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Experiment -1.

Aim :- To study different types of gear box and power train.

Objectives :- i) To study diff^r types of gear box, their uses, functions, etc.

ii) Mostly, the objective of gearbox is to allow gear change for different speeds.

iii) By increasing the gear number, the speed of vehicle can be increased.

iv) Powerplant powertrain comprises the main components that generate power and deliver it to the road surface water or air.

Introduction :- i) In motor vehicle, powertrain or powerplant comprises the main component that generate power and deliver it to the road surface, water, or air.

ii) This includes the engine transmission, drive shafts, differentials and the final drive

iii) More recently in hybrid powertrains the battery, electric motor and control algorithm are elements of power train.

iv) A motor vehicle's driveline or drive train consists of parts of powertrain excluding the engine.

v) It is the portion of a vehicle after the prime mover, that changes depending on whether a vehicle is front wheel, rear wheel or four wheel drive.

vi) In wider sense, the power train includes all components used to transform stored energy into kinetic energy for propulsion purpose. This includes utilization of multiple power sources and non-wheel based vehicles.

7) Gear box :- vii) Most modern gearboxes are used to increase torque while reducing the speed of prime movers output shaft.

viii) The output shaft of the gearbox rotates at a slower rate than the input shaft and this

reduction in speed produces a mechanical advantage, increasing torque.

1] Power train :-

-The mechanism that transmits the drive from the engine of a vehicle to its axle is called power train. The power train mechanism includes engine and the axle considered collectively.

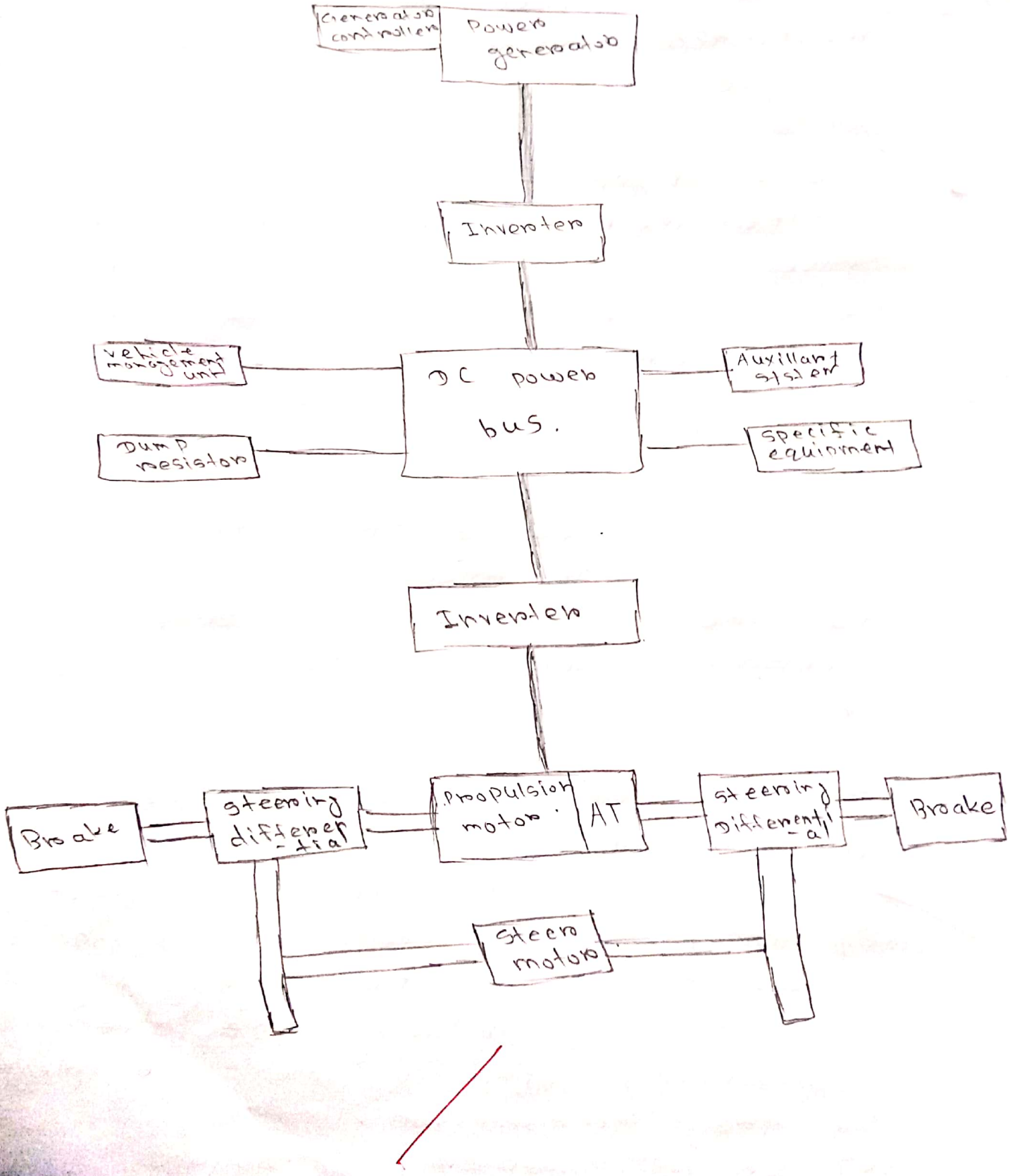
i) In motor vehicle, the term powertrain or powerplant refers to the group of components that generate power and deliver it to the road surface, water or air.

