

Reg. No. \_\_\_\_\_

Name: \_\_\_\_\_

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
**FIRST SEMESTER B.TECH DEGREE EXAMINATION, JULY 2017**

Course Code: **BE101-02**Course Name: **INTRODUCTION TO MECHANICAL ENGINEERING SCIENCES.**

Max. Marks: 100

Duration: 3 Hours

**PART A***Answer any two full questions.*

1. a) State the difference between extensive, intensive & specific properties. Quote examples. (6)  
b) What is the essence of first law of thermodynamics? Write down expressions for first law applied to a (i) a process (ii) a cycle. What are limitations of first law? (6)  
c) What is meant by available energy? (3)
2. a) Explain carnot cycle. (3)  
b) A Carnot engine receives 800kJ of heat per cycle from a high temperature reservoir at  $400^{\circ}\text{C}$  and rejects heat at  $20^{\circ}\text{C}$ . Find the theoretical efficiency of the cycle and amount of heat rejected to low temperature heat reservoir. (6)  
c) Narrate the history of development of steam engine, steam turbine & hydraulic turbines. (6)
3. a) Sketch and explain the working principle of Francis Turbine. (5)  
b) Explain the working of a four stroke SI engine. (5)  
c) What are the applications of air compressors? Explain the working principle of centrifugal air compressor. (5)

**PART B***Answer any two full questions.*

4. a) Draw the schematic diagram of a vapour compression refrigeration system and show the process in T-S diagram. (5)  
b) Compare the advantages and disadvantages of food preservation using refrigeration and freezing. (5)  
c) Draw the block diagram and explain the working of a window AC unit. (5)
5. a) Sketch and explain the working of a Fuel pump. (6)  
b) What are the different types of scavenging system in automobiles? (6)  
c) Explain Winter and Summer air conditioning. (3)
6. a) Define Lift, Drag and Thrust in aerodynamics. (5)  
b) Draw a block diagram representing the power line from engine to wheel of an automobile (Rear wheel drive) and name the components. (5)

- c) What are the types of gas turbine engines used in air craft and write their basic differences. (5)

**PART C**

*Answer any two full questions.*

7. a) How engineering materials are classified? Give two examples for each group. (5)  
b) Define Crystal Lattice, Unit cell and Packing factor. (5)  
c) What is a composite? List four engineered composites and give their applications. (5)  
d) Draw a typical stress strain curve for mild steel and mark the salient points. (5)
8. a) What are the main mechanical and magnetic properties of materials? (5)  
b) List any four Destructive material testing methods and explain. (5)  
c) Distinguish between soldering, brazing & welding. (5)  
d) What are the different types of flames in Oxy Acetylene gas welding process? Explain. (5)
9. a) With a neat sketch, explain forging operations. Give two specific advantages of forging over casting method. (7)  
b) Draw the block diagram of a lathe and explain the various lathe operations. (6)  
c) List the advantages of CNC machining over conventional machining operations. (4)  
d) Give one example each for a part manufactured by casting, rolling, extrusion and forging. (3)

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