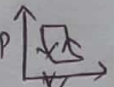
Reciprocating Air Compressor

1. For air compressor, least work input will be needed if the compressor is: [SSC-JE 2015]
   a) Hyperbolic b) Isentropic c) Polytropic d) Isothermal

2. An Ideal gas air compressor cycle (with clearance) on pv diagram can be represented by the processes. [SSC-JE-2017]
   a) one adiabatic, two isobaric & one constant volume.
   b) two adiabatic & two isobaric  Brayton cycle
   c) two adiabatic, one isobaric, one constant volume
   d) one adiabatic, one isobaric and two constant volume.

3. What is the unsteady to and fro motion of the fluid that causes pulsation in the engine compressor known as [2017]
   a) Pulsing b) Compressing c) choking d) Surging → Reverse flow

4. In a two stage reciprocating air compressor, the suction & the delivery pressures are 1 and 4 bar respectively. For maximum efficiency, the intercooler pressure is
   a) 1.5 bar b) 2 bar c) 2.5 bar d) 3 bar [2018]

$$P_{inter} = \sqrt{P_1 P_2} = \sqrt{1 \times 4} = 2$$

5. Identify the incorrect statement, from the following options: [2019]
   Irreversibility is introduced into the desired isentropic compression in an air compressor by
   a) Mechanical losses in bearings → No contribution in irreversibility
   b) heat loss from compressor walls
   c) rapid compression
   d) Friction between air ~~piston~~ cylinder walls

6. The water jacketing the cylinder of a reciprocating piston-cylinder air compressor leads to the:

a) prevention of seizure of piston due to high temperature.

b) Increase in mass of air taken during the intake stroke

c) Prevention of damage to compressor valves due to high temp. of compression

d) Reductions in the work required for compression.

(Temp↓) Intercooling → work required for compression↓

7. Identify the incorrect statement, from the following options.

In a multi-stage reciprocating compressor, the process of intercooling _____.

a) final compressed air delivery pressure is higher as compared to single stage compression.

b) cools the compressed air from each stage before admission to the next stage.

c) reduction of compression work needed

d) is used during compression of air in two or more stages.

The work done in compressing air from state 1 (at the beginning of compression stroke) to state 2 (end of compression) by a piston-cylinder type compressor without clearance volume with standard terminologies is

a) $\frac{n}{n-1}(P_2V_2 - P_1V_1)$ b) $\frac{n}{n-1} P_2V_2 \left\{ (P_2/P_1)^{n-1/n} - 1 \right\}$

c) $\frac{n}{n-1} \cdot P_1V_1 \left\{ \left(\frac{P_2}{P_1}\right)^{\frac{n-1}{n}} - 1 \right\}$ d) $MRC_p(T_2 - T_1)$

9. Select the incorrect statement with regard to rotary compressors.

a) They have more vibration & pulsation in the flow than piston-cylinder compressors.

b) They operate at a higher speed than piston cylinder compressors, and are used when large flow rates are needed.

c) They can be centrifugal compressor

d) They can be flow compressor.

10. The volume of air delivered by the compressor is called:

a) Free Air delivery b) Swept vol. c) Compression ratio

d) compressor capacity

11. If the compression of air is carried out in a large no. of stages with perfect intercooling between the stages then the overall compression approaches an:

a) isentropic b) isenthalpic c) Isothermal d) Isochoric

12. Multistage compression of air as compare to single stage compression

a) Improve volumetric efficiency for the given pressure ratio

b) Increase work done per kg of air

c) doesnot improve volumetric efficiency for the given pressure ratio

d) Gives less uniform torque

13. Volumetric efficiency of a reciprocating compressor is Not dependent on which of the following factors?

a) clearance ratio b) Pressure ratio c) Air receiver

d) Polytropic index

$$\eta_{vol} = 1 + C - C\left(\frac{P_2}{P}\right)^{\frac{1}{n}}$$

14. In reciprocating air compressors, the clearance ratio is

$$C = \frac{V_c}{V_s}$$

a) Swept vol. to clearance vol of the cylinder

b) Clearance vol. to swept vol.

c) Total vol. to clearance vol.

d) clearance vol. to total vol.

15. The work input of a compressor is minimum when the law followed by compression is

a) $PV^{1.35} = C$ b) Isentropic $PV^{\gamma} = C$ c) isothermal $PV = C$

d) $PV^{1.25} = C$