

Studentsdash - FEG 303: Engineer in Society (2023/2024)

Question 1

(a) Engineers are regarded as artists because they use creativity and innovation to design and build useful systems, structures, and machines. They imagine, create, and improve things just like artists do in their work. In the engineering family, we have different groups of professionals such as:

- Civil Engineers (design roads, bridges, buildings)
- Mechanical Engineers (work on machines, engines)
- Electrical Engineers (handle electrical systems)
- Chemical Engineers (work with chemicals and manufacturing)
- Agricultural Engineers (apply engineering in farming)
- Computer Engineers (design hardware and software systems)
- Environmental Engineers (focus on protecting the environment)

All these professionals play key roles in making life easier and better.

(b) Science is about discovering facts and principles about how the world works. Technology is using scientific knowledge to create tools and systems. Engineering applies both science and technology to solve real-life problems. For example, scientists discover how electricity works (science), technologists develop tools like wires and switches (technology), and engineers use them to build power plants or electrical systems (engineering).

Question 2

(a) Engineering has a long history. It started in ancient times when people built tools, houses, and roads using simple knowledge. The Egyptians built pyramids, and Romans built roads and bridges. During the industrial revolution, machines were developed and more people began to study engineering formally. In modern times, engineering has grown into different fields like electrical, mechanical, civil, software, and more, with advanced tools and techniques.

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(b)

i. Agricultural Engineering:

- Farm machinery
- Irrigation systems
- Soil and water management
- Food processing
- Crop storage facilities

ii. Civil Engineering:

- Structural engineering
- Transportation engineering
- Geotechnical engineering
- Environmental engineering
- Water resources engineering

iii. Mechanical Engineering:

- Thermal engineering
- Fluid mechanics
- HVAC systems
- Machine design
- Manufacturing engineering

Question 3

(a) The three main components of the environment are:

- Atmosphere: the air and gases that surround the earth.
- Hydrosphere: all the water bodies like rivers, oceans, and lakes.
- Lithosphere: the solid part of the earth including soil, rocks, and landforms.

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(b) Air Pollution: Happens when harmful gases like carbon monoxide, smoke, and dust are released into the air.

Water Pollution: Happens when harmful substances like chemicals, waste, or oil spill into water bodies.

Soil Pollution: Occurs when the soil is contaminated with chemicals or waste, making it unfit for plants or farming.

(c) Types of erosion:

- Water erosion: When rain or flowing water removes soil.
- Wind erosion: When strong wind blows away topsoil.
- Glacial erosion: When glaciers move and carry soil and rocks with them.

Question 4

(a) Four major fossil fuels are:

- Coal: Used in power plants to produce electricity.
- Crude oil: Refined into fuel like petrol and diesel.
- Natural gas: Used in cooking and heating.
- Bitumen: Used for road construction. These fuels are important because they supply energy for industries, homes, and transport.

(b)

i. Wind energy:

- Used to generate electricity through wind turbines.
- Used in water pumping systems.
- Helps in reducing greenhouse gas emissions.
- Powers remote or rural areas.

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ii. Solar energy:

- Provides electricity using solar panels.
- Used for heating water (solar heaters).
- Powers street lights and calculators.
- Used in agriculture for drying crops.

Question 5

(a) Feasibility studies are investigations done before starting a project to check if it is possible and worth doing. It helps to decide whether the project is realistic, affordable, and likely to succeed.

(b) Five major contents of a typical feasibility study report:

- Project background and objectives
- Market analysis (demand and supply)
- Technical requirements (materials, machines, labor)
- Financial analysis (cost, profit, and funding)
- Legal and environmental considerations