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GUJAKAT 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. (a) Define: Engine downsizing. Explain the methods to achieve downsizing. 07 0.1 (b) Describe the urea-based SCR NOx after treatment with schematic diagram. **07** What is lean boost direct injection (LBDI) concept? Explain the working **Q.2** 07 principle of LBDI. (b) Explain the types of nozzle used in gasoline direct injection and compare their 07 features. OR (b) Explain the thermodynamic aspects of gasoline direct injection and describe the 07 combustion processes. Explain the following: (a) Lean NOx trap (b) Stratified charge combustion **07** 0.3 (a) Describe the three combustion concepts (wall, air and spray) for the 07 implementation of mixture preparation of gasoline direct injection With a neat sketch explain thermodynamic analysis of gasoline direct injection 0.3 (a) **07** at part-load condition. Explain the salient features of the first-generation and the second generation **(b) 07** gasoline direct injection engines What are the problems associated with turbo charging the spark-ignition 0.4 07 engine? Explain any two of the problems in detail. What are the advantages of combining direct injection and turbo charging in **07** spark-ignition engine? Describe how the selective catalytic reduction (SCR) NOx control as an **Q.4 07** alternative to lean NOx traps (LNT). **(b)** Explain the principle of autoignition combustion in the gasoline engine. 07 **Q.5** What are the approaches to autoignition combustion operation in gasoline **07** engines? Explain any two of them in detail. Describe the operation of gasoline engines with autoignition combustion. **07 (b)**

Describe the different approaches to HCCI operation in gasoline engines?

Describe the fundamental principle of HCCI combustion in gasoline engines.

0.5

(a)

07

07