

PRN No.	
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PAPER CODE	U314-21105-A (ESE)
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(AY:2024-25) December 2024 (ENDSEM) EXAM

TY (SEMESTER - I)

COURSE NAME: I C Engines & Alternative Fuels Branch: Mechanical COURSE CODE: MEUA31205A
TY (PATTERN 2020)

Time: [1Hr 30 Min]

[Max. Marks: 40]

(*) Instructions to candidates:

- 1) Figures to the right indicate full marks. Use of scientific calculator is allowed
- 2) Use suitable data wherever required
- 3) All questions are compulsory. Solve any two sub question each from Questions 1 and 2
- 4) Solve any one sub question (2 marks) from Questions 3, 4, 5 and 6 and sub question of 4 marks is compulsory from questions 3, 4, 5, and 6

Q. No.	Question Description	Max. Marks	CO mapped	BT Level
Q.1	a) With help of diagram (only) show the effect of spark advance (20° , 35° before TDC and at TDC)	[4]	1	2
	b) Discuss the assumptions in air standard cycle	[4]	1	2
	c) Describe blow down losses with the help of PV diagram.	[4]	1	2
Q2	a) With help of P-theta diagram describe first 3 combustion stages of CI engine	[4]	2	2
	b) Explain any four factors that increase Flame speed in SI engine.	[4]	2	2
	c) Compare the types of mixture and its necessity in SI and CI Engines	[4]	2	2
Q3	a) Demonstrate speed and temperature on volumetric efficiency.	[2]	3	2
	OR	[2]	3	2
	b) "GDI over sizes the engine cylinder" Discuss	[4]	3	3
Q4	c) 4-cylinder 4 stroke CI engine has a bore of 8 cm and stroke 10 cm. Its rated speed is 3500 RPM and it is tested at this speed against a torque of 70 Nm. Estimate BMEP	[4]	3	3
	a) The Brake Power is 20 kW, mass of fuel consumed is 12 kg/hr, CV of fuel is 45000 kJ/kg. Determine Brake thermal efficiency.	[2]	4	3
Q4	OR	[2]	4	3
	b) The Frictional power at a speed of 1500 rpm at 3.43 kW is 0.25 kw. The same engine was working at 2.85 kW at same speed. Calculate Indicated Power	[2]	4	3

	c) During a test on 4 stroke diesel engine following data were recorded IP= 24 kW, Load applied on Dynamometer= 70 kg, Dynamometer arm length= 0.65 m, Speed = 6.6 rev/sec, Fuel consumed = 0.0018 kg/sec, mass water circulated for engine cooling = 0.135 kg/sec, Specific heat of water= 4.187 kJ/kg K, Initial and Final temperature of water are 28 and 63 degrees respectively. Estimate the Mechanical efficiency, heat lost to water.	[4]	4	3
Q.5	a) Why LNG is a highway fuel. OR	[2]	5	1
	b) State the effect on any two pollutants if ethanol used as fuel in SI engine.	[2]	5	1
	c) The four stroke SI engine working at 2500 RPM develops a brake power of 20 kW. When same engine is retrofitted to use CNG as fuel, at same RPM its brake power and bsfc (value) decreased by 20 %. Evaluate the mass of petrol and CNG consumed in kg/hr	[4]	5	3
Q.6	a) Elaborate effect of Hydrogen addition in SI engine (in terms of power) OR	[2]	6	2
	b) Explain back-fire in case of hydrogen powered engine.	[2]	6	2
	c) During Trial on 4 Cylinder 4 stroke SI Engine the recorded BP was 15 kW and fuel consumed was 0.00201 kg/sec. The same engine was fueled with petrol blended with 20 % ethanol (E20P80) and fuel consumption was found to be increased to 1.23×10^{-3} kg/sec. Calculate the Brake thermal efficiency of engine powered blended petrol (E20P80). Calorific Value of Petrol = 44000 kJ/kg Calorific Value of E10P90 = 40000 kJ/kg	[4]	6	3

Note : [BT level 1: Remember 2:Understand 3: Apply 4: Analyze 5: Evaluate 6: Create]