

Total No. of Printed Pages:2

**SUBJECT CODE NO: H-156**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**F. E. (All)**  
**Basic Mechanical Engineering**  
**(REVISED)**

[Time: Three Hours]

[Max.Marks: 80]

Please check whether you have got the right question paper.

- N.B
- i) Q. No. 1 and Q. No.6 are compulsory
  - ii) Attempt any two questions from the remaining questions in each section 'A' and 'B'
  - iii) Assume suitable data if necessary and mentioned it clearly
  - iv) Figure to right indicate full marks
  - v) Use of non-programmable calculator is allowed

**Section A**

- Q.1 Solve any five 10
- a) Define Boyle's law and Charles's law of an ideal gas
  - b) Define thermodynamic equilibrium and write any one example of it.
  - c) Show constant volume process of PV and TS diagram
  - d) Differentiate between point and path function
  - e) Write any four applications of refrigeration system
  - f) Write the classification of an automobile system
  - g) State the sign conventions for heat and work
  - h) State Joule's law of thermodynamics and write any one example of it.
- Q.2 07
- a) Differentiate between heat and work
  - b) State law of conservation of energy. Explain Joule's experiment with neat diagram 08
- Q.3 08
- a) Derive equation of state for an ideal gas
  - b) A mass of 0.8 kg of air at 1 bar and 25°C is contained in a gas tight frictionless piston-cylinder device. The air is now compressed to final pressure of 5 bar. During the process, heat is transferred from the air such that the temperature inside the cylinder remains constant. Calculate the heat transfer and work done during the process and direction of each in the process. 07
- Q.4 08
- a) Explain with neat diagram the construction and working principle of four stroke SI engine.
  - b) Define refrigeration system. Explain with neat diagram the working principle of household refrigerator. 07
- Q.5 08
- a) Write short note on different modes of heat transfer with suitable example
  - b) Write the applications of compressed air 07

## Section B

- Q.6 Solve any five 10
- State the various power transmitting elements
  - Define forging operation
  - Enlist any four applications of cast iron material
  - State the working principle of Drilling machine
  - Define Arbor in milling machine
  - How shaft is differ from Axle
  - Define addendum and dedendum of gear
  - Define clutch and write any two applications of it.
- Q.7
- Explain the construction and working of multi-plate clutch with neat diagram. 07
  - In assembly of spur gear having velocity ratio 0.2, the centre distance between gears is 500 mm and module is 5mm. find 08
    - No. of teeth on pinion
    - No. of teeth on gear
    - Pitch circle diameter of pinion
    - Pitch circle diameter of gear
- Q.8
- Explain in detail selection criteria of engineering materials 07
  - Write detail classification of forging process and explain with neat sketch drop forging operation 08
- Q.9
- Draw the block diagram of centre Lathe machine and explain its principle parts. 08
  - Explain with neat sketch the working of Radial Drilling machine 07
- Q.10
- Write short note on annealing and normalizing heat treatments. 07
  - List the operations performed on grinding machine and explain the same with neat sketch. 08