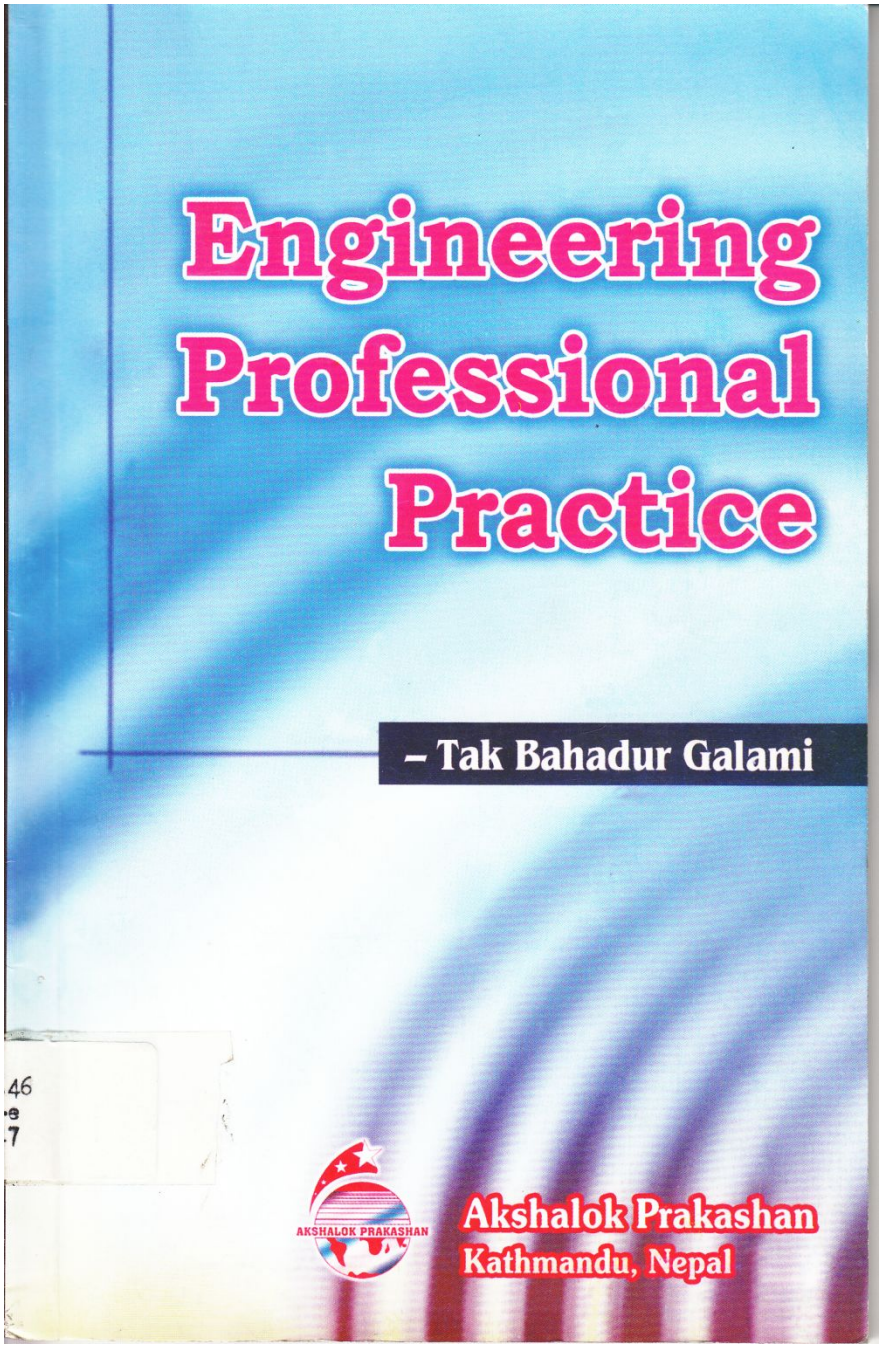

50 Marks evaluation.

40 External.
10 Internal

Purely Theoretical Subject…

Definition of Engineering

The profession in which knowledge of the mathematical and natural sciences, gained by study, experience, and practice, is applied with judgment to develop ways to use, economically, the materials and forces of nature for the benefit of mankind.

