

Reg. No. \_\_\_\_\_ Name: \_\_\_\_\_

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
**FIRST SEMESTER B.TECH DEGREE EXAMINATION, JANUARY 2017****Course Code: BE101-02****Course Name: INTRODUCTION TO MECHANICAL ENGINEERING SCIENCES**

Max. Marks: 100

Duration: 3 Hours

**PART A***Answer any two questions completely*

1. a. What are the limitations of the first law of thermodynamics? How are these limitations addressed by the second law of thermodynamics? (4)
- b. An inventor is claiming to have developed an engine that produces 110 kW of power by absorbing heat at the rate of 200 kJ/s. Is this claim valid if the engine operates between 500 °C and 100 °C? (4)
- c. Differentiate between renewable and non-renewable sources of power with examples for each. (4)
- d. Explain the working principle of chemical rockets. (3)
2. a. What is a Carnot engine? What is its significance? Why is it not practical? (6)
- b. State any one application each of zeroth law, first law and second law of thermodynamics. (3)
- c. Give any 3 applications of IC engines. (3)
- d. Mention three significant events in Indian space programme. (3)
3. a. What is meant by available energy and irreversibility? (4)
- b. List three historically significant events in the development of steam engines. (3)
- c. With the aid of a diagram, explain the working of a two stroke petrol engine. (5)
- d. List any 2 types of air compressors and their applications. (3)

**PART B***Answer any two questions completely*

4. a. Explain the different types of refrigerated storage. (3)
- b. Differentiate between refrigeration and air-conditioning. (3)
- c. What are the applications of refrigeration in chemical and process industries? (5)
- d. Explain the function of cooling system and ignition system in an automobile. (4)
5. a. List two important events in the history of refrigeration. (2)
- b. Define (i) Dew point temperature (ii) Specific Humidity and (iii) Relative humidity (3)

- c. Mention any 3 types of classification of automobiles with examples for each type. (6)
- d. Define drag and lift and explain their significance for a body in flight. (4)
6. a. What are the factors affecting human comfort in an air-conditioned space? (4)
- b. List any three car manufacturers in India and the cars they produce. (3)
- c. Name the main components in the power train of an automobile and give their functions. (5)
- d. Name three types of jet engines and their applications. (3)

**PART C**

*Answer any two questions completely*

7. a. What is meant by an alloy? What is the purpose of alloying? (2)
- b. Explain BCC and FCC structures with the help of the figure of a unit cell. (6)
- c. Name five material property tests for engineering materials with their purpose. (5)
- d. List any four advantages and three disadvantages of CNC machines. (7)
8. a. List two main characteristics of composites and ceramics and give examples for each. (6)
- b. Define (i) Toughness (ii) Hardness (iii) Ductility and (iv) Malleability. (4)
- c. Classify manufacturing process for materials with examples for each class. (8)
- d. Identify a possible manufacturing process for the following products:  
(i) Plastic bottle (ii) Rubber hose (iii) Turbine blades (iv) Steel rod. (2)
9. a. How are engineering materials classified? Give examples. (5)
- b. Name and define 5 operations that can be performed on a lathe. (5)
- c. Explain and classify ( i) Forging (ii) Rolling. (6)
- d. Name two products that can be produced by each of the following processes:  
(i) Welding (ii) Soldering (iii) Extrusion (iv) Casting. (4)