

SNS COLLEGE OF TECHNOLOGY
DEPARTMENT OF AGRICULTURE ENGINEERING

19AGT301 HEAT POWER ENGINEERING

Two Mark Questions

INTERNAL COMBUSTION ENGINES

1. What is an internal combustion engine?

Ans.:-Internal combustion engines is an engine in which the combustion of fuel takes place inside the engine cylinder. These are petrol, diesel and gas engines.

2. What is the function of piston rings?

Ans.:-There are two sets of piston rings mounted for the piston. The function of upper rings is to provide air tight seal to prevent leakage of the burnt gases in to lower portion.

The function of the lower rings is to provide effective seal to prevent leakage of the oil into the engine cylinder.

3. Function of Fly wheel?

Ans.:-The function of Fly wheel is to store energy during power stroke and return during other strokes and there by maintain constant speed.

4. What is valve timing diagram?

Ans.:-A valve timing diagram is a graphical representation of the exact moments, in the sequence of operations, at which the two valves (inlet and exhaust valves) open and close as well as firing of the fuel. It is generally expressed in terms of angular positions of the crankshaft.

5. What is Clearance volume, Stroke volume and Compression ratio?

Ans.:-Clearance volume: The space between cylinder head and piston when the piston is at the top dead center is known as clearance volume.

Stroke volume: The volume displaced by the piston as it moves from one dead center to the other dead center is called stroke volume (swept volume).

Compression ratio: The ratio of total cylinder volume (stroke volume + clearance volume) to the clearance volume

$$\text{Compression ratio} = \frac{\text{Stroke volume} + \text{Clearance volume}}{\text{Clearance volume}}$$

$$r = \frac{V_s + V_c}{V_c}$$

where, V_s = Swept volume, and
 V_c = Clearance volume.

6. What are the functions of Fuel injection system for C.I. engines?

Ans.:-

1. To meter (measure) the correct quantity of fuel to be injected
2. Atomize the fuel in to fine particles
3. Time the fuel injection
4. Control the rate of fuel injection
5. Properly distribute the fuel in the combustion chamber

7. Differentiate between Air injection system and Airless (solid) injection system?

Ans.:-

Air injection system	Air less (solid) injection system
1. Liquid fuel is sprayed into the engine cylinder by means of compressed air	1. Liquid fuel is injected into the engine cylinder at high pressure by means of fuel pump.
2. It requires multi stage air compressor which causes increases in engine weight and reduce net power output. It is used rarely.	2. This system is used more common.

8. What is carburettor?

Ans.:-The process of atomizing the fuel and mixing of fuel with air at required proportion for SI engines is called carburetion and the device in which this process takes place is called carburettor.

9. Differentiate between air cooling system and water-cooling system?

Ans.:-

Air cooling system	Water cooling system
The design of this system is simple and less costly.	The design of this system is complex and more costly.
The mass of the cooling system is very less.	The mass of the cooling system is very much more.

The fuel consumption is more.	The fuel consumption is less.
Its installation and maintenance is very easy and less costly.	Its installation and maintenance is very difficult and more costly.
There is no danger of leaking or freezing of the coolant.	There is a danger of leaking or freezing of the coolant.
It doesn't require any coolant.	It requires coolant.

10. What are the functions of carburettor?

Ans.:-

1. To maintain a small reserve of petrol at a constant level in float chamber.
2. To atomize the liquid fuel (petrol) and to mix it with air
3. To supply air-fuel vapour mixture at correct ratio according to engine requirements.

11. What are the differences between a carburettor and fuel injector?

Ans.:-

Carburettor	Fuel injector
1. Carburettor is used in spark ignition system.	1. Fuel injector is used in compression ignition system.
2. Carburettor supply Fuel + air mixture in to the engine cylinder.	2. Fuel injector supply only fuel in to the engine cylinder.

12. What is scavenging?

Ans.:-The process of removing burnt gases, from the combustion chamber of the engine cylinder is defined as scavenging.

13. What is the purpose of spark plug?

Ans.:-The purpose of spark plug is to conduct spark into combustion chamber due to which the ignition of air fuel mixture takes place.

14. Write about performance parameters of IC engine?

Ans.:-Indicated Power (I.P): The power produced inside the engine cylinder is called indicated power.

Brake power (B.P): The power output of the engine at the crank shaft is called brake power. It is also called shaft power.

$$B.P = \frac{2\pi NT}{60000} \text{ in KW}$$

$$T = (w - s) R_m$$

$$N = \text{speed in rpm}$$

Friction Power (F.P): The difference between indicated power and brake power. It is the power wasted due to friction at the bearings and sliding parts

$$F.P = I.P - B.P$$

Mechanical efficiency: It is the ratio of brake power to the indicated power. It is denoted by η_m

$$\eta_m = \frac{\text{Brake Power}}{\text{Indicated Power}} = \frac{B.P}{I.P}$$

Brake thermal efficiency: It is defined as the ratio of heat utilized to produce brake power to heat supplied. It is denoted by η_b

$$\text{Brakethermalefficiency} = \frac{\text{Heat equivalent to B.P}}{\text{Heat supplied}}$$

$$\eta_b = \frac{B.P \times 60}{m_f \times C_v}$$

$$m_f = \text{mass of fuel supplied per min, in kg/min}$$

$$C_v = \text{calorific value of fuel, kg/kg}$$

Indicated thermal efficiency: It is defined as the ratio of heat utilized to produce indicated power to heat supplied. It is denoted as η_i

$$\text{Indicatedthermalefficiency} = \frac{\text{Heat equivalent to I.P}}{\text{Heatsupplied}}$$

$$\eta_b = \frac{I.P \times 60}{m_f \times C_v}$$

Indicated mean effective pressure (IMEP): It is defined as hypothetical pressure which is thought to be acting on the piston through out the power stroke and based on indicated power.