Historical background
History of Engineering Practice

- Engineers are
  - For the benefits of mankind.
  - The civilization.
  - Organized.
  - Comforts and conveniences.
  - Our lives and those of our forefathers thousands of years ago.
  - Work in the society.
- Society
  - Has population
  - Occupies certain territory
  - Share same political authority
  - Have common culture and a sense of relationship/membership in and commitment to the same group.

Criteria for the society

1. **Plurality:**

A society must have populations composed of all ages, sexes and groups of various economic statuses.

2. **Stability:**

A society is of a permanent character. Social life is organized mainly on the basis of division of labor.

3. Likeness: Blood relation in previous days. Nationality **today.**

4. Differences: Interest, age, sex, opinions, intellectuality etc.

5. Interdependences:

Populations of a group that forms a society are often dependent on each other. When a child takes birth, its mothers must be taking care of it till it becomes able to feed itself. A member of a society must need cooperation for survival.

6. Cooperation:

It is must, else human society would have vanished a long ago. A sense of confidence to get help from other population members.

- Civilization has arisen 10,000 years ago.
- Crops and tame animals
- The revolution seems first taken place in the hills that curve around to the north of Iraq and Syria. From Iraq and Syria, agriculture revolution quickly spread to the valley of the north and Indus, which in their turn become centers of cultural radiations.
- metals writings, large scale government, science and other features of civilization.
- When farmers learned to raise more foods then they themselves needed, other men were able to spend their times in making useful things, which they exchanged for surplus food, this way specializations arose.

The human societies in the world can be broadly divided in two, as following on the bases of its beginning, composition and values and cultures.

a. Western Societies
b. Eastern Societies

In the **western societies**, the following values are regarded as the success in lives:

1. Achievement and success
2. Activity and work
3. Moral orientation
4. Efficiency and practicability
5. Progress
6. Material comforts
7. Equality
8. Freedom
9. Use of technology
10. Individualistic
11. High concern overtime

Eastern Societies:

- The values accorded by the culture to the individual and groups in the eastern societies are to the achieve high mortality, power of truth, and achievement in religious activities.
- They, who have achieved those, are regarded higher than those acquiring materialistic and physical objects.
- The Saint, Mahatma, Sadhu are the examples.

Journey into Time….

- 1200 B.C. – A.D. 1
  - Quality of wrought iron is improved
  - Swords are mass produced
  - Siege towers are perfected
  - Greeks develop manufacturing
  - Archimedes introduces mathematics in Greece
  - Concrete is used for arched bridges, roads and aqueducts in Rome.

Journey into Time…. A.D 1-1000

- Chinese further develop the study of mathematics
- Gunpowder is perfected
- Cotton and silk manufactured

Journey into Time…. 1000-1400

- Silk and glass industries continued to grow
- Leonardo Fibonacci, a medieval mathematician, writes the first Western text on algebra

Journey into Time…. 1400-1700

- First toilet is invented in England
- Galileo constructs a series of telescopes, with which he observes the rotation about the sun
- Otto von Guerick first demonstrates the existence of a vacuum
- Issac Newton constructs first reflecting telescopes
- Boyle's Gas Law, stating pressure varies inversely with volume, is first introduced.

Traveling Through the Ages: 1700-1800

- Industrial Revolution begins in Europe
- James Watt patents his first steam engine
- Society of Engineers, a professional engineering society, is formed in London
- First building made completely of cast iron built in England

Traveling Through the Ages: 1800-1825

- Machine automation is first introduced in France
- First railroad locomotive is designed and manufactured
- Chemical symbols are developed, the same symbols used today (Au, He)
- Single wire telegraph line is developed

Journey into Time…. 1825-1875

- Reinforced concrete is first used
- First synthetic plastic material is created
- Bessemer develops his process to create stronger steel in mass quantities
- First oil well drilled in Pennsylvania
- Typewriter is perfected

Journey into Time…. 1875-1900

- Telephone is patented in the US by Alexander Graham Bell
- Thomas Edison invents the light bulb and the phonograph
- Gasoline engine developed by Gottlieb Daimler
- Automobile introduced by Karl Benz

Traveling Through the Ages: 1900-1925

- Wright brothers complete first sustained flight
- Ford develops first diesel engines in tractors
- First commercial flight between Paris and London begins
- Detroit becomes center of auto production industry

Traveling Through the Ages: 1925-1950

- John Logie Baird invents a primitive form of television
- The VW Beetle goes into production
- First atomic bomb is used
- The transistor is invented

