

Gandhi Institute of Engineering and Technology University, Odisha, Gunupur
(GIET University)



M.Tech. (First Semester – Regular/Supplementary) Examinations, January– 2026

24MTEPE11021 – Internal Combustion Engines

(Heat Power and Thermal Engg.)

Time: 2 hrs

Maximum: 60 Marks

Answer ALL questions

(The figures in the right hand margin indicate marks)

PART – A

(2 x 5 = 10 Marks)

Q.1. Answer **ALL** questions

	CO #	Blooms Level
a. Why is liquid cooling preferred for multi-cylinder, high-power engines?	CO4	K2
b. State the advantages of electronic ignition systems over conventional battery ignition systems.	CO6	K2
c. What is scavenging in two-stroke engines, and why is it necessary?	CO1	K2
d. Explain how particulate emissions are formed in diesel engines.	CO2	K2
e. What is meant by a stratified charge engine? State its main advantage.	CO5	K2

PART – B

(10 x 5 = 50 Marks)

Answer ALL the questions

	Marks	CO #	Blooms Level
2. a. A two-stroke CI engine develops a brake power of 368 kW while its frictional power is 73.6 kW. Its fuel consumption is 180 kg/h and works with an air-fuel ratio of 20:1. The heating value of the fuel is 42000 kJ/kg. Calculate (i) indicated power (ii) mechanical efficiency (iii) air consumption per hour (iv) indicated thermal efficiency and (v) brake thermal efficiency.	10	CO1	K4
(OR)			
b. A four-stroke SI engine delivers a brake power of 441.6 kW with a mechanical efficiency of 85 per cent. The measured fuel consumption is 160 kg of fuel in one hour and air consumption is 410 kg during one sixth of an hour. The heating value of the fuel is 42000 kJ/kg. Calculate (i) indicated power (ii) frictional power (iii) air-fuel ratio (iv) indicated thermal efficiency (v) brake thermal efficiency.	10	CO1	K4
3. a. Describe the working of a carburetor-based fuel delivery system with a neat sketch.	5	CO5	K2
b. Describe the electronic ignition system used in modern SI engines.	5	CO6	K3
(OR)			
c. Explain the working of a gasoline injection system used in SI engines. Discuss its advantages over carburetor systems.	5	CO5	K2
d. Compare magneto ignition system with a battery ignition system in terms of reliability and application.	5	CO6	K4
4. a. Describe the working of cross-flow, loop, and uniflow scavenging systems used in two-stroke engines with neat sketches.	5	CO1	K3
b. Define scavenging efficiency and trapping efficiency. Explain how these efficiencies affect the performance of two-stroke CI engines.	5	CO1	K3

(OR)

Page 1 of 2

c.	Discuss the advantages and limitations of supercharging in CI engines. Explain why supercharging is commonly used in modern diesel engines.	10	CO1	K2
5.a.	Explain the emission control systems used in SI engines. Discuss the role of catalytic converters in reducing exhaust emissions.	5	CO2	K3
b.	Analyze the factors affecting hydrocarbon and carbon monoxide emissions in SI engines.	5	CO2	K4
(OR)				
c.	Explain the formation of major SI engine pollutants such as CO, HC, and NO _x . Discuss their effects on human health and the environment.	10	CO2	K3
6.a.	Discuss the various alternative fuels used in SI engines. Compare gasoline with any one alternative fuel in terms of performance and emissions.	10	CO6	K3
(OR)				
b.	Describe the desirable characteristics of diesel fuel. Explain the significance of cetane number, viscosity, and volatility in diesel engine operation.	10	CO5	K3

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