

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-VIII (NEW) EXAMINATION – WINTER 2017****Subject Code: 2180210****Date: 15/11/2017****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.

- Q.1**
- (a) What is Engine downsizing? Write down any two methods for engine downsizing. **03**
  - (b) Enlist strategy for emission control in gasoline and diesel fueled vehicle. **04**
  - (c) Explain working of Direct Injection Gasoline Engine with schematic diagram. **07**
- Q.2**
- (a) Enlist various after treatment technologies for diesel and gasoline vehicle. **03**
  - (b) What is stratified charge operation in case of gasoline direct injection? **04**
  - (c) Explain different types of direct injection gasoline injectors. **07**
- OR**
- (c) Explain salient feature of spray guided combustion system for gasoline direct injection. **07**
- Q.3**
- (a) What is turbocharging? What is the advantage of turbocharging in SI engine? **03**
  - (b) Describe Thermal loading and Turbo lag in context of gasoline engine with turbo charging. **04**
  - (c) Explain the reasons for knocking and abnormal combustion with turbocharging in SI engine? Enlist the methods to reduce knock and abnormal combustion of an SI engine with turbocharging. **07**
- OR**
- Q.3**
- (a) Enlist the possible measures for NO<sub>x</sub> reduction in diesel and petrol vehicles. **03**
  - (b) What is the effect of turbocharging on SI engine emission? **04**
  - (c) Explain the advantages of combining direct injection and turbocharging in SI engine. **07**
- Q.4**
- (a) What is auto ignition phenomenon? What is the basic difference between auto ignition combustion and SI combustion? **03**
  - (b) Enlist the problems associated with stratified charge lean-burn mixture in a DI gasoline engine. **04**
  - (c) Explain thermal management approach to achieving auto ignition combustion in gasoline engine. **07**
- OR**
- 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) Explain the effect of fuel injection timing on auto ignition combustion. **07**

- Q.5 (a) Enlist the controlling parameters for HCCI combustion for best fuel economy and low emissions in SI engine. **03**
- (b) Explain basic principle of HCCI combustion. **04**
- (c) Explain stages of combustion of HCCI engine. **07**
- OR**
- Q.5 (a) Which are the primary objectives of gasoline HCCI engine and Diesel HCCI engine? **03**
- (b) Enlist the limitation of HCCI combustion. **04**
- (c) Differentiate homogenous combustion and diffusion combustion based on any seven aspects. **07**

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