Journey into Time…. 1950-1975

- Computers first introduced into the market, and are common by 1960
- Sputnik I, the first artificial satellite, put into space by USSR
- First communication satellite—Telstar—is put into space
- The U.S. completes the first ever moon landing

Journey into Time…. 1975-1990

- The Concord is first used for supersonic flight between Europe and the U.S.
- Columbia space shuttle is reused for space travel
- First artificial heart is successfully implanted

Journey into Time…. 1990-Present

- Robots travel on Mars
- The “Chunnel” between England and France is finished
- GPS is used to predict and report weather conditions, as well as many other consumer applications

History of Engineering Practice in Eastern Society

Engineering practices in eastern societies can be with significant events as follows.

1. During 5000 BC, civilization developed near Yanshao, where people roamed seeking new soil for animals and agriculture. People used earthen pottery and stone tools.

2. During 4000 BC, early Chinese communities planned cities according to Grid pattern with intersecting streets at right angles to each other.

3. During 3300 – 3200 BC, Egyptians first developed a system of Division of Labor on closed societies in Sumar and Egypt, particularly among merchants and metal workers.

5. During 3500-3000 BC, in Sumeria, the appearance of towns and cities coincide with the production and distribution of goods through trades.
6. In 132 AD, Chinese philosopher Chang Heng invented a Seismoscope.
7. In 510 AD, China's Grand Canal (Shan-Yang) in southern China was built connecting Yangtze (Chang-Jiang) and Huang-He (yellow river), which played a lifeline for north China providing a transportation route for grains and commodities.
8. During 704 AD, the Buddhist text "Dharani Sutra" was printed in Korea during 704-751 AD, using block-printing technique. It is the oldest existing printed book.

9. In 805 AD, the forerunners of Gun were invented, which is called ‘fire lance’, early models consisting of Roman Candles tied two spears, resembling flame throwers.
10. In 1040 AD, Chinese writer Tseng Kung – Liang published the first known Gun-powder formula for use in three weapons- a. Bomb held by a king of catapult, b. Bomb with hooks and c. Poison smoke ball
11. In 1045-1048 AD, Pi-Sang invented movable type of printing. Printing with movable type was developed in Europe in mid 15th century.

12. In 1250 AD, true guns with a gun powder chamber and strengthening explosion chamber to prevent splitting appeared in China. In less than a century, guns reached in Europe and changed to characters of medieval warfare.
13. In 1805 AD, Habaoka Seishu performed the first Surgery under a general anesthesia in Japan.
14. The Iranians built many bridges, however of which some survive from the time of Shapur-I (300 AD).

15. In 400 AD, the Sassaid kings built a great palace at Ctesiphon, which was a capital on Tigris, north east of deserted Babylon and downstream from the village of Baghdad. Part of this palace still stands, including most of the vaulted dining hall –"the widest single span vault of unreinforced brick work in the world." The vault is 77 feet wide at the base and 112 feet high.

16. In 515 BC, Persian building method with stone instead of wood introduced in to India when Darius conquered the Punjab.

History of Engineering Practice in Western SocietyAAK\\90

Engineering practices in western societies can be traced out with significant events as follows.

1. In 3000-1000 BC, Stonehenge – a monument consisting of concentric circles of stone oriented towards the Sun position on the summer solstice in England.
2. In 300-100 AD, agriculture and power appeared in ancient Mesoamerica.
3. In 250-900 AD, Maya created and maintained a sophisticated pair of interlocking calendar to help them plan ceremonies.
4. In 1268 AD, English scientist and philosopher Roger banon records a statement about using lenses to improve vision with eyeglasses. At the end of 13th century, many wealthy and elite people in Europe, Asia, and Africa wear glasses.

5. In 1487 AD Aztee ruler Ahuizotl dedicated the new Tempo Mayor (great temple), an enormous double pyramid in Tenochtitlan to the warrior God of the Sun.
6. In 1673 AD, English Mathematician, John Hadlley and American inventor Thomas Godfery independently invented the Sextant, an optical instrument to measure angular distance between any two objects.
7. In 1747-1752 AD, American Scientist Benjamin Franklin theorized that lightning is a form of electricity.
8. In 1780 AD, Scottist inventor James Watt and English manufacturer Matthew Boulton began manufacturing a steam engine for individual use.
9. In 1793 AD, American Eli Whitney invented the cotton gin, a device that rapidly and effectively removes the seeds from cotton fiber.

