~~Unit~~

Assignment 1.

Q.1 a What is automobile? Write down vehicle specification for any two wheeler.

Ans: ① An automobile, autocar or motor car is a self propelled wheeled motor vehicle used for transporting passengers and goods on ground.

② Vehicle specification of Hero splendor+.

Make / Manufacturer	Hero splendor+
1) Variant	Splendor+
2) Fuel type	Petrol
3) Engine	
Engine type	Air cooled, 4-stroke, single cylinder.
Displacement, cc	97.2
Maximum Power, HP@rpm	7.5 HP @ 8000 rpm
Maximum Torque, Nm @rpm	7.95 Nm @ 5000 rpm
Ignition Type	CDI
4) Transmission System	
Gearbox type	4-speed constant mesh
Clutch	Wet, Multiplate
5) Chassis	
Chassis type	Tubular double cradle type.
6) Suspension System	
Front	Telescopic hydraulic shock absorbers
Rear	Swing arm with hydraulic shock absorbers.

7)	Braking System	
	Front	Internal expandable drum brakes
	Rear	Internal expandable drum brakes.
8)	Wheels	
	Type	Spoke wheel / cast wheel
	Tyres	
	Front	2.75 x 18 - 42 P/4PR
	Rear	2.75 x 18 - 48P/6PR
9)	Battery	12V x 2.5 Ah
10)	Weight	
	Kerb, kg	109
	Fuel tank, capacity, liters	11
11)	Dimensions	
	Overall length, mm	1970
	Overall width, mm	720
	Overall Height, mm	1040
	Wheel base, mm	1230
	Ground clearance, mm	159.

b) Define. Which different parameters are considered for cost analysis?

1) Swept Volume :
Volume displaced by the piston as it travels through one stroke. Swept volume is defined as stroke times bore.

2) Clearance volume: It is the minimum volume of the cylinder available for the charge when the piston reaches at its outermost point during compression stroke of the cycle.
Minimum volume of combustion chamber with piston at TDC.

The cost of vehicle is depend on following factors:

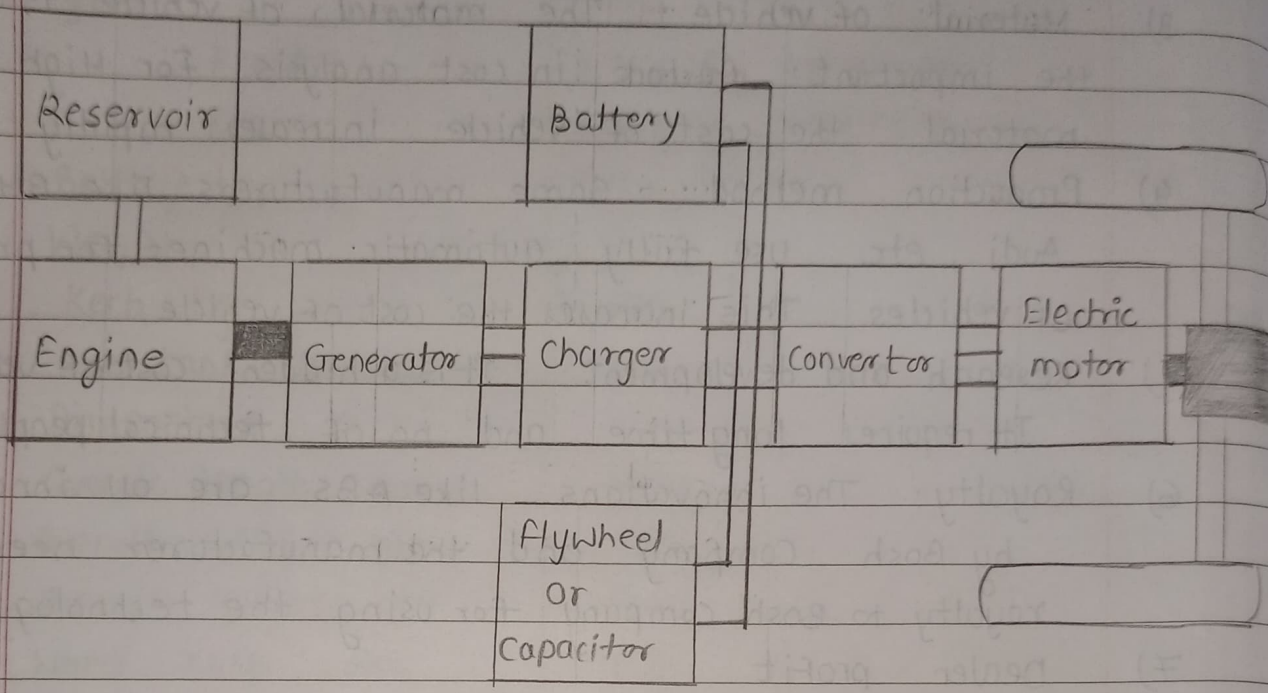
1) Types of engine : According to the type of engine or its capacity the cost of vehicle changes.
2) Safety features: If a vehicle includes safety, feature like ABS, air bag etc. then cost of vehicle increases.
3) Material of vehicle: The material of vehicle is one of the important factors in cost analysis. For High grade material the cost of vehicle increases rapidly.
4) Production method: Some manufacturers. like BMW, Audi, etc. use fully automatic machines for production of vehicles. This increases the cost of vehicle.
5) Research and development: It is a hidden cost of vehicle. It requires long time and no. of technical people.
6) Royalty: The innovations like ABS are all innovations by Bosh Company and the manufacturer need to pay royalty to Bosh company for using the technology.
7) Dealer profit
8) Insurance and taxation.
9) Availability of spare parts.
10) Advertisment.
11) Quantity of production.

