

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION)

CLASS: BTECH
BRANCH: Mechanical

SEMESTER: V
SESSION: MO/2025

SUBJECT: ME301 I.C. ENGINES AND GAS TURBINE
TIME: 02 Hours

FULL MARKS: 25

INSTRUCTIONS:

1. The question paper contains 5 questions each of 5 marks and total 25 marks.
 2. Attempt all questions.
 3. The missing data, if any, may be assumed suitably.
 4. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates
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| Q.1 Describe the working of a 4-stroke spark-ignition (S.I.) engine with the help of a neat sketch. Also, explain the purpose of the spark plug in initiating combustion in an S.I. engine. | [5] | 1 | 3 |
| Q.2 A gas engine operating on the ideal Otto cycle has a compression ratio of 6:1. The pressure and temperature at the commencement of compression are 1 bar and 27 °C. Heat added during the constant volume combustion process is 1170 kJ/kg. Determine the peak pressure and temperature, work output per kg of air and air-standard efficiency. Assume $C_v = 0.717$ kJ/kg K and $\gamma = 1.4$ for air. | [5] | 1 | 4 |
| Q.3 Explain the Fuel-Air cycle used in internal combustion engine analysis. Discuss how it differs from the Air-Standard cycle. | [5] | 2 | 2 |
| Q.4 Compare the knocking in S.I. engines with detonation in C.I. engines. | [5] | 2 | 3 |
| Q.5 With the support of pressure - crank angle diagram, explain the various stages of combustion in S.I. engines | [5] | 2 | 4 |

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