10. In 1807 AD, American inventor and engineer Robert Fulton inaugurated a new era of power driven navigation as a steamboat.
11. In 1660 AD, a fine opportunity for planned city was offered after a great fire of London by John Evelyn, the diarist and civil servant and Christopher Wren, an architect to Charles II for rebuilding the burnt city before the ashes cool down.
12. In 1548-1620, Simon Stevin discovered the triangle of forces in Netherlands, which helped to calculate the actual load on the members of cranes, trusses and other structures.

13. Stevin’s younger contemporary Galileo Galilel in 1564-1642 AD, solved the problem of accelerated movement and began the analysis of stresses in beams.
14. Technical men organized the society of Lynxes to which Galileo belonged. The first research institute was founded in 1560 AD.
15. Engineering school appeared in France in 1800 AD and at the same time specialization within engineering profession took place. John Smeaton, who went to France in 1750’s AD to round off his technical education, called himself ‘Civil engineer’ meaning non-military engineer.

Key roles of engineering in the developmental activities

- **Creating vision:** Imagine a useful and beneficial object are product that can be produced by utilizing the properties of different matters and sources of power for the benefits of the people.

- **Preparing mission:** Plan, prepare and produce the same economically for the use of larger number of people for safe, healthy and protection.

- **Execution:** Assign the planned activities and or get assigned the jobs that require engineering skills and knowledge for implementation.

- **Monitor and evaluate:** Monitor and evaluate and supervise the make for accuracy, timely, quality and economical products.

- **Train:** Train new engineers practically, technically and professionally to make professionals.

- **Upgrade profession:** Innovate, systematize and produce or make facilities for the people by keeping up the dignity and ethical values of engineers.

The changes brought by the engineers' activities in the human societies are as below: -

- Mass production of goods though machines
- Automation
- Faster means of transportation
- Mass communication
- Inventing labor saving devices
- Creating faster pace of life
- Commercializing recreation
- Emphasizing on high degree of specialization

Impact of Engineering in different types of Society

A. At family level of society:

- Some positive changes:
- Nuclear family emerged
- Women started involving in male dominant working areas
- Changed living standard of life
- Children started new ways in specialization
- Started bringing changes orthodox values

Some Demerits

- Life became mechanical
- Relationship among keen relatives become formal
- Existing social customs changed
- Family ties among family member became less

B. In religion societies:

- Started analyzing religion doctrines and tradition
- Relaxation occurred in the rigidity of caste system
- People became free from religious rituals
- Religion became secondary thing.

C. In rural societies:

- Population started migrating towards urban areas
- Populations became increasingly consciousness of their societies
- People started changed farming techniques
- People have more comfortable lives than before
- Their life patterns changed

D. In urban societies:

- Shortage of land and space for living
- Rapid increasing in population and slums
- Transportation problem occurred
- Crimes increased
- Life became expensive
- Money became the most important thing in life

Individual freedom vs. societal goals

- If you live by yourself on an island, you have only yourself to consider. When you band together with other human beings, however, your actions can affect the group of which you are a part.

- Then Individual freedom vs. societal goals comes into scene.

- An individual's freedom can best be protected against the interest of the society is the concern. This concern has long been dealt with the study of Ethics. The study of Ethics is the study of "how to live in group".

- Ethics is normative science of conduct, and the conduct is collective name for voluntary actions of individuals. So, ethics is the science of disciplined dealings with what is good and bad and with moral duties and obligations towards the societies.

- Individuals interests contrasting with social interests creates dilemma, a confusion of which is right and wrong.

- Ethics deals with the norms about how one should behave in such dilemmas of right and wrong, good and bad and fair and unfair.

- An individual freedom facing dilemmas can be assured by the following analysis: -

✔ Economical analysis
✔ Legal analysis and
✔ Philosophical analysis

- The societal goal is to maintain and keep up morality in the society. In the most places, unwritten tribal customs have been supplanted by written codes of behaviors.

- The theory of '**Formalism**', which judges the good of an act on the basis of motive.
- In contract, **Teleological theory** judges an act on the basis of ultimate value of the outcomes.

Case 1: - Assume for the moment that you meet a very thirsty person in desert whom you give a drink of water from your canteen. What if the thermal shock of cold water kills that person?

- **Formalistic theory** says that you are not guilty for the person's death.
- Whereas, **teleological theory** says that you are guilty. You are responsible for contributing to the person's death.

- THANK YOU