

**II B. TECH II SEMESTER REGULAR EXAMINATIONS, AUGUST 2021**  
**APPLIED THERMODYNAMICS**  
(Mechanical Engineering)

Time: 3 hours

Max, Marks: 60

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Note: Answer **ONE** question from each Unit (**5 x12 = 60 Marks**)

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UNIT - I

1. a) Explain the following terms as applied to IC engines: [6M]  
Bore, Stroke, Clearance volume, Swept volume, Compression ratio, Piston speed.
- b) Explain port timing diagram of 2-stroke petrol engine. [6M]

(OR)

2. a) Compare the relative advantages and disadvantages of 4-stroke and 2-stroke cycle engines. [6M]
- b) Describe the water-cooling system in IC engines with neat sketch. [6M]

UNIT - II

3. a) A single cylinder, two stroke petrol engine develops 4 kW indicated power. Find the average speed of the piston, if the effective pressure is 6.5 bar and piston diameter is 100mm. [6M]
- b) What is brake power of an IC engine? Derive its equation. [6M]

(OR)

4. a) Explain the efficiencies of an IC engine. [6M]
- b) An IC engine operate having piston diameter of 150mm, length of stroke 400mm and mean effective pressure 5.5 bar. The engine makes 120 explosions per minute. Determine the mechanical efficiency, if its BP is 5kW. [6M]

UNIT - III

5. a) In a Carnot cycle, heat is supplied at 350<sup>0</sup>C and is rejected at 25<sup>0</sup>C, fluid is water, which while receiving heat, evaporates from liquid at 350<sup>0</sup>C to steam at 350<sup>0</sup>C. If the cycle operates on a stationary mass of 1kg of water, find out heat supplied, heat rejected and work done. [6M]
- b) Explain the Rankine cycle various stages of operational process with neat diagram, also show p-v diagram and T-s diagram. [6M]

(OR)

6. a) Explain with neat sketch Babcock and Wilcox Boiler. [6M]
- b) State the classification of steam turbines and also describe the main parts of De-Level Impulse turbine. [6M]

UNIT - IV

7. a) Explain the closed cycle gas turbine, various components operational process with neat diagram, also show P-v diagram and T-s diagram, [6M]  
b) A simple closed gas turbine plant receives air at 1 bar and  $15^{\circ}\text{C}$ , and compresses it to 5 bar and then heats it to  $800^{\circ}\text{C}$  in the heating chamber, The hot air expands in a turbine back to 1 bar. Calculate the power developed per Kg of air supplied per second. Take  $C_p = 1\text{kJ/kg K}$ . [6M]

(OR)

8. a) Derive an equation for thermal efficiency of Gas turbine plant. [6M]  
b) Describe a gas turbine plant with Intercooler with neat schematic diagram, T-s diagram and show the net work done. [6M]

UNIT - V

9. a) Derive an equation for work done by a single stage reciprocating air compressor when air compressed isothermally, also show the P-v diagram and T-s diagram. [6M]  
b) Explain multi stage compression and state the advantages of multi stage compression. [6M]

(OR)

10. a) A single stage reciprocating air compressor is required to compress 1kg of air from 1 bar to 4 bar. Initial temperature is  $27^{\circ}\text{C}$ . compare the work requirement in cases of Isothermal and Isentropic compression. [6M]  
b) Distinguish between Reciprocating and Rotary air compressors. [6M]

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