

**Dr. Babasaheb Ambedkar Technological University, Lonere**  
**End Semester Examination**  
I Sem B. Tech.

**Sub: Basic Mechanical Engineering**

**06 MAY 2017**

**Max Marks: 60**

**Max Time: 3 hour**

- INSTRUCTIONS:**
- 1) Attempt any **FIVE** questions.
  - 2) Necessary data are given in the respective questions. If such data is not given, it means that the knowledge of that data is a part of the examination.
  - 3) Make suitable assumptions if **necessary** and state them **clearly** giving reasons.
  - 4) Use of necessary charts and tables are permitted.

**Q. 1(a)** Write name of the specialization of Mechanical Engineering of the following applications/activities they belong **(1/2X8)**

Sr. No	Example/ Activity	Specialization
1	Cooling of an Engine	
2	Propeller shaft material selection	
3	Insulation selection of a refrigerator	
4	Fixing of the Tie rod dimensions	
5	Thread generation on the bolt	
6	Working of a heat pump	
7	Selection of fastener for a car	
8	Temperature measurement by a thermocouple	

**(b) Attempt Any TWO**

- (i) State the First law of Thermodynamics for a closed system undergoing the cycle and change of state. **(4)**
- (ii) A domestic food freezer maintains a temperature of  $-15^{\circ}\text{C}$ . The ambient air temperature is  $30^{\circ}\text{C}$ . If heat leaks into freezer at the continuous rate of  $2 \text{ kJ/s}$  what is the least power necessary to pump this heat out continuously. **(4)**
- (ii) A heat pump is used to heat a room and maintain temperature as  $25^{\circ}\text{C}$  while the ambient temperature is  $-5^{\circ}\text{C}$ . Calculate the maximum possible heat supplied by the said heat pump per kW of power input. **(4)**

**Q. 2(a)** Classify the IC engine with respect to Cycle of operation, cylinder arrangement, type of ignition, type of fuel used, type of cooling, and compression ratio. **(6)**



- (b) The cubic capacity of a four stroke engine is 240 cubic centimetre. The stroke to bore ratio is 1.5. The clearance volume is 30 cubic centimetre. Calculate the bore, stroke, and compression ratio of the engine. (6)

**Q. 3** Attempt Any **TWO**.

- (a) Draw the neat labelled diagram of a Gas power plant and briefly explain its working. (6)
- (b) Draw the neat labelled diagram of a Nuclear reactor and briefly explain its parts. (6)
- (c) Draw the neat labelled diagram of a Leaf spring suspension system and write the functions of the suspension system in a vehicle. (6)

**Q. 4** (a) Define the following terms with suitable examples. Mechanisms, Constrained motion, lower pair, higher pair, links, and degree of freedom. (6)

- (b) Define the factor safety and enlist all the factors with one line justification for each to decide the factor of safety. (6)

**Q. 5** (a) Write the salient features of the power transmission devices and enlist the advantages of V belt over flat belt power transmission device. (6)

- (b) Draw the neat labelled diagram of a portable drill machine and enlist all its essential features with justifications. (6)

**Q. 6** (a) Classify the different type of the materials used in engineering applications and write two applications and two characteristics of each. (6)

- (b) Draw the neat labelled diagrams of a Lathe machine and enlist all its necessary specifications. (6)

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