ii) This includes the engine transmission, drive shafts, differentials and the final drive.

iii) Sometimes, powertrain is used to refer to simply the engine and transmission including the other components only if they are integral to the transmission.

iv) In a carriage or wagon, running gear designates the wheels

Block diagram of powertrain



and axles in distinction from the body. A motor vehicle's driveline or drivetrain consists of the parts of powertrain excluding the engine and transmission.

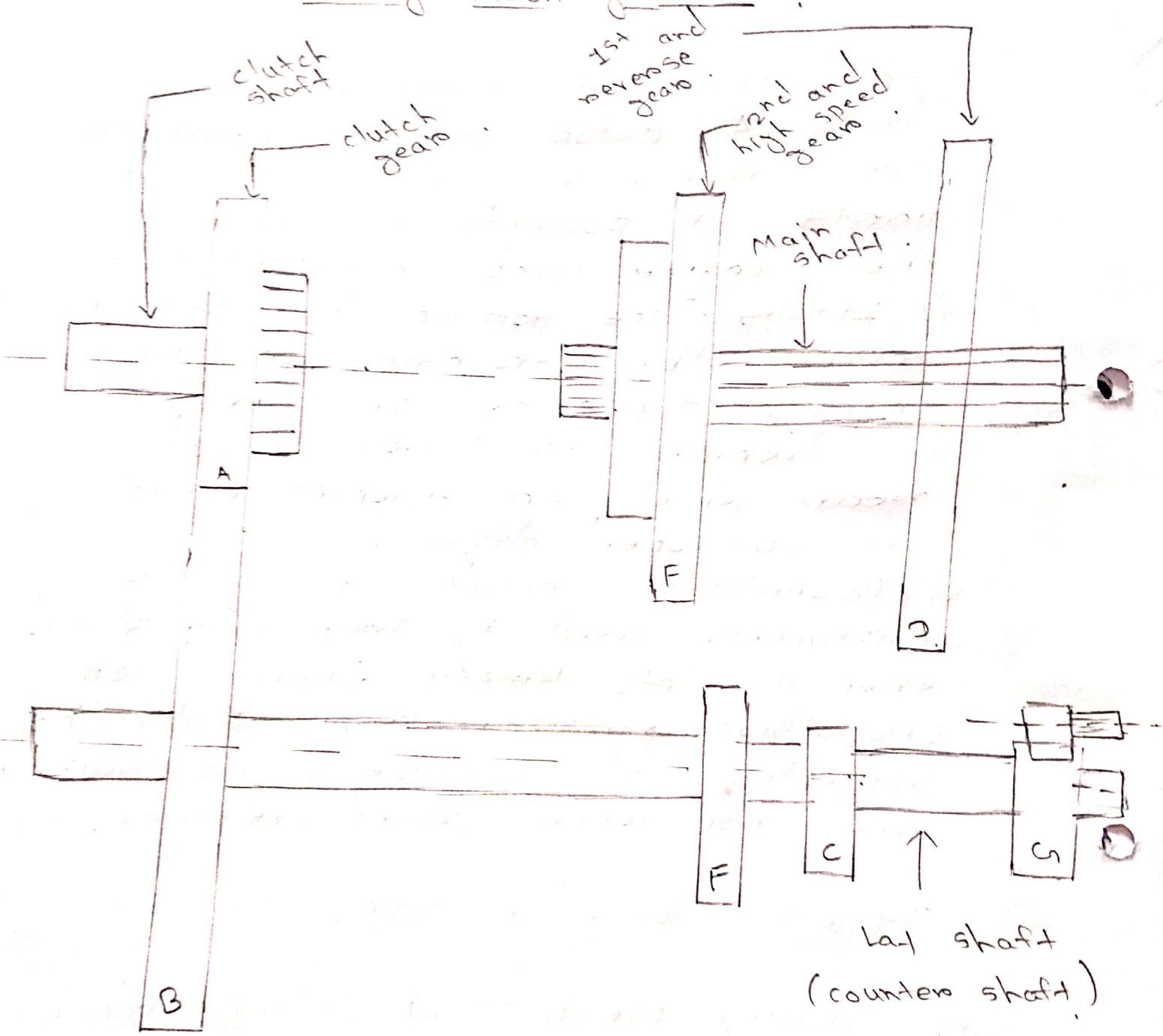
v) It is the portion of a vehicle, after the transmission that changes depending on whether a vehicle is front wheel, rear-wheel or 4-wheel drive or 8-wheel drive.

