Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE – SEMESTER- VIII EXAMINATION-SUMMER 2023

Subject Code: 2180215 Date: 28/06/2023

Subject Name: Automotive and Combustion Engine Technology

Time: 02:30 PM TO 05:00 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)**	What is Engine downsizing?	**03**
	(b)	What is lean boost direct injection (LBDI) concept?	**04**
	(c)	Describe the urea-based SCR NOx after treatment with schematic diagram.	**07**
Q.2	**(a)**	What is Micro Hybrid & Mild Hybrid Vehicle?	**03**
	(b)	What is stratified charge operation in case of gasoline direct injection?	**04**
	(c)	Explain working of Direct Injection Gasoline Engine with schematic diagram.	**07**
		OR	
	(c)	Explain the wall, air and spray combustion system for the mixture preparation of gasoline direct injection.	**07**
Q.3	**(a)**	What is turbo charging? What is the advantage of turbo charging in SI engine?	**03**
	(b)	Explain EGR with the neat sketch.	**04**
	(c)	With a neat sketch explain thermodynamic analysis of gasoline direct injection at part-load condition.	**07**
		OR	
Q.3	**(a)**	Define : Atkinson cycle and Miller cycle.	**03**
	(b)	Write the advantages of gasoline direct injection in terms of efficiency in a real engine.	**04**
	(c)	What is auto ignition phenomenon? What is the basic difference between auto ignition combustion and SI combustion?	**07**
Q.4	**(a)**	What is internal exhaust gas recirculation system and external exhaust gas recirculation system?	**03**
	(b)	Which are the modifications required to change from SI combustion to auto ignition combustion?	**04**
	(c)	What are the approaches to auto ignition combustion operation in gasoline engines? Explain any two in detail.	**07**
		OR	
Q.4	**(a)**	Give the difference between turbocharging and supercharging.	**03**
	(b)	Enlist the methods to reduce knock and abnormal combustion of an SI engine with turbocharging.	**04**
	(c)	Describe the operation of gasoline engines with autoignition combustion.	**07**
Q.5	**(a)**	Explain basic principle of HCCI combustion.	**03**

	(b)	Enlist the controlling parameters for HCCI combustion for best fuel economy and low emissions in SI engine.	**04**
	(c)	Differentiate homogenous combustion and diffusion combustion based on any seven aspects.	**07**

OR

Q.5	**(a)**	Enlist the limitation of HCCI combustion.	**03**
	(b)	Compare emissions with HCCI and CI engine operation.	**04**
	(c)	Explain stages of combustion of HCCI engine.	**07**

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