

(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) ODD SEMESTER THEORY EXAMINATION
2010-11

I. C. ENGINES & COMPRESSORS

Time : 2 Hours

Total Marks : 50

- Note :**
- (1) Attempt **all** questions.
 - (2) Assume suitably, any missing data.
 - (3) Be precise in your answer.

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

- (a) The air flow to a four cylinder four stroke oil engine is measured by means of a 5 cm diameter orifice, having a coefficient of discharge of 0.6. During the test on the engine the following data were recorded :

Bore = 10.5 cm; stroke = 12.5 cm; Engine speed = 1200 rpm; brake torque = 14.7 Nm; time taken for 50ml fuel consumption is 25 seconds; calorific value of fuel = 43.1 MJ/kg; density of fuel = 831 kg/m³; pressure drop across orifice = 5.7 cm of water; ambient temperature and pressure were 20°C and 1.013 bar respectively. Find Brake

thermal efficiency, brake mean effective pressure, brake specific fuel consumption and volumetric efficiency of the engine.

- (b) (i) Compare the Otto and Diesel cycle for same maximum pressure and temperature with the help of p-V and T-s diagram.
- (ii) A diesel engine having compression ratio 18 and cut off ratio of 2.53 operates on air standard cycle. The temperature and pressure of air at the beginning of compression is 30°C and 1 bar. Find air fuel ratio. The C.V. of fuel is 41 MJ/kg.
- (c) (i) How the thermal efficiency vary with equivalence ratio for air standard, fuel-air and actual cycle ?
- (ii) What is octane number and how is it found ?

Attempt any **two** of the following : **(6×2=12)**

- (a) Describe with suitable sketch the working of choke and idling system in case of carburetor.
- (b) What is ignition lag in SI engine ? Discuss the effect of engine variables on ignition lag.
- (c) Write short notes on the following :
- (i) Multi point fuel injection
- (ii) Battery ignition system.

3. Attempt any **two** of the following : **(6×2=12)**

- (a) Show the different stages of combustion on pressure vs crank angle ($p-\theta$) diagram. How do the fuel quality, injection timing and compression ratio affect the knocking in diesel engine ?
- (b) Explain the working of common rail injection system. A four stroke diesel engine is operating at 2400 rpm. Fuel injection starts at 20° before TDC and ends at 5° after TDC. If the quantity of fuel injected in a cycle is 40 mg, find the fuel injection rate in kg/s.
- (c) Discuss, how catalytic convertor reduces the pollutants from the engine and why unleaded petrol is required in case of catalytic convertor fitted vehicle.

4. Attempt any **two** of the following : **(6×2=12)**

- (a) (i) What is the effect of supercharging on power output and fuel consumption ? Why supercharging is not preferred in SI engine ?
(ii) What do you understand by surging and stalling in an axial flow compressor ?
- (b) (i) State the functions of lubricants in I-C engine. Name the different type of lubrication systems used in engines.
(ii) Explain the working of thermo-syphon cooling system with neat sketch.

(c) A single acting reciprocating compressor (bore = 14 cm and stroke = 10 cm) having 4% clearance gives the following data obtained from performance test. Suction pressure is 0.1 bar gauge, suction temperature 20 C, atmospheric pressure 1 bar, discharge pressure 6 bar absolute, discharge temperature 180 C, speed 1200 rpm, shaft power 6.3 kW and mass of air delivered 1.7 kg/minute. Find volumetric efficiency, isothermal efficiency and mechanical efficiency.