vi) Powertrain includes all of its components used to transform stored energy into kinetic energy for propulsion purposes. This includes the utilization of multiple power sources and non-wheel based vehicles.

2] Types of gear box.

i) Sliding Mesh :- a) Sliding mesh gearbox is a transmission system that consists of a various sets of gears and shafts that are arranged together in an organised fashion and the shifting or meshing of different gear ratios is done by the sliding of gears towards right

Sliding mesh gearbox



and left over the splined shaft with the help of a gear lever.

ii) In 1894, the first transmission system named sliding mesh transmission system was introduced which was designed to provide different speed and torque ratios to overcome the road challenges

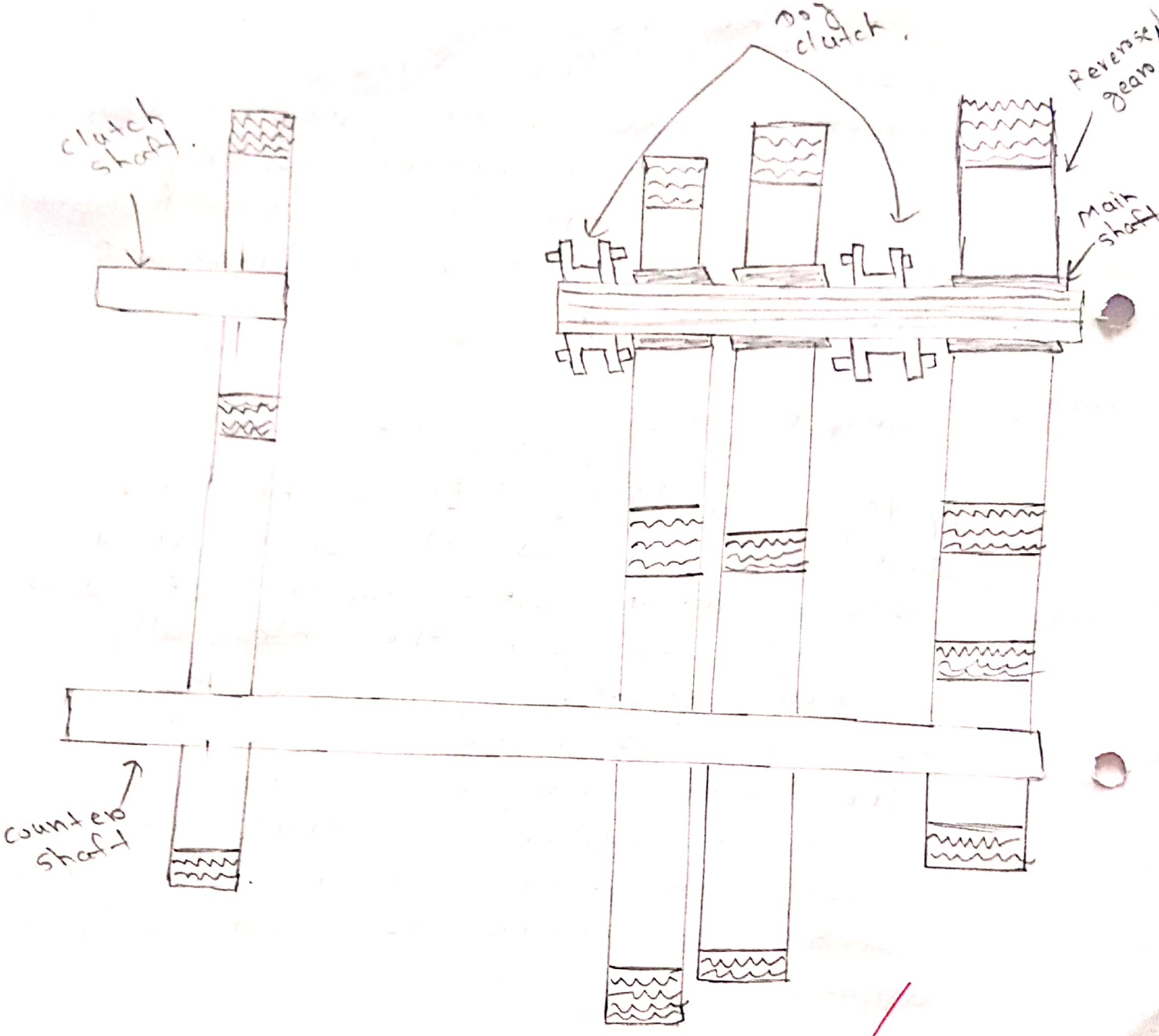
- components :-

1) Main shaft :- i) It is the shaft used as an output shaft in a sliding-mesh over which the sets of gears with the internally splined grooves are arranged in an organised fashion. The

ii) The outer surface of this shaft is made splined so that the gears can easily slide over this shaft in order to mesh with the appropriate gear.

2) Clutch shaft :- i) It is the shaft that is used to carry engine output to the transmission box with the help of engaging and disengaging clutch which is mounting at the engine end,

Constant Mesh gearbox.



gear or a pair of gear is mounted over this shaft which is used to transmit rotational motion to lay shaft.

3) Lay shaft :- It is the shaft having gears mounted over its outer surface and is in continuous rotation with the clutch shaft as one gear of this shaft is always in contact with a gear on the clutch shaft, it is used as a intermediate shaft that provides the meshing of gears of the main shaft in order to transmit appropriate output to the final drive. Gears used in sliding mesh gearbox are :-

