

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VIII (NEW) - EXAMINATION – SUMMER 2017****Subject Code: 2180210****Date: 06/05/2017****Subject Name: Automotive and Combustion Engine Technology (Department Elective III)****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.

- Q.1** (a) Define: Engine downsizing. Explain the methods to achieve downsizing. **07**
 (b) Describe the urea-based SCR NO_x after treatment with schematic diagram. **07**
- Q.2** (a) What is lean boost direct injection (LB DI) concept? Explain the working principle of LB DI. **07**
 (b) Explain the types of nozzle used in gasoline direct injection and compare their features. **07**
- OR**
- (b) Explain the thermodynamic aspects of gasoline direct injection and describe the combustion processes. **07**
- Q.3** (a) Explain the following: (a) Lean NO_x trap (b) Stratified charge combustion **07**
 (b) Describe the three combustion concepts (wall, air and spray) for the implementation of mixture preparation of gasoline direct injection **07**
- OR**
- Q.3** (a) With a neat sketch explain thermodynamic analysis of gasoline direct injection at part-load condition. **07**
 (b) Explain the salient features of the first-generation and the second generation gasoline direct injection engines **07**
- Q.4** (a) What are the problems associated with turbo charging the spark-ignition engine? Explain any two of the problems in detail. **07**
 (b) What are the advantages of combining direct injection and turbo charging in spark-ignition engine? **07**
- OR**
- Q.4** (a) Describe how the selective catalytic reduction (SCR) NO_x control as an alternative to lean NO_x traps (LNT). **07**
 (b) Explain the principle of autoignition combustion in the gasoline engine. **07**
- Q.5** (a) What are the approaches to autoignition combustion operation in gasoline engines? Explain any two of them in detail. **07**
 (b) Describe the operation of gasoline engines with autoignition combustion. **07**
- OR**
- Q.5** (a) Describe the fundamental principle of HCCI combustion in gasoline engines. **07**
 (b) Describe the different approaches to HCCI operation in gasoline engines? **07**
