

**Model Question Paper**  
**First Semester B.E. Degree (CBCS) Examination**  
**Elements of Mechanical Engineering**

Time: 3 hrs.

Max. Marks: 100

**Note: 1. Answer any FIVE full questions, choosing one full question from each module.**  
**2. Use of Thermodynamic data hand book permitted.**

**MODULE – I**

- 1 a Enumerate the method of extracting energy from wind with a neat sketch (08Marks)  
 b Illustrate the formation of steam with relevant sketches. (08Marks)  
 c What are the different states of steam? Explain them in brief. (04 Marks)

**OR**

- 2 a Explain Zeroth law of thermodynamics. List the similarities and dissimilarities between work and heat. (10 Marks)  
 b A stationary mass of gas is compressed without friction from an initial stage of  $0.3 \text{ m}^3$  and  $0.105 \text{ MPa}$  to a final state of  $0.15 \text{ m}^3$ , the pressure remaining constant. There is a transfer of  $37.6 \text{ kJ}$  of heat from the gas during the process. How much does the internal energy of the gas change? (10Marks)

**MODULE – II**

- 3 a With a neat sketch, explain the working of Lancashire boiler. (10 Marks)  
 b Explain the different boiler mountings and accessories. (10 Marks)

**OR**

- 4 a Classify Hydraulic turbines and with a neat sketch explain the working of a typical impulse turbine. (10 Marks)  
 b Describe the working of a reciprocating pump. (10 Marks)

**MODULE – III**

- 5 a With the help of P-V diagram, explain the operation of 4-Stroke Diesel engine (10 Marks)  
 b The following observations were recorded during a test on single cylinder diesel engine: Brake Power=  $75 \text{ kW}$ , Brake thermal efficiency=  $35\%$ , Mechanical efficiency=  $90\%$ , calorific value =  $40000 \text{ kJ/kg}$ . Determine i) IP ii) FP iii) fuel consumed per hour. (10 Marks)

**OR**

- 6 a Explain the ideal properties of refrigerant. (06 Marks)  
 b With the help of a sketch, explain the functioning of Vapor Absorption System. (10 Marks)  
 c List the most commonly used refrigerants. (04 Marks)

**MODULE – IV**

- 7 a Classify and explain various types of smart materials (10 Marks)  
 b With a neat sketch explain TIG welding. (10 Marks)

**OR**

- 8 a Derive an expression for length of belt in cross belt drive. (10 Marks)  
 b What are the advantages and disadvantages of gear drives over belt drives? (10Marks)

**MODULE – V**

- 9**    **a**    What are the various methods of producing taper turning method? Explain taper turning by swiveling the compound method. **(10Marks)**
- b**    Explain the following machining operations on milling machine with suitable sketches **(10 Marks)**  
          (i) Plane milling (ii) End milling (iii) Slot milling (iv) Form milling
- OR**
- 10**    **a**    Explain the components of a CNC with a block diagram **(10Marks)**
- b**    Elaborate the various robot configurations with simple sketches **(10 Marks)**