c) Explain series hybrid electric vehicle with neat sketch.

Ans: 1) In series hybrids only the electric motor drives the drives train and a smaller I.C. engine works as a generator to power electric motor or to recharge the batteries.
2) Series hybrids have larger battery pack than the parallel hybrids, hence they are more expensive.
3) series hybrids have largers battery pack than the

parallel hybrids, hence they are more expensive.

4) Once the battery are low, the small engine can generate power at its optimum settings at all times, making them more efficient in extensive city driving.



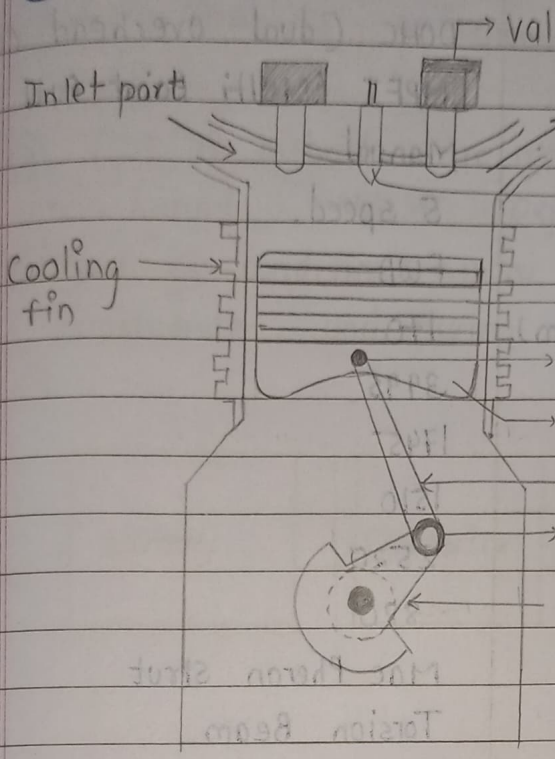
Q.2

a) Draw neat sketch IC engine showing all the parts. Name the components.

Answer: Main components of Reciprocating IC engine:

1. Cylinder.
2. Cylinder Head.
3. Piston
4. Piston Rings.
5. Water Jackets.
6. Connecting Rods.
7. Crank and crank shaft.

⑧ Flywheel.
⑨ spark plug.
⑩ Valve.
⑪ fuel injector.



b) Write down vehicle specification for any four wheeler (LMV).

Specification	Maruti Baleno Zeta.
1) Fuel Type	Petrol
2) fuel Tank capacity (Lit)	37
3) Engine Displacement (cc)	1197
4) Body Type	Hatchback
5) Max Power (bhp@rpm)	83.1 bhp @ 6000rpm
6) Engine Type	Petrol Engine
7) Displacement (cc)	1197.

