

Code No.: ME403PC

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CMR ENGINEERING COLLEGE: : HYDERABAD

UGC AUTONOMOUS

II-B.TECH-II-Semester End Examinations (Regular) - August- 2023

THERMAL ENGINEERING-I

(MECH)

[Time: 3 Hours]

[Max. Marks: 70]

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 20 marks. Answer all questions in Part A.

Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-A

(20 Marks)

1. a) Why fuel is auto ignites in the diesel engine? [2M]
- b) Write the applications of internal combustion engines? [2M]
- c) What is meant by ignition delay? [2M]
- d) What are the stages in combustion in CI engine? [2M]
- e) Define clearance volume in reciprocating compressor? [2M]
- f) Define air fuel ratio? [2M]
- g) List out the applications of compressors? [2M]
- h) Define slip factor in dynamic compressor? [2M]
- i) What are the basic types of gas turbines? [2M]
- j) Difference between open cycle gas turbine and closed cycle gas turbine. [2M]

PART-B

(50 Marks)

2. Explain any two types of lubrication systems for in IC engine? [10M]
- OR**
3. A four stroke single cylinder gas engine has a bore of 146 mm and a stroke of 280 mm. The net load on the brake drum is 433N and the radius is 0.45 m. The indicator diagram area is 578mm² and length is 70 mm with a spring constant of 0.815 bar per mm. Calculate the IP, BP and mechanical efficiency if the engine speed is 475 rpm. [10M]
 4. Explain Knocking or detonation in CI engine? [10M]
- OR**
5. A fuel contains 90% C, 3.3% H₂, 3% O₂, 0.8% N₂, 0.9% S₂ and remaining incombustible mass. Find the HCV, LCV, chemically correct air fuel ratio and composition of exhaust gas on percentage mass basis. [10M]
 6. Derive the volumetric and isothermal efficiencies of reciprocating compressors with sketch? [10M]
- OR**
7. Air is to be isentropically compressed at the rate of 1 m³/s from 1 bar and 20°C to 10 bars. Find the work of compression and the volumetric efficiency if the clearance volume is 4% of stroke volume for all the cylinders for the single stage compression? [10M]

8. Air is compressed from 1 bar to 6 bar in a vane type rotary compressor and delivered at $0.06 \text{ m}^3/\text{revolution}$. Find the efficiency of the compressor when there is no internal compression and there is 40% pressure rise due to internal compression before back flow occurs. Find the power required to drive the compressor, if the speed is 100 rpm? [10M]

OR

9. Explain the working of vane sealed compressor with neat sketches? [10M]
10. Explain open and closed cycle gas turbines with neat sketches? [10M]

OR

11. Explain the effect of regeneration, inter cooling and reheating on the performance of Gas turbine. [10M]
