D   **B1D007**   **Total Pages:2**

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 ºC and 100 ºC?   (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)