

**BACHELOR OF ENGINEERING (MECHANICAL ENGINEERING)**  
**THIRD YEAR FIRST SEMESTER SUPPLEMENTARY EXAMINATION - 2024**

**INTERNAL COMBUSTION ENGINE**

**Time : Three Hours**

**Full Marks : 100**

**Answer any Five questions :**

**Different parts of a question should be answered sequentially.**

**Any relevant data, if missing, can be assumed suitably.**

- 1.[a] Write all the assumptions of an Air – Standard Cycle.
- [b] Derive the thermal efficiency of an Air-Standard Diesel Cycle with sketches of (P-V) and (T-S) diagram. Also find out the expression of mean effective pressure for such a cycle. [5+15]
- 2.[a] With a neat sketch, and also a suitable (P-V) diagram explain the value Timing Diagram of a Vertical single Cylinder Spark Ignition Engine.
- [b] Explain why the Intake valve closes after the BDC and the Exhaust valve opens before the BDC. [10+10]
- 3.[a] Compare the Otto, Diesel and the Dual cycles based on the same compression ratio and same heat addition.
- [b] In an Otto Cycle engine air at 20°C and 1 Bar is compressed isentropically until the pressure is 15 Bar. Heat addition at constant volume raises the pressure to 35 Bar. Calculate the air standard efficiency, the compression ratio and the mean effective pressure for the cycle. Assume  $C_v = 0.717 \text{ KJ/Kgt}$  and  $R = 8.314 \frac{\text{KJ}}{\text{Kmol} \cdot \text{K}}$  [5+15]

- 4.[a] With a neat sketch and with proper labeling explain the working principle of a simple downtake type carburetor.
- [b] Why a rich Fuel Air ratio is necessary during the Idling range and the High – Power range of working of the carburetor? [12+8]
5. What are the fundamental requirements of a Fuel-Injection system in a C.I. Engine?
- [b] Why the Air Injection system is Obsolete now?
- [c] Explain the different types of solid – Injection system with neat sketches. [5+5+10]
- 6.[a] Explain the stages of combustion in a SI engine with suitable diagrams.
- [b] What are the different types of Abnormal combustion in a SI engine? What is knocking in a CI engines? [10+10]
- 7. Write shot notes on (any two) :** [10+10]
- [a] Two stroke Crankcase Scavenged SI engine.
- [b] SI Engine versus CI Engine.
- [c] 4 stroke Engine versus 2-stroke Engine.
- [d] Morse Test.
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