



Internal Combustion Engine (1050)

P. Pages : 3

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with blue ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Attempt **all five** questions. Solve **any two** sub questions from each unit.
5. Use of non programmable scientific calculator is allowed.
6. Draw suitable sketch wherever necessary.
7. Figure to the right indicates full marks.

UNIT – I

1. a) Explain any five terms – 10
 - i) Air – fuel ratio
 - ii) BMEP
 - iii) Volumetric efficiency
 - iv) Inlet valve Mach Index
 - v) Calorific value of fuel
 - vi) Brake Thermal efficiency.
- b) Draw P – V and T – S diagrams for Diesel Cycle. Derive expression for thermal efficiency of Diesel Cycle. 10
- c) An engine is working on Otto cycle. The pressure and temperature at the start of compression stroke are 1 bar, 300 K. The temperature at the end of compression stroke is 600 K. The temperature at the end of constant volume heat addition process is 1800 K. Calculate the air standard efficiency, heat added per kg of air and heat rejected per kg of air. 10

Assume γ (gamma) = 1.4 $C_V = 0.75 \text{ kJ/kg K}$.

UNIT – II

2. a) What do you understand by quantity governing? Draw a neat sketch of simple Carburettor. Explain the construction, working and limitations of simple carburettor. 10

- b) With the help of a suitable sketch, explain automotive engine air-fuel mixture requirements. **10**
- c) i) What are functions of a nozzle in fuel injection? Explain types of commonly used nozzles. **5**
- ii) Explain with suitable sketch. **any one.** **5**
- a) Common Rail System.
- b) Individual pump and nozzle system.

UNIT – III

3. a) i) Explain various parameters affecting engine heat transfer. **5**
- ii) Discuss advantages and limitations of air cooling system used in automotives. **5**
- b) What is the need of a governor? Briefly explain governing in gasoline engines. Explain mechanical governor with a neat sketch. **10**
- c) Enlist the effects of super charging in IC Engines. **5**
- i) What are the typical applications that demand super charging?
- ii) Compare between magneto ignition system and Battery Ignition system. **5**

UNIT – IV

4. a) i) Briefly compare knock in SI engines and knock in CI engines. **4**
- ii) Explain stages of Combustion in SI Engine. **6**
- b) i) Discuss various factors affecting the delay period in CI engine. **6**
- ii) Explain **any one.** **4**
- a) Direct Injection Type Combustion Chamber.
- b) Swirl Combustion Chamber.
- c) i) Explain what is homogeneous mixture and heterogeneous mixture. **4**
- ii) Discuss the factors that influence the flame speed. **6**

UNIT – V

5. a) i) Enlist methods to measure friction power of an engine. **2**
- ii) Give a brief comparison of methods friction powers. **3**
- iii) Explain any one : **5**
- a) Willan's Line method
- b) Motor Test
- b) Write short notes on **any two**. **10**
- i) Merits and demerits of EGR.
- ii) Oxidation reactions taking place in catalytic convertor.
- iii) Non-exhaust emissions and control.
- c) A four cylinder engine running at 1200 rpm develops 20 KW. The average torque when one cylinder was cut is 110 N-m. Find the indicated thermal efficiency when the calorific value of fuel is 43000 kJ/kg and the engine uses 360 gram of gasoline per kwh. **10**