8)	Max Torque (nm @ rpm)	115 Nm @ 4000 rpm
9)	No. of cylinder	4
10)	Valves per cylinder	4.
11)	valve configuration	DOHC (dual overhead cam)
12)	Fuel supply system	MPFI (Multi Point fuel Injection)
13)	Transmission Type	Manual
14)	Gear Box	5 speed.
15)	Drive Type	FWD
16)	Ground Clearance (mm)	170
17)	Length (mm)	3995
18)	Width (mm)	1745
19)	Height (mm)	1510
20)	Wheel Base (mm)	2520
21)	Total weight (kg)	880
22)	Front suspension	Mac Pheron strut
23)	Rear Suspension	Torsion Beam
24)	steering Type	Power
25)	steering column	Tilt & Telescopic
26)	Steering Gear Type	Rack & Pinion
27)	Front Brake Type	Disc
28)	Rear Brake Type	Drum
29)	Tyre size / Type	16 / Tubeless, Radial.

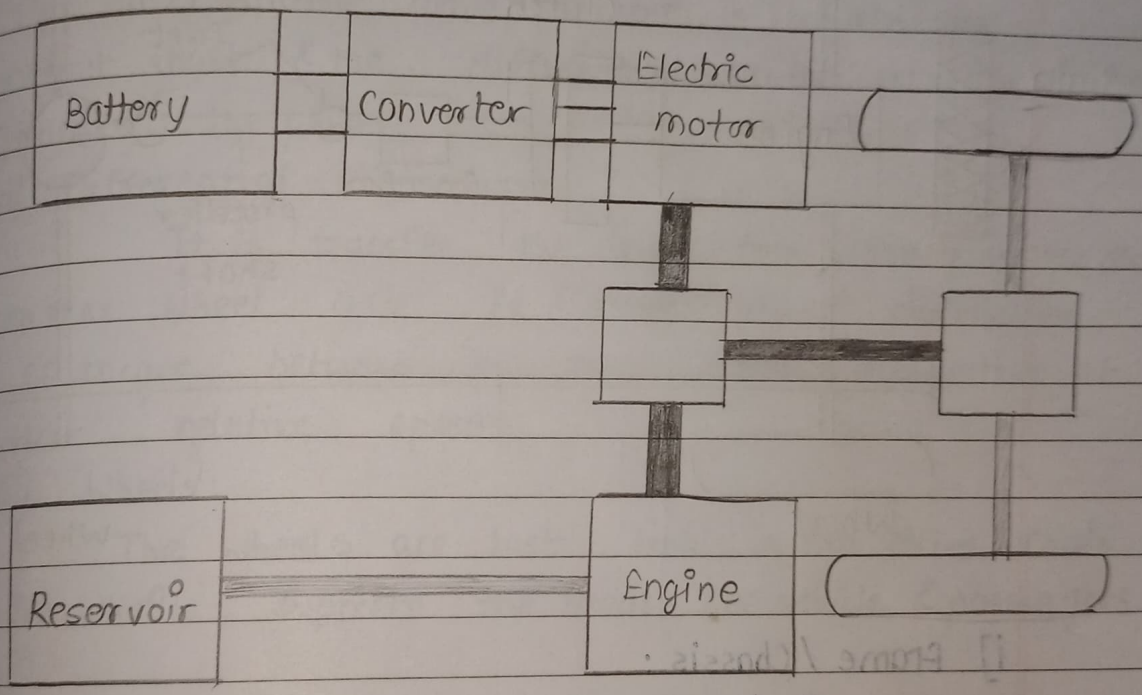
c) Explain Parallel hybrid electric vehicle with neat sketch.

Ans: ① In parallel hybrids, the internal combustion engine and the electric motor are connected to the mechanical transmission and

transmits power to drive the wheels through a conventional transmission.

② The I.C. engine of many parallel hybrids can also act as a generator for supplemental recharging.

③ Parallel hybrids are more efficient than comparable non-hybrid vehicles especially during urban stop and go conditions where the electric motor is constribute and during highway operation.

