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Question Paper Code : 60917

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2026.

Fourth/Sixth Semester

Mechanical Engineering

ME8493 – THERMAL ENGINEERING I

(Common to: Mechanical Engineering (Sandwich)

(Regulations 2017)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the assumptions made in air standard cycles?
2. Define volumetric efficiency.
3. Sketch the p-v diagram of a 2-stage compressor without clearance.
4. List the advantages of multi-stage compression over single-stage compression.
5. Define engine knocking.
6. Define lean and rich mixtures.
7. What is the significance of Morse test?
8. Differentiate between super charger and turbo charger.
9. List the different fuels used in gas turbine power plants.
10. Write the difference between open and closed cycle.

PART C — ($1 \times 15 = 15$ marks)

16. (a) In one type of nuclear power plant, heat is transferred in the nuclear reactor to liquid sodium. The liquid sodium is then pumped through a heat exchanger where heat is transferred to boiling water. Saturated Vapor steam at 5 MPa exits this heat exchanger and is then Superheated to 600°C in an external gas-fired superheater. The steam enters the turbine, which has one a (open-type) feedwater extraction at 0.4 MPa. The condenser pressure is 7.5 kPa. Determine the heat transfer in the reactor and in the Superheater to produce a net power output of 1 MW.

Or

- (b) A single-stage single-acting reciprocating air compressor has a bore of 120 mm and a stroke of 150 mm and is driven at a Speed of 1200 rpm. It is a compressing Carbon di-oxide from a pressure of 120 kPa and a temperature of 25°C to a temperature of 215°C . Assuming polytropic compression with $n = 1.3$ and volumetric efficiency of 100%, calculate
- (i) the pressure ratio,
 - (ii) indicated power,
 - (iii) shaft power, with a mechanical efficiency of 80% and
 - (iv) mass flow rate.