Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII (NEW) EXAMINATION – WINTER 2022

Subject Code:3171923 Date:12-01-2023

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 Petrol and Diesel engine on the basis of: I. Fuel Ignition II. Thermal efficiency III. Fuel supply	**03**
	(b)	What are the desirable properties of IC engine fuels?	**04**
	(c)	Compare the knocking in SI and CI engines.	**07**
Q.2	**(a)**	Why rich mixture required during idling?	**03**
	(b)	What are the drawbacks of simple carburetor?	**04**
	(c)	Explain construction and working of Bosch fuel pump.	**07**
		OR	
	(c)	Explain the working of common rail fuel injection system with a line diagram and also discuss about the advantages and disadvantages.	**07**
Q.3	**(a)**	What is the importance of ignition lag in SI engine combustion?	**03**
	(b)	Explain the advantages of using hydrogen as a fuel in IC engines.	**04**
	(c)	Describe the various stages of combustion in CI engine with the help of p-θ diagram.	**07**
		OR	
Q.3	**(a)**	Classify different types of combustion chambers in CI engine.	**03**
	(b)	Explain the term: I. Vapor lock II. Ice formation	**04**
	(c)	Explain the stages of combustion in SI engine with the help of p-θ diagram.	**07**
Q.4	**(a)**	Give the classification of engine cooling system.	**03**
	(b)	Give comparison between wet sum and dry sump lubrication system.	**04**
	(c)	Derive an expression for air-fuel ratio for simple carburetor by using the approximate analysis method.	**07**
		OR	
Q.4	**(a)**	State the function of lubrication system in IC engine.	**03**
	(b)	Compare and differentiate the supercharging and turbocharging.	**04**
	(c)	Explain with neat sketch splash lubrication system.	**07**
Q.5	**(a)**	Write a short note on SAE rating of lubricants.	**03**
	(b)	Give comparison between the catalytic convertor and thermal rector.	**04**
	(c)	A two stroke diesel engine was motored when energy meter reading was 1.5 KW. Then the test on the engine was carried out for one hour and following observations were recorded: Brake torque = 120Nm	**07**

RPM = 600
Fuel used = 2.5 Kg/hr
C.V. of fuel = 40.3 MJ/Kg
Cooling water used = 818 Kg/hr
Rise in cooling water temperature = 10^0C
Cp_w = 4.2 KJ/Kg-K
Exhaust gas temperature = 345^0C
Room temperature = 25^0C
A:F ratio = 32:1
Cp_g = 1.045 KJ/Kg-K

Draw heat balance sheet indicating units in KJ/min and also on percentage basis.

OR

Q.5 **(a)** Explain the procedure of engine trouble shooting. **03**

(b) Write a brief note on Wankel engine. **04**

(c) In a test of four cylinder four stroke petrol engine of 75 mm bore & 100mm stroke. The following results were obtained at full throttle at a constant speed and with a fixed setting of the fuel supply of 0.082 kg/min. **07**

Brake power with all cylinder working = 15.24 KW
Brake power with cylinder 1 cut off = 10.45 KW
Brake power with cylinder 2 cut off = 10.38 KW
Brake power with cylinder 3 cut off = 10.23 KW
Brake power with cylinder 4 cut off = 10.45 KW

Estimate the indicated power of the engine under this conditions. If calorific value of fuel is 44 MJ/Kg, find the thermal efficiency of the engine and compare it with air standard efficiency. The clearance volume is taken as 115 cc.

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