

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VII (NEW) EXAMINATION – WINTER 2022****Subject Code:3170215****Date:10-01-2023****Subject Name:Advance Combustion Technology of I.C. 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

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| Q.1 | (a) What is engine downsizing? | 03 |
| | (b) Enlist strategy for emission control in gasoline and diesel fueled vehicle. | 04 |
| | (c) Describe the urea-based SCR NO _x after treatment with schematic diagram | 07 |
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| Q.2 | (a) What is turbo-charging? What is the advantage of turbo-charging in SI engine? | 03 |
| | (b) How is stratified charge combustion achieved? | 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 implementation of mixture preparation of gasoline direct injection | 07 |
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| Q.3 | (a) Write short notes on exhaust emission. | 03 |
| | (b) Describe Thermal loading and Turbo lag in context of gasoline engine with turbo charging. | 04 |
| | (c) Explain the salient features of the first-generation and the second generation gasoline direct injection engines | 07 |
| | OR | |
| Q.3 | (a) Explain salient feature of spray guided combustion system for gasoline direct injection | 03 |
| | (b) What is auto ignition phenomenon? What is the basic difference between auto ignition combustion and SI combustion? | 04 |
| | (c) What are the problems associated with turbo charging the spark-ignition engine? Explain any two of the problems in detail. | 07 |
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| Q.4 | (a) Which are the modifications required to change from SI combustion to auto ignition combustion? | 03 |
| | (b) Mention the advantages of direct injection system. | 04 |
| | (c) What is lean boost direct injection (LBDI) concept? Explain the working principle of LBDI. | 07 |
| | OR | |
| Q.4 | (a) Write short notes on engine knock | 03 |
| | (b) Explain EGR with the neat sketch. | 04 |
| | (c) Explain the effect of fuel injection timing on auto ignition combustion. | 07 |
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| Q.5 | (a) Differentiate turbo charging and super charging. | 03 |
| | (b) Enlist the limitation of HCCI combustion. | 04 |
| | (c) Describe the different approaches to HCCI operation in gasoline engines | 07 |
| | OR | |
| Q.5 | (a) Which are the primary objectives of gasoline HCCI engine and Diesel HCCI engine? | 03 |
| | (b) Enlist the controlling parameters for HCCI combustion for best fuel economy and low emissions in SI engine | 04 |
| | (c) Describe the fundamental principle of HCCI combustion in gasoline engines | 07 |