GANDHI INSTITUTE OF ENGINEERING AND TECHNOLOGY UNIVERSITY, ODISHA, GUNUPUR

(GIET UNIVERSITY)

M.Tech. (First Semester) Regular Examinations, February – 2025

24MTEPE11021 – Internal Combustion Engines

(HPTE)

Time: 3 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.	Define brake mean effective pressure	CO1	K1
b.	Define auto ignition? How autoignition effect in knocking?	CO2	K1
c.	Differentiate between rich mixture, stoichiometric mixture and lean mixture.	CO3	K2
d.	Explain the importance of Brake specific fuel consumption?	CO4	K1
e.	Define mal-distribution of fuel in a multi cylinder engine?	CO5	K1

PART – B **(10 x 5 = 50 Marks)**

Answer ***ALL*** the questions		Marks	CO #	Blooms Level
2. a.	The cubic capacity of four stroke over square SI engine is 245 cc. Over square ratio is 1.1. Clearance ratio is 27.2 cc. Calculate bore diameter, stroke length, and compression ratio of engine.	10	CO1	K3
	(OR)			
b.	Briefly describe the typical arrangements of mechanical supercharging.	5	CO2	K2
c.	Explain the method of turbocharging.	5	CO2	K2
3.a.	Explain the phenomena of knock in CI engine and compare with SI engine knock.	10	CO3	K2
	(OR)			
b.	A four stroke gas engine has bore diameter 20cm and stroke length 30 cm runs at 3000 RPM. The air fuel ratio is 14:1 and volumetric efficiency is 85%. If calorific value of gas is 8MJ/m^3 and brake thermal efficiency is 25%. Determine Volume of gas used per minute and brake power.	10	CO3	K3
4.a.	Describe with the help of a simple diagram and the operating principle of a stratified charge engine.	10	CO4	K2
	(OR)			
b.	An eight cylinder, four stroke engine of 9 cm bore and 8 cm stroke with a compression ratio of 7 is tested at 4500 rpm on a dynamometer which has 54 cm arm. During 10-minute test, the dynamometer scale reading was 42 kg and the engine consumed 4.4 kg of gasoline having calorific value of 44000 kJ/kg. Air at 1 bar was supplied to carburettor at a rate of 6 kg/min. Calculate- a) Brake Power b) Brake Mean Effective Pressure c) Brake Specific Fuel consumption d) Brake Specific Air Consumption e) Air Fuel ratio	10	CO4	K3
5.a.	Briefly explain the stage of combustion in SI engine.	7	CO2	K2
b.	Explain the drawback of simple carburettor.	3	CO2	K3
	(OR)			

c.	A four stroke diesel engine working at a sea level pressure 1 bar temperature 17^0C develops a brake power of 280 kW with a volumetric efficiency of 80% at sea level condition. The engine works at an air fuel ratio of 18:1 with a specific fuel consumption of 0.24 kg/kWh. The engine runs at 1800 rpm. Determine the engine capacity and bmep.	10	CO2	K3
6.a.	Describe with the help of a diagram construction and working principle of a free piston engine.	10	CO3	K2
	(OR)			
b.	A six cylinder 4.5 litre four stroke supercharged engine running at 4000 rpm has an overall volumetric efficiency of 150 %. The compressor has an isentropic efficiency of 90 % and a mechanical efficiency of 85% in the link with the engine. The compressed air is delivered to the engine cylinder at 57^0C and 1.8 bar pressure. The ambient conditions are 1 bar 17^0C. Determine the rate of heat rejection from the after cooler and power absorbed by the supercharger.	10	CO1	K2

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