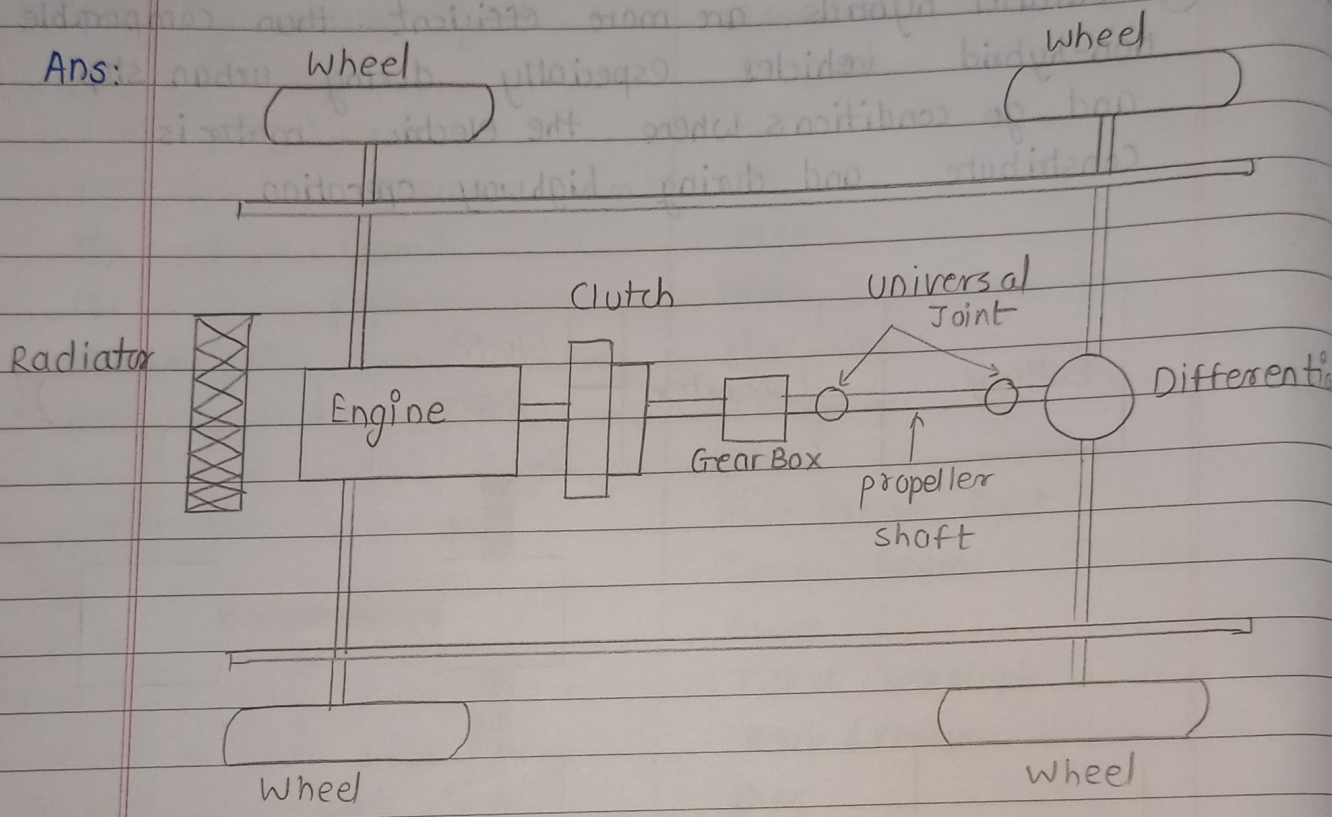


Assignment : 02

Q.1

a) Draw the layout of chassis. Explain the function of each part in short.

Ans:



i] Frame / Chassis :

It is the basic metallic structure on which various other components / assemblies are mounted.

ii] Engine :

It consists of an internal combustion engine which converts thermal energy of fuel into mechanical energy at the engine flywheel.

iii] clutch :-

It is connected after the engine & transfers the drive from engine to gearbox at the will of driver clutch & hence the drive can be easily engaged & disengaged by a pedal provided at the foot region in the driver's cabin.

iv] Geabox :

It provides the necessary speed / torque variation available from engine to propellor shaft.

v] Propeller shaft :

It is the drive element in between the gearbox output shaft & the differential on the rear axle, to transfer the power.

vi] Differential Gear box :

It is transfer the drive from the propeller shaft to rear wheel axle. It ensures equal distribution of torque between the two wheels irrespective of their relative speeds.

vii) Wheels :

The wheels are last link in the drive chain. The wheels supports the loads of vehicle & passengers.

b) Explain working principal of single plate friction clutch with sketch.

