Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII (NEW) EXAMINATION – WINTER 2023

Subject Code:3171923 Date:19-12-2023

Subject Name: Internal Combustion Engine

Time: 10:30 AM TO 01:00 PM Total Marks:70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	Compare SI and CI engines based on initial and maintenance costs.	**03**
	(b)	Enlist and explain about different applications of SI and CI engine.	**04**
	(c)	Discuss about important qualities of IC engine fuels.	**07**
Q.2	**(a)**	Explain in brief about necessity of engine cooling.	**03**
	(b)	Briefly discuss about types of lubricants and their properties.	**04**
	(c)	Explain pressurized water cooling system with neat sketch.	**07**
		OR	
	(c)	Explain splash lubrication system with neat sketch.	**07**
Q.3	**(a)**	Enlist types of nozzles used in CI engine fuel injector. Explain any one of them in brief.	**03**
	(b)	Explain carburetion mixture requirement for different loads and speeds in SI engine.	**04**
	(c)	Explain working of MPFI system with neat sketch.	**07**
		OR	
Q.3	**(a)**	Explain stoichiometric air fuel ratio in brief.	**03**
	(b)	Enlist different SI engine combustion chambers and explain any one of them with neat sketch.	**04**
	(c)	Discuss in detail about various factors affecting engine knocking.	**07**
Q.4	**(a)**	Explain in brief objectives of supercharging.	**03**
	(b)	Discuss about emission from SI engines in brief.	**04**
	(c)	Write short note on alternative fuels for I.C. engines.	**07**
		OR	
Q.4	**(a)**	Explain diesel smoke and its control in brief.	**03**
	(b)	Discuss about trouble shooting and overhauling of engines in brief.	**04**
	(c)	A six cylinder, four-stroke gasoline engine having a bore of 90 mm and stroke of 100 mm has a compression ratio 7. The relative efficiency is 55% when the indicated specific fuel consumption is 300 gm/kWh. Estimate: (i) the calorific value of the fuel and (ii) corresponding fuel consumption, given that imep is 8.5 bar and speed is 2500 rpm.	**07**
Q.5	**(a)**	Explain Willan's line method to find friction power of the engine.	**03**
	(b)	Explain air box method to calculate the air consumption in an engine.	**04**

(c) A gasoline engine working on four stroke develops a brake power of 20.9 kW. A Morse Test was conducted on this engine and the brake power (kW) obtained when each cylinder was made inoperative by short circuiting the spark plug are 14.9, 14.3, 14.8 and 14.5 respectively. The test was conducted at constant speed. Find: **07**

(i) the indicated power,

(ii) mechanical efficiency and

(iii) bmep when all the cylinders are firing.

The bore of the engine is 75 mm and the stroke is 90 mm. The engine is running at 3000 rpm.

OR

Q.5 **(a)** Explain in brief about working principle of stratified charge engines. **03**

(b) A single-cylinder engine running at 1800 rpm develops a torque of 8 Nm. The indicated power of the engine is 1.8 kW. Find the loss due to friction power as the percentage of brake power. **04**

(c) Write short note on Wankel engine. **07**

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