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December 2023 (ENDSEM) EXAM

T.Y. (SEMESTER - I)

COURSE NAME: I C Engine & Alternate Fuels Branch: Mechanical COURSE CODE: MEUA31205A

(PATTERN 2020)

Time: [1Hr. 30 Min] **[Max. Marks: 40]**

(*) Instructions to candidates:

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

Q. No.	Question Description	Max. Marks	CO mapped	BT Level
Q.1	a) Sketch a valve timing diagram of four stroke petrol engine at a higher speed.	[2]	1	2
Q2	a) "Why carburetor used in SI Engine" ? Explain in brief.	[2]	2	2
Q3.	a) With the help of p-Theta curve illustrate the combustion stages in CI Engine	[6]	3	3
	b) With the help of neat diagram illustrate any three combustion chambers used in CI Engine	[6]	3	3
Q.4	a) Illustrate the methods to calculate Frictional Power	[5]	4	3
	b) A trail was conducted on 4 stroke single cylinder oil engine. The following observations were made. Duration of trial 60 min, Total fuel used= 4 kg Calorific value= 42000 kJ/kg, Net load on Dynamometer = 25 kg, Dynamo arm length= 0.2 m, Cooling water circulated =200 kg, IP= 10 kW , Crankshaft rotates at 1500 rpm cooling water temp rise= 40 degree, CPw = 4.18 kJ/kg K. Calculate mechanical efficiency and heat loss to cooling water. (Density of oil = 800 kg/m^3)	[5]	4	3
	c) A 4 Cylinder gasoline engine operates on 4 stroke cycle. The bore of each cylinder is 75 mm and stroke is 95 mm. The engine is running at 2800 rpm. The fuel consumption is 6.5 ml/sec and torque developed is 135 Nm. The calorific value of fuel is 45000 kJ/kg and density is 740 kg/m^3. Estimate (i) BP (ii) BSFC (iii) η_{brake}	[5]	4	3

Q.5	a) Comment on "CNG is city and LNG is a highway fuel".	[5]	5	4
	b) A CNG powered SI engine working on four stroke develops 32.9 kW. Morse test was conducted on the engine and the brake power obtained when each cylinder was inoperative by short circuiting the spark plug are 22.9, 22.3,22.8 and 22.5 kW respectively. The test was conducted at constant speed. Evaluate IP and η_{mech}	[5]	5	4
	c) During Trial on 4 Cylinder 4-stroke SI Engine the recorded BP was 41 kW and fuel consumed was 0.00421 kg/sec. The same engine was fueled with petrol blended with 25 % ethanol (E25G75) and fuel consumption was found to be increased by 10%. Evaluate the BSFC and Brake thermal efficiency of engine powered by pure and blended petrol. Calorific Value of Petrol = 44000 kJ/kg Calorific Value of E25G75 = 39000 kJ/kg	[5]	5	4
Q.6)	a) Comment on the limitations and advantages of Ethanol as a fuel	[5]	6	4
	b) "DME is a synthetic fuel more suitable for CI Engine" Justify. Also Explain its performance characteristics	[5]	6	4
	c) Comment on practical limitations of Hydrogen using a fuel in IC Engine. Explain performance characteristics when used in IC (SI or CI) Engine.	[5]	6	4

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