

**BACHELOR OF TECHNOLOGY (C.B.C.S.) (2014 COURSE)**

**B.Tech.Sem - VI MECHANICAL : WINTER- 2022**

**SUBJECT : INTERNAL COMBUSTION ENGINES**

Day : Friday

Time : 10:00 AM-01:00 PM

Date : 25-11-2022

**W-13451-2022**

Max. Marks : 60

**N.B.:**

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Draw neat and labeled diagrams **WHEREVER** necessary.
- 4) Assume suitable data if necessary.

- Q.1** With neat sketch explain working of 4-stroke petrol engine. In an air standard diesel cycle the pressure and temperature at the beginning of compression are 1 bar and 77°C respectively and the compression ratio is 14:1. The pressure at the end of expansion is 2.7 bar. Determine: **[10]**
- i) Maximum pressure attained during the cycle.
  - ii) Percentage volume of fuel cut-off of the swept volume
- $C_p = 1.05 \text{ kJ/kgK}; \quad \gamma = 1.4; \quad C_v = 0.75 \text{ kJ/kgK}.$

**OR**

Discuss the valve timing diagram of 4-stroke petrol engine. Give the comparison of Otto and diesel cycle on the basis of:

- i) Same constant maximum pressure and heat supplied.
- ii) Same maximum pressure and temperature.

- Q.2** Draw the neat and labeled sketches of following: **[10]**
- |                    |                        |                      |
|--------------------|------------------------|----------------------|
| i) pintle nozzle   | iii) spark plug        | v) multi-hole nozzle |
| ii) pintaux nozzle | iv) single hole nozzle |                      |

**OR**

Explain with neat sketch Bosch fuel pump.

- Q.3** Explain the need of cooling system in I-C Engines. Classify the cooling-systems and explain anyone with neat sketch. **[10]**

**OR**

Explain the need of ignition system in IC Engines. Explain electronic ignition system with sketch.

- Q.4** Explain eddy current dynamometer with sketch. A four stroke diesel engine has a cylinder bore of 150 mm and a stroke of 250 mm. The crank shaft speed is 300 rpm and fuel consumption is 1.2 kg/hr having a calorific value of 39000kJ/kg. The indicated mean effective pressure is 5.5 bar. If the compression ratio is 15 and cut off ratio is 1.8, calculate the relative efficiency taking  $\gamma = 1.4$ . **[10]**

**OR**

**P.T.O.**

The following data relates to four cylinder four stroke petrol engine:

Diameter of the piston = 80 mm  
Length of the stroke = 120 mm  
Clearance volume =  $100 \times 10^3 \text{ mm}^3$   
Fuel supply = 4.8 kg/hr  
Calorific value = 44000 kJ/kg

When the Morse test was performed on the engine, the following data were recorded:

B.P. with all the cylinders working = 14.5 kw  
B.P. with cylinder 1 cut-off = 9.8 kw  
B.P. with cylinder 2 cut-off = 10.3 kw  
B.P. with cylinder 3 cut-off = 10.14 kw  
B.P. with cylinder 4 cut-off = 10.0 kw

Find I.P. of the engine and also calculate indicated thermal efficiency, brake thermal efficiency and relative efficiency. Also draw sketch of set-up.

**Q.5** Give the classification of combustion chambers in C.I. Engines. Explain them with neat sketches. **[10]**

**OR**

Explain the different stages of combustion in S.I. Engines with neat sketch.

**Q.6** What is need of alternative fuels? Classify them and discuss them. **[10]**

**OR**

Explain the rating of CI Engine fuels. Explain concept of "hybrid cars".

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