

6E3050

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B. Tech. VI Semester (Main/Back) Examination, May/June-2011
Mechanical Engineering
6ME2 I.C. Engines & Diesel Power Plant

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 24

Instructions to Candidates:

Attempt any **five** questions, selecting **one** question from **each** unit. All questions carry **equal** marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.)

Unit - I

1. a) Explain with the help of sketches why inlet and exhaust valves close after dead centers. (6)
- b) A four stroke petrol engine of 100 mm bore and 150 mm stroke consumes 1.0kg of fuel per hour. The mean effective pressure is 7 bar and it's indicated thermal efficiency is 30%. The calorific value of the fuel is 40,000 kJ/kg. Find out the speed of the crank shaft. (10)

OR

- a) Explain the significance and the methodology of heat balance test conducted on an IC engine. (6)
- b) Explain the various methods of finding the frictional power of an IC engine and discuss the relative merits. (10)

Unit - II

2. a) Discuss the stages of combustion in a C.I engine with the help of a neat pressure-crank angle diagram. (6)
- b) Discuss the phenomenon of knocking and the various engine factors which affect it in a SI engine. (10)

OR

- a) What is flame speed? How does turbulence and equivalence ratio of fuel-air mixture affect the flame speed? (6)
- b) Discuss the measures adopted in the design of S.I. engine combustion chambers to reduce the possibility of knocking. (10)

Unit - III

- a) Explain the limitations of a simple carburetor with the help of a neat sketch. Why injection system is preferred these days over carburetion system? (6)
- b) A simple jet carburetor is required to supply 4.5kg of air and 0.5 kg of fuel per minute. The fuel specific gravity is 0.8. The air is initially at 1 bar and 300K. Calculate the throat diameter of the choke for a flow velocity of 110m/s. The coefficient of discharge for venturi is 0.8. If the pressure drop across the fuel metering orifice is 0.85 of that of the choke, calculate the orifice diameter assuming coefficient of discharge for fuel orifice to be 0.6. (10)

OR

- a) What are the limitations of conventional ignition system?
- b) Explain Transistorized Coil Ignition (TCI) system and Capacitive Discharge Ignition (CDI) system.
- c) Explain the requirements of a spark plug.
- d) Mention the factors affecting ignition timing. (4×4)

Unit - IV

A two stroke spark ignition engine gave the following results during a test.

Number of cylinders	4
Bore of cylinders	100 mm
Stroke	100 mm
Speed	2000 rev/min
Fuel consumption rate	5g/s
Calorific value	46MJ/kg
Net brake load	500 N
Torque arm	0.5m
Net indicated area	1500 mm ²
Base length of indicator diagram	66 mm
Pressure scale	25 kPa/mm

Calculate the following :

- i) The Indicated thermal efficiency.
- ii) The Mechanical Efficiency
- iii) The Brake Thermal efficiency. (16)

OR

- a) What are the major characteristics of an engine lubricating oil?
- b) How engine friction can be reduced?
- c) Which type of engine is more suitable for supercharging i.e. S.I. or C.I. and why?
- d) Define scavenging efficiency, trapping efficiency and scavenging ratio. **(4×4)**

Unit - V

5. a) What are the major advantages and disadvantages of diesel power plant over other types of power generation plants? (6)
- b) Show the schematic arrangement of diesel power station layout and give its principle of operation. (10)

OR

- a) What are limitations of a dual fuel engine?
 - b) Explain the working principle of rotary Winkle engine with the help of a neat sketch.
 - c) Differentiate between free piston engine and conventional four stroke engine.
 - d) What are the major applications of variable compression ratio engines? (4×4)
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