Code: 23ME3502

III B.Tech - I Semester - Regular Examinations - NOVEMBER 2025

THERMAL ENGINEERING
(MECHANICAL ENGINEERING)

Duration: 3 hours   Max. Marks: 70

Note: 1. This question paper contains two Parts A and B.
2. Part-A contains 10 short answer questions. Each Question carries 2 Marks.
3. Part-B contains 5 essay questions with an internal choice from each unit. Each Question carries 10 marks.
4. All parts of Question paper must be answered in one place.

BL – Blooms Level   CO – Course Outcome

PART – A

		BL	CO
1.a)	Define Volumetric Efficiency of an I.C Engine	L1	CO1
1.b)	Why does exhaust blowdown occur in actual cycles?	L2	CO1
1.c)	Classify the IC Engines based on ignition and working cycle.	L1	CO2
1.d)	How the boilers are classified?	L2	CO2
1.e)	Define critical pressure ratio in a steam nozzle.	L1	CO3
1.f)	Differentiate between parallel flow and counter flow condensers.	L2	CO3
1.g)	What do you meant by multi-stage compression in reciprocating compressors?	L1	CO4
1.h)	What is the function of intercooling in a gas turbine plant?	L2	CO4
1.i)	Define thrust in a jet engine.	L1	CO5
1.j)	What are solar collectors? Give examples.	L2	CO5

PART – B

			BL	CO	Max. Marks
		UNIT-I			
2		Compare air standard cycle and actual cycle with neat sketches. Explain the reasons for deviation of actual cycle from air standard cycle.	L2	CO1	10 M
		OR			
3		Explain the concepts of time loss factor and heat loss factor in actual engine cycles. How do they affect the efficiency?	L2	CO1	10 M
		UNIT-II			
4	a)	Explain the construction and working of Four Stroke CI Engine with a neat sketch.	L3	CO2	5 M
	b)	With a neat diagram explain the working of battery ignition system.	L2	CO2	5 M
		OR			
5	a)	A single cylinder, four stroke cycle oil engine is fitted with a rope brake. The diameter of the brake wheel is 600 mm and the rope diameter is 26 mm. The dead load on the brake is 200 N and the spring balance reads 30 N. If the engine runs at 450 r.p.m, what will be the brake power of the engine?	L3	CO2	5 M
	b)	Describe Working Principles of Lamont Boiler with a neat sketch.	L2	CO2	5 M

		UNIT-III			
6	a)	Define the term 'steam nozzle'. Explain various types of nozzles	L2	CO3	5 M
	b)	Discuss the concept of Wilson line.	L3	CO3	5 M
		OR			
7	a)	Define the term degree of reaction as applied to a reaction turbine. Show that for a Parson's reaction turbine, the degree of reaction is 50 percent.	L2	CO3	5 M
	b)	Explain the working of a surface condenser with a neat sketch	L3	CO3	5 M
		UNIT-IV			
8	a)	What is an air compressor? How are they classified? Enumerate the applications of compressed air.	L2	CO4	5 M
	b)	Describe with a neat sketch the construction and working of a single stage single acting reciprocating air compressor	L3	CO4	5 M
		OR			
9	a)	What is a centrifugal compressor? How it defers from an axial flow compressor.	L2	CO4	5 M
	b)	What is the purpose of intercooling in a gas turbine and where the intercoolers are applicable in gas turbines?	L2	CO4	5 M

UNIT-V

10	a)	Derive the expression for thrust developed in a jet propulsion system.	L3	CO5	5 M
	b)	Differentiate between solid and liquid propellant rocket engines.	L3	CO5	5 M

OR

11	a)	Classify solar collectors and describe the construction and principle of flat-plate collectors.	L3	CO5	5 M
	b)	Discuss the applications of solar energy in domestic and industrial sectors.	L3	CO5	5 M