BASIC SCIENCE
TOPIC: SIMPLE MACHINE

MEANING OF SIMPLE MACHINE

- Simple machine are tools that help people to make things or make work easy.

TYPES OF SIMPLE MACHINES

- Lever, pulleys, wheels, wheel and axle, screw jacks, belt driver and gear,

LEVER

Is a rod or stick which enables us move or lift heavy object with minimum energy.

- Common tools that are lever are: scissors, wheelbarrow, screwdriver, hoe, spanner, chisel, plier.

TYPES OF LEVERS

- Lever can be classified into three groups. These are:

1. First class levers
2. Second class levers
3. Third class levers

- First class levers: the fulcrum is between the load and the effort. Examples of these levers are claw hammer, a pair of scissors, a pair of pincers, crowbar, etc.
- Second class levers: the load is between the fulcrum and the effort. Examples of such levers are nutcrackers, wheelbarrow, etc.
- Third class levers: the effort is between the load and the fulcrum. Examples of this class are forceps, tongs, etc.

GEARS

- Is a toothed machine part, such as wheel or cylinder, that meshes with another toothed part to transmit motion or change speed or direction.

TYPES OF GEARS

- There are three types of gear, namely: internal gear, external gear and bevel gear.
- INTERNAL GEAR: Is one with the teeth formed on the inner surface of the cylinder or cone, which has the advantage of not causing output shaft direction reversal. The internal gear always meshes with the external gear.

FEATURES OF AN INTERNAL GEAR ARE:

1. In the meshing of two gears (internal and external), rotation goes in the same direction.
2. Care should be taken as to the number of teeth when meshing a large (internal) gear with a small (external) gear.
3. Usually, internal gear is driven by external gear.

4. It allows compact design of the machine

- EXTERNAL GEAR: Is one with the teeth formed on the outer surface of a cylinder or cone. Examples of external gears are:

1. Spur gear

a. It is easy to manufacture

b. There will be no axial force

2. Helical gear

a. It has high strength compared with the spur gear

b. It is effective in reducing noise and vibration compared to spur gear.

3. Rack gear:

a. Changes a rotary motion into a rectilinear motion.

4. Screw gear:

a. It is used in a speed reducer

b. It tends to wear as the gear come in sliding contact.

5. Worm gear:

a. It provides large reduction ratio for a given center distance

b. A worm wheel is not easy to drive except for special occasions.

- BEVEL GEAR: Is one of a pair of gears used to connect two shafts whose axes intersect and the pitch surfaces are cones. Teeth are cut along the pitch cone, there are different classes of bevel gear:

1. Straight bevel gear

a. It is relatively easy to manufacture

b. It provides reduction ratio up to 1:5

2. Spiral bevel gear

a. It has a higher contact ratio, higher strength and durability than an straight gear.

b. It has a better efficiency of transmission with reduced gear noise.

3. Miter gear: this is a special class of bevel in which the shafts intersect at $90^0$and the gear ratio is 1:1.

USES OF GEAR

1. Power transmission
2. Changing direction
3. Selecting speed