Roll No.												

PRESIDENCY UNIVERSITY

BENGALURU

Mid - Term Examinations – MARCH 2026

Date: 10- 03- 2026 **Time:** 09:30am – 11:00am

School: SOE	**Program:** B.Tech.	
Course Code: MEC4009	**Course Name:** IC Engines and Fuels	
Semester: VI	**Max Marks**: 50	**Weightage**: 25%

CO - Levels	CO1	CO2	CO3	CO4	CO5	CO6
Marks	26	24	-	-	-	

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 2marks. **5Q x 2M=10M**

1	Identify internal combustion engines categorized according to the fuel they utilize?	**2 Marks**	**L1**	**CO1**
2	List two examples of engines that operate on external combustion?	**2 Marks**	**L1**	**CO1**
3	Tabulate ethanol and methanol difference from each other?	**2 Marks**	**L1**	**CO2**
4	Defend how brake thermal efficiency is considered as an important performance parameter?	**2 Marks**	**L2**	**CO1**
5	Contrast the main constituents of gases present in biogas?	**2 Marks**	**L2**	**CO2**

Part B

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

6.	A petrol engine uses a fuel of calorific value of 42000 kJ/kg and has a specific gravity of 0.75. The brake thermal efficiency is 24 per cent and mechanical efficiency is 80 per cent. If the engine develops a brake power of 29.44 kW, calculate (i) volume of the fuel consumed per second (ii) indicated thermal efficiency	**10 Marks**	**L3**	**CO**1
	Or			
7.	A four-cylinder spark-ignition engine has the following dimensions: bore = 680 mm and a crank radius = 375 mm. If the compression ratio is 8:1, determine the (i) stroke length (ii) swept volume (iii) cubic capacity (iv) clearance volume and (v) total volume. If the volumetric efficiency is 80% determine the (vi) actual volume of air aspirated/stroke in each cylinder?	**10 Marks**	**L3**	**CO1**

8.	Compare and contrast between Otto cycle, Diesel cycle, and Dual cycle with proper justifications.	**10 Marks**	**L**2	**CO**1
	Or			
9.	An engine with an indicated thermal efficiency of 25% and mechanical efficiency of 75% consumes 25 kg/h of fuel at a fixed speed. The brake mean effective pressure is 5 bar and the mean piston speed is 15 m/s. Assuming it is a single cylinder square engine determine the crank radius and the speed in rpm. Take CV of the fuel = 42 MJ/kg.	**10 Marks**	**L3**	**CO1**

10.	Ilustrate the advantages and disadvantages of using LPG in SI engines?	**10 Marks**	**L**3	**CO**2
	Or			
11.	Demonstrate the general chemical formula of the following fuels: (i) paraffin (ii) olefin (iii) diolefin (iv) naphthene(v) aromatic Also state their molecular arrangements and mention whether they are saturated or unsaturated.	**10 Marks**	**L3**	**CO2**

12.	Demonstrate the process of transesterification with a neat diagram and discuss its advantages.	**10 Marks**	**L**3	**CO**2
	Or			
13.	Interpret a detailed note on the combustion properties of hydrogen and how it affects the engine performance.	**10 Marks**	**L2**	**CO2**