

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 2106

Roll No.

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B.Tech.

(SEM. V) THEORY EXAMINATION 2011-12

I.C. ENGINES AND COMPRESSORS

Time : 2 Hours

Total Marks : 50

Note :— (i) Attempt all questions.

(ii) Be precise in your answer.

(iii) Assume suitably any relevant data, if missing.

1. Attempt any **two** parts out of the following : **(7×2=14)**

(a) A four cylinder petrol engine working on two stroke cycle develops 30 kW at 2500 rpm. The mean effective pressure on each piston is found to be 8.0 bar. The calorific value of fuel used is 43900 kJ/kg and brake thermal efficiency is 29 percent. Calculate the fuel consumption of the engine. Further determine the bore and stroke of each cylinder, if stroke to bore ratio is 1.5. Mechanical efficiency is 80.8%.

(b) (i) For the same maximum pressure and heat input, compare Otto cycle and Diesel cycle using pressure–volume and temperature–entropy diagram.

- (ii) A Diesel Engine operating on air standard cycle takes air at 1 bar pressure during suction. The pressure at the end of compression is 32.5 bar. The ratio of expansion is 6. Find thermal efficiency and Air-fuel ratio. Assume calorific value of fuel is 44 MJ/kg.
- (c) (i) Discuss the effect of variation of specific heat on power output of a spark ignition engine.
- (ii) How SI engine fuels are rated ?
2. Attempt any **two** parts out of the following : **(6×2=12)**
- (a) What are the fuel : air requirements of a carburettor at different operating conditions ? Why is float chamber vented to the atmosphere ?
- (b) (i) Discuss the effect of compression ratio, Engines speed and spark advance on the knocking in SI engine.
- (ii) Explain the working of MPPI engine.
- (c) (i) Explain the meaning of ignition advance. What are the factors which affect its variation ?
- (ii) Sketch a labelled line diagram of a magnets ignition system.
3. Attempt any **two** parts out of the following : **(6×2=12)**
- (a) Distinguish between the 'Physical ignition delay' and 'Chemical ignition delay'. Discuss the effect of different variables on ignition delay.

- (b) Sketch and explain the construction and working of a fuel injector. Name different types of nozzles used on it.
- (c) Discuss briefly the following :
- (i) Scavenging in 2 stroke engine
 - (ii) Mechanism of NO_x formation in Diesel Engine.
4. Attempt any **two** parts out of the following : **(6×2=12)**
- (a) (i) With the help of a neat sketch explain the working of a radiator.
- (ii) Compare centrifugal and axial compressors as to their advantages and restrictions.
- (b) (i) What is crankcase ventilation ? What are its different types ?
- (ii) What is the importance of viscosity for lubricating oils ? What are different ways to express it ?
- (c) (i) What are super charging limits for SI and CI engines ?
- (ii) Prove that in case of reciprocating compressor the condition for minimum work per kg of air delivered by its two stage with intercooling is achieved when intermediate pressure is geometric mean of suction pressure and final delivery pressure.