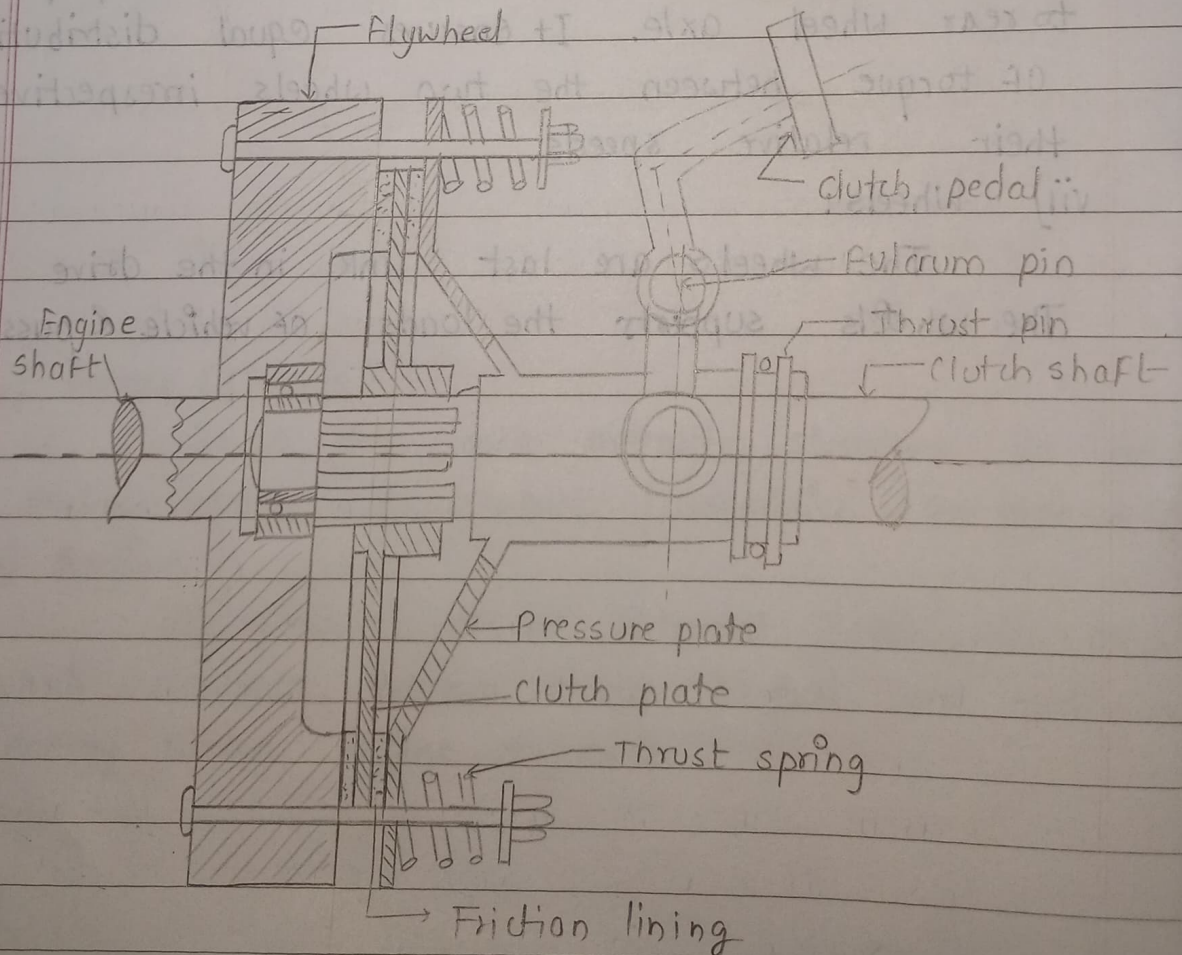
Ans. 1) Single plate clutch is most commonly used type of clutch on automobiles.

2) It provides quicker disengagement.

3) It consists of clutch disc, pressure plate and a cover assembly which are bolted to the engine flywheel.

Working:

1) When the pedal position is up, the axial force of thrust springs ensures the pressure plate is pressed against the flywheel with clutch plate being sandwitched between the two of them.



2) The drive is hence transmitted from the flywheel to clutch plate through friction and from clutch plate to clutch shaft through mechanical splines.

