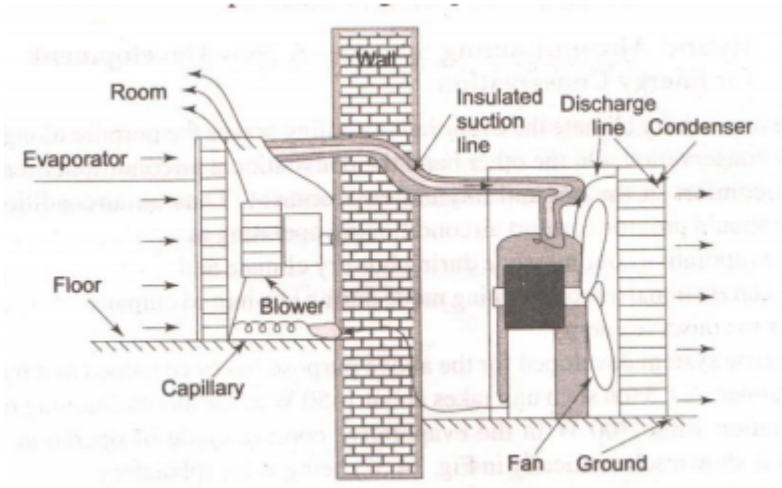
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## Draw neat sketch of split air conditioner and name the parts.

Split Air-conditioner labeled Diagram 02 for figure 02 for labeling




## Explain the principle of Ram jet with neat sketch

Ram jet – (Fig – 2 marks ; explanation –2 marks) - Ram jet is also called as ‘Athodyd or flying stove pipe’. - It is a steady combustion or continuous flow engine & has the simplest construction of any propulsion engine. - Consist of inlet diffuser, combustion chamber & exit nozzle. - Air entering into ram jet with supersonic speed is slowed down to sonic speed in supersonic diffuser, increasing air pressure. - The air pressure is further increased in the subsonic diffuser. - The fuel injected into the combustion chamber is burned with the help of

flame stabilizers.

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## Define (i) Dew point temp. (ii) Wet bulb temp

i) DPT – Dew point temperature tDP - It is the temperature at which air water vapour mixture starts to condense. D.P.T. of mixture is defined as the temperature at which water vapours starts to condense.

Ii) WBT - Wet bulb temperature - tWB - It is the temperature recorded by thermometer when its bulb is covered with wet cloth known as wick and is exposed to air.

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## A diesel engine has a compression ratio of 14 and cut-off takes place at 6% of stroke....

(b) The air std. efficiency of diesel cycle

$$\eta = 1 - \frac{1}{r_c^{\gamma-1}}\left[\frac{\rho^{\gamma}-1}{\gamma(\rho-1)}\right]$$

Cut off ratio $\rho = 1 + 0.06[r_c - 1]$

$= 1 + 0.06[14-1]$

$= 1.78$

$$\eta = 1 - \frac{1}{14^{1.4-1}}\left[\frac{1.78^{1.4}-1}{1.4(1.6-1)}\right]$$

$= 1 - 0.34(1.478)$

$= 48.68\%$.

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## What is the necessity of purification of air in compressor and how it is done ?

Necessity of purification of air in compressor :

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## Explain with neat sketch construction and working of constant volume gas turbine.

Constant volume gas turbine Working:- Air from surrounding atmosphere is drawn in compressor and is compressed to a pressure of about 3 kN/m2 . The compressed air is then admitted to the combustion chamber through the inlet valve. When inlet valve is

closed, the fuel oil is admitted by means of a separate fuel pump into combustion chamber containing compressed air. The mixture (of air and fuel oil) is then ignited by an electric spark, the pressure rising to about 12 kN/m2 , whilst the volume remains constant. Thus combustion takes place at constant volume.

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A single cylinder reciprocating compressor has a bore of 120 mm and a stroke of 150 mm...

$$\frac{P_2}{P_1} = \left(\frac{T_2}{T_1}\right)^{n/n-1}$$

$$P_2 = 1.2\left(\frac{488}{293}\right)^{\frac{1.3}{1.3-1}}$$

$$P_2 = 10.92 \text{ bar}$$

$$\text{Pressure Ratio} = \frac{P_2}{P_1} = 9.1$$

$$V_s = \frac{\pi}{4} d^2 l \times N$$

$$= \frac{\pi}{4} \times (0.12)^2 \times 0.15 \times \frac{1200}{60}$$

$$V_1 = 2.036 \text{ m}^3/\text{min}$$

$$\text{I.P.} = \frac{n}{n-1} P_1 V_1 \left(\left(\frac{P_2}{P_1}\right)^{n-1/n} - 1\right)$$

$$= \frac{1.3}{1.3-1} \times 1.2 \times 10^5 \times \frac{2.036}{60}\left[(9.1)^{\frac{1.3-1}{1.3}} - 1\right]$$

$$= 11.68 \text{ KW}$$

Shaft power when mech efficiency 80%.

$$\text{Shaft Power} = \frac{\text{I.P.}}{\eta_{mech}} = \frac{11.68}{0.8}$$

$$= 14.6 \text{ KW}$$

$$P_1 V_1 = m R T_1$$

$$m = \frac{P_1 V_1}{R T_1} = \frac{1.2 \times 10^5 \times 2.036}{287 \times 293}$$

$$= 2.9054 \text{ kg/min}$$

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Explain with neat sketch construction and working of ice

plant.

Working of Ice plant: The main cycle used for ice plant is vapor compression cycle with ammonia as the refrigerant in primary circuit and brine solution in secondary circuit. Brine solution takes heat from water in secondary circuit and delivers the heat to ammonia in primary circuit. Thus, the indirect method of cooling is used in ice plant. In secondary circuit brine is cooled in evaporator and then it is circulated around the can which contains water. The heat is extracted from the water in the can and is given to the brine.

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## List the additives of lubricant used in S.I engine and state their advantages.

Additives (any six ) (1) Detergents – To keep engine parts, such as piston and piston rings, clean & free from deposits. (2) Dispersants – To suspend & disperse material that could form varnishes, sludge etc that clog the engine. (3) Anti – wear – To give added strength & prevent wear of heavily loaded surfaces such as crank shaft rods & main bearings. (4) Corrosion inhibitors – To fight the rust wear caused by acids moisture. Protect vital steel & iron parts from rust & corrosion.

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## Define – (i) Indicated power, (ii) Mechanical efficiency, (iii) BSFC

i) Indicated Power (ip) is defined as the power developed by combustion of fuel in the cylinder of engine. It is always more than

brake power. ii) Mechanical efficiency : ηm : It is a measure of mechanical perfection of the engine or its ability to transmit power developed in the engine cylinder to the crank shaft . It is defined as the ratio of brake power to indicated power of the engine

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Pages