$$P_{mi} = \frac{I.P}{LAN}$$

Brake thermal effective pressure (BMEP): It is defined as hypothetical pressure which is thought to be acting on the piston through out the power stroke and based on brake power.

$$P_{mb} = \frac{I.P}{LAN}$$

Specific heat consumption (SFC): It is the mass of fuel consumed per KW developed per hour.

$$S.F.C = \frac{m_f}{B.P} \text{ kg / KWh}$$

15. What is angle of overlap?

Ans.:-It is the crank angle during which the exhaust valve remains open during the suction period i.e. the angle between inlet valve open (I.V.O) and exhaust valve close (E.V.C).

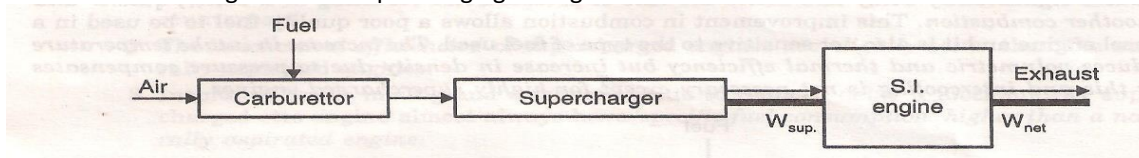
16. What is indicator diagram?

Ans.:-An "indicator diagram" is a graph between pressure and volume the former being taken on vertical axis and the latter on the horizontal axis. This is obtained by an instrument known as indicator

17. What is supercharging?

Ans.:-The apparatus used to increase the air density is known as a supercharger. It is merely a compressor which provides a denser charge to the engine, thereby enabling the consumption of a greater mass of charge with the same total piston displacement. The purpose of supercharging is to raise the volumetric efficiency above that value which can be obtained by normal aspiration.

The schematic arrangement for supercharging SI. engine



18) What are the methods for Measurement of frictional power ?

Ans.:-The frictional power of an engine can be determined by the following methods

- 1, Willan's line method (used for CI. engines only)
- 2, Morse test
3. Motoring test
4. Difference between I.P. and B.P.
5. Retardation test

19) what is air standard efficiency?

Ans.:- The efficiency of engine using air as the working medium is known as **air standard efficiency**.

20) What is The mean effective pressure of the cycle ?

Ans.:- Mean effective pressure (P_m) of the cycle is the ratio of Work done per cycle to Stroke volume

$$P_m = \frac{\text{Work done per cycle}}{\text{Stroke volume}}$$

21) What are the differences between Flywheel and Governor?

Ans.:-

	<i>Flywheel</i>	<i>Governor</i>
1.	It is provided on engines and fabricating machines viz., rolling mills, punching machines ; shear machines, presses etc.	It is provided on primemovers such as engines and turbines.
2.	Its function is to store the available mechanical energy when it is in excess of the load requirement and to part with the same when the available energy is less than that required by the load.	Its function is to regulate the supply of driving fluid producing energy, according to the load requirement so that at different loads almost a constant speed is maintained.
3.	It works continuously from cycle to cycle.	It works intermittently i.e., only when there is change in load.
4.	In engines it takes care of fluctuations of speed during thermodynamic cycle.	It takes care of fluctuations of speed due to variation of load over long range of working engines and turbines.
5.	In fabrication machines it is very economical to use it in that it reduces capital investment on primemovers and their running expenses.	But for governor, there would have been unnecessarily more consumption of driving fluid. Thus it economises its consumption.

22) Classify Internal combustion engines?

Ans.:-Internal combustion engines may be classified as given below:

1. According to cycle of operation:

(1) Two-stroke cycle engines (ii) Four-stroke cycle engines.

2. According to cycle of combustion:

(i) Otto cycle engine (ii) Diesel cycle engine (iii) Dual-combustion or Semi-Diesel cycle engine

3. According to arrangement of cylinder:

(i) Horizontal engine (ii) Vertical engine (iii) V-type engine (iv) Radial engine etc.

4. According to their uses:

(i) Stationary engine (ii) Portable engine (iii) Marine engine (iv) Automobile engine (v) Aero engine etc.

5. According to the fuel employed and the method of fuel supply to the engine cylinder:

(i) Oil engine (ii) Petrol engine(iii) Gas engine (iv) Kerosene engine(v) Carburettor, hot bulb, solid injection and air injection engine.

6. According to the speed of the engine:

(i) Low speed engine (ii) Medium speed engine(iii) High speed engine.

7. According to method of ignition:

(i) Spark ignition (S.I.) engine (ii) Compression ignition (C.I.) engine.

8. According to method of cooling the cylinder:

(i) Air-cooled engine (ii) Water-cooled engine.

9. According to method of Governing:

(i) Hit and miss governed engine (ii) Quality governed engine(iii) Quantity governed engine.

10. According to valve arrangement:

(i) Overhead valve engine (ii) L-head type engine(iii) T-head type engine (iv) F-head type engine.

11. According to number of cylinders:

(i) Single cylinder engine (ii) Multi-cylinder engine.

23) List the applications of I.C. engines?

Ans.:-The I.C. engines are generally used for:

(i) Road vehicles (e.g., scooter, motorcycle, buses etc.)(ii) Air craft(iii) Locomotives(iv) Construction in civil engineering equipment such as bull-dozer, scraper, power shovels etc.(v) Pumping sets(vi) Cinemas(vii) Hospital(viii) Several industrial applications.