Roll No.												

PRESIDENCY UNIVERSITY

BENGALURU

Mid - Term Examinations – March 2026

Date: 13- 03-2026 **Time:**11.45am to 01.15pm

School: SOE	**Program:** B.Tech	
Course Code : MEC2515	**Course Name:** Applied Thermodynamics	
Semester: IV	**Max Marks**: 50	**Weightage**: 25%

CO - Levels	CO1	CO2	CO3	CO4	CO5
Marks	13	15	22	-	-

Instructions:

(i) Read all questions carefully and answer accordingly.

(ii) Do not write anything on the question paper other than roll number.

Part A

Answer ALL the Questions. Each question carries 2 marks. **5Q x 2M=10M**

1	Define Thermal Efficiency and Mean Effective Pressure.	**2 Marks**	**L2**	**CO1**
2	Name the processes during which heat is added in Diesel and Dual cycles.	**2 Marks**	**L2**	**CO1**
3	Explain the concept of Reheating in Brayton cycle.	**2 Marks**	**L2**	**CO3**
4	Write the relationships between temperature and pressure for an Isentropic process taking place between 2 states.	**2 Marks**	**L2**	**CO1**
5	Write the P-V and T-S diagrams for Otto cycle.	**2 Marks**	**L2**	**CO1**

Part B

Answer the Questions. **Total Marks 40M**

6.	Derive the thermal efficiency of Carnot cycle with P-V and T-S diagrams.	**5 Marks**	**L3**	**CO1**
	Or			

7.	Compare the thermal efficiencies of Otto, Diesel and Dual Cycle when compression ratio and heat addition are same in detail with P-V and T-S diagrams.	**5 Marks**	**L3**	**CO1**

8.	An engine working on Otto cycle is supplied with air at 0.1 MPa, 35 ^{0}C. The compression ratio is 8. Heat supplied is 2100 kJ/kg. Calculate (a) the maximum pressure and temperature of the cycle, (b) the cycle efficiency, (c) the mean effective pressure and (d) network done by the cycle. (For air, C_p=1.005, C_v=0.718, and R=0.287 kJ/kg-K). Also draw the P-V and T-S diagrams of the cycle.	**15 Marks**	**L3**	**CO2**
	Or			
9.	An air standard Dual cycle has a compression ratio of 16, and compression begins at 1 bar, 30 ^{0}C. The maximum pressure is 60 bar. The heat transferred to air at constant pressure is equal to that at constant volume. Estimate (a) the pressures and temperatures at the cardinal points of the cycle, (b) the cycle efficiency and (c) the MEP of the cycle (C_v=0.718 kJ/kg K, C_p=1.005 kJ/kg K). Also draw the P-V and T-S diagrams of the cycle.	**15 Marks**	**L3**	**CO2**

10.	**a**	Derive the thermal efficiency of Brayton cycle with P-V and T-S diagrams.	**5 Marks**	**L3**	**CO3**
	b	Consider an air standard cycle in which the air enters the compressor at 1.2 bar and 30°C. The pressure of air leaving the compressor is 5.5 bar and the temperature at turbine inlet is 800°C. Determine per kg of air : (i) Efficiency of the cycle, (ii) Heat supplied to air, (iii) Work available at the shaft, (iv) Heat rejected in the cooler, and (v) Temperature of air leaving the turbine. For air γ = 1.4 and C_p = 1.005 kJ/kg K. Also draw the P-V and T-S diagrams for Brayton cycle.	**15 Marks**	**L3**	**CO3**
		Or			
11.	**a**	Write advantages and disadvantages of Closed gas cycle for gas turbine engines over open cycle gas turbine engine.	**5 Marks**	**L3**	**CO3**
	b	In a gas turbine plant working on Brayton cycle, the air at inlet is 30 °C, 0.1 MPa. The pressure ratio is 5.25 and the maximum temperature is 900 °C. The turbine and compressor efficiencies are each 85%. Find (a) compressor work, (b) turbine work, (c) heat supplied, (d) cycle efficiency and (e) turbine exhaust temperature. Mass of air may be considered as 1 kg. Also draw the P-V and T-S diagrams.	**15 Marks**	**L3**	**CO3**