1) Spur gear.
2) Helical gear

- Working of Sliding Mesh gearbox.

The shifting of gears is obtained by the meshing of the gears on the main shaft with the gears on the lay shaft by right or left sliding of gears on the main shaft in order to

obtain appropriate gears, lets understand the working of 3-speed : 1 reverse transmission used in automobile vehicles.

2] Constant Mesh Gear box.

→ i) Constant mesh gearbox is a type of transmission in which all or most of the gears are always in mesh with one another as opposed to a sliding gear transmission in which engagement is obtained by sliding some of the gears along a shaft into mesh.

ii) In a constant mesh manual gearbox, gear ratios are selected by small clutches that connect the various gear sets to their shafts so that power is transmitted through them.

• Construction and working of constant mesh gear box.

→ 1) Constant gear mesh gearbox employed helical gears for power transmission. The gears are rigidly fixed in the lay shaft.

2) The gears in output shaft rotates freely without engaging with shaft.

thus not transmitting power. The gears in both shafts are always meshed together.

3) To engage the gears with output shaft dog clutch is used. Dog clutch is shifted by the selector fork moved by gear lever. To provide reverse gearing, a idler gear is used.

4) When the gear lever is pushed, the gear selector fork pushes the dog clutch. The dog clutch engages the gear and output shaft, thus power from lay shaft now transmitted to output shaft

Conclusion :-

In this experiment, we studied different types of gear box like sliding mesh gear box, constant mesh gear box, their uses and functions. We also studied powertrain and it applications.