

TERM/WEEK: **THIRD TERM/WEEK 1**

DATE: 3rd June 2020.

CLASS: JSS 2.

SUBJECT: Basic Technology.

Topic: Energy and Power.

Reference: Basic Technology by F. A. Sadiku.

Brief Explanation:

Day 1

Everybody is involved in one activity or the other including you. Walking, running, planting etc. are few of the things we do daily. You cannot do all these activities if you are weak. You need strength (Energy to do everything).

Notes for the students

Energy is the ability to do work. Work is done when a force is applied on a body through a distance in the direction of the force. That is, before any useful work is done energy must be expended.

Work done = Force x Distance

When distance = 0, work = 0

Forms of energy are listed below from 1 to 8:

1. **Mechanical Energy**: This is the energy associated with a machine or any such physical object. The two types of mechanical energy are potential energy and kinetic energy.

(a) **Potential Energy** is the energy possessed by a body at rest.

Potential energy = mgh

m = mass of the body

g = Acceleration due to gravity

h = height

(b) **Kinetic Energy** is the energy possessed by a moving body. Kinetic

Energy = $\frac{1}{2}mv^2$

m = mass

v = velocity of the moving body

2. Electrical energy.
3. Heat or thermal energy.
4. Chemical energy (Energy present in chemicals, food, and fuels).
5. Sound energy.
6. Light energy.
7. Solar energy.
8. Nuclear energy.

Sources of energy

Sources of energy can be derived from two groups:

- 1.) a. Renewable Energy Source.
- b. Non-renewable Energy Source.

Renewable energy are energy sources that man cannot exhaust or use up entirely in a life span. Examples are

- i) Sun
- ii) Wind
- iii) Waves and tide

Non-renewable energy are energy sources that are limited in supply. They are exhaustible.

Examples are

- i.) Fossil fuel: coal, oil and natural gas.
- ii) Nuclear Fuel: Uranium
- iii) Fuel – wood and charcoal.

fuel is any material that produces heat when burned in air or oxygen.

2nd period

Power

Brief Explanation:

Energy is required to do work but we need to determine the rate at which the energy is being used. When you run from your class to the playground, the energy you consume is not the same as the energy required to walk to the same place. The rate of energy consumption or the rate of doing work is known as power.

Notes for the students

Power is the energy consumed within a particular time. The first man to talk about power was called James. The unit of measuring power is Watt.

$$\text{Power} = \frac{\text{energy}}{\text{time}} \left(\frac{J}{s} \right) \text{ or } \text{power} = l \times v \text{ or } l^2 \times R$$

Calculations:

If you use 20J energy to do a job for 2 seconds, the power consumed is

$$\text{Power} = \frac{\text{energy}}{\text{time}} \text{ (J/s)}$$

$$\text{Power} = \frac{20}{2} = 10 \text{ Joules per second.}$$

2.) A 100W bulb is used for a period of 2 minutes. What is the energy consumed?

Solution

Change the time from minutes to seconds.

$$2 \text{ minutes} = 2 \times 60 = 120 \text{ seconds}$$

$$\text{Power} = 100\text{W}$$

$$\text{Time} = 120\text{sec}$$

$$\text{Energy} = \text{Power} \times \text{Time}$$

$$= 100 \times 120 = 12,000 \text{ Joules.}$$

Summary

Mechanical work = force x distance

Mechanical power = $\frac{\text{force} \times \text{distance}}{\text{time}}$

If V = Voltage

I = current

R = Resistance

T = Time, then

Electrical energy or work = VIt

$$= I^2Rt$$

$$= V^2t/R$$

If these equations are each divided by time, we obtain electrical power

$$= VI$$

$$\text{or} = I^2R$$

$$\text{or} = V^2/R$$

problems of energy exploitation

the exploitation of the earth's resources to provide energy has brought a lot of problems of which the main ones are the following.

1. Depletion of the earth's fuel reserves
2. Environmental pollution.

Exercises/Assignments

1. Define (a) Energy (b) Power
2. List and explain energy sources.
3. Explain five forms of energy.
4. What is the difference between renewable energy sources and non-renewable energy sources?
5. (a) Give two examples of renewable energy sources. (b) Give two examples of non-renewable energy source.
6. Write two problems of energy exploitation in our society.