3) When the clutch pedal is pressed down, the release plate and flywheel and hence the drive gets disengaged to the geabox.

Q.2

a) What is clutch? Explain the function of clutch with block diagram?

Ans: Clutch is a mechanism to transmit rotary motion from one shaft to another coincident shaft as and when required, without stopping the driving shaft.

Functions of the clutch:

The clutch has following four major functions:

i) When clutch is engaged, the clutch transmits maximum power from engine crankshaft to gearbox input shaft.

ii) When clutch is disengaged, the clutch allows driver to shift the transmission in various gear position.

iii) When clutch is disengaged, the engine can be cranked freely without transmitting the drive to wheels.

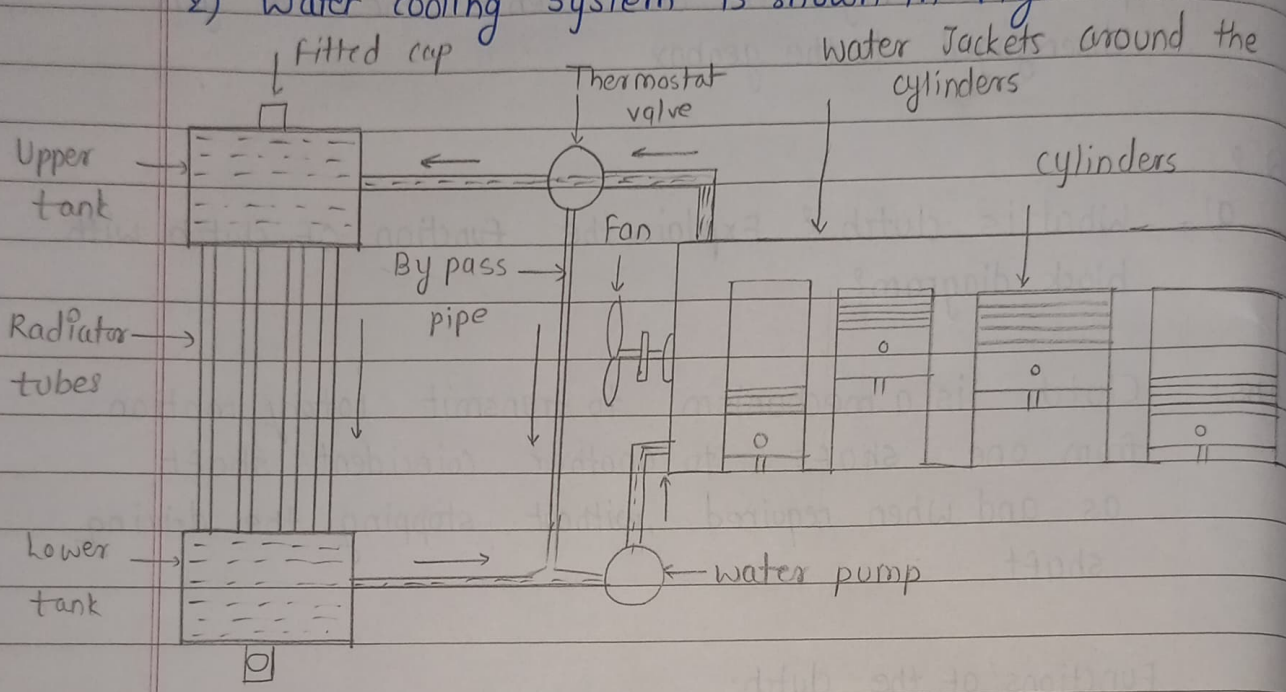
iv) When the clutch is engaging, the clutch accomodates for minor slippages and hence provides smooth drive transmission without Jerks.

b) How water cooling system works in vehicle? Explain with diagram.

Ans:

1) Water cooling is mainly preferred in medium & large size engines.

2) Water cooling system is shown in fig.



3) Water is circulated through the water Jackets provided around the cylinder walls. The water extracts the Heat from cylinder walls & releases it in the atmosphere.

4) Water Jacket is connected to a radiator through thermostat valve.

5) To avoid overcooling of the engine, thermostat is used. The thermostat maintains the constant temp. of cooling water, which in turn maintains the temp. of engine within desirable limits.

6) Radiator is a kind of Heat exchangers which cools the Hot water coming through water Jackets & it recirculates the cooled water to engine for cooling purpose.