

# C. U. SHAH UNIVERSITY

## Winter Examination-2019

**Subject Name: Elements of Mechanical Engineering**

**Subject Code: 4TE01EME1**

**Branch: B.Tech (All)**

**Semester : 1**

**Date : 21/11/2019**

**Time : 02:30 To 05:30**

**Marks : 70**

Instructions:

- (1) Use of Programmable calculator & any other electronic instrument is prohibited.
- (2) Instructions written on main answer book are strictly to be obeyed.
- (3) Draw neat diagrams and figures (if necessary) at right places.
- (4) Assume suitable data if needed.

- Q-1 Attempt the following questions: (14)**
- (a)** State Zeroth law of thermodynamics? **01**
  - (b)** Why gas have two specific heats? **01**
  - (c)** What do you mean by isothermal process? **01**
  - (d)** What is the limitation of throttling calorimeter? **01**
  - (e)** What is the function of desuperheater? **01**
  - (f)** Write the chief advantage of water tube boilers over fire tube boilers. **01**
  - (g)** Why cooling of air during compression is essential? **01**
  - (h)** List out four uses of compressed air in different fields. **01**
  - (i)** What is the function of a carburetor in I.C. engine? **01**
  - (j)** What is the function of an injector? **01**
  - (k)** What is the unit of refrigeration? **01**
  - (l)** Which type of brake is mostly used in automobiles and why? **01**
  - (m)** What is clutch? Where it is installed? **01**
  - (n)** What is the function of a governor? **01**

**Attempt any four questions from Q-2 to Q-8**

- Q-2 Attempt all questions (14)**
- a)** Define prime movers. Classify the prime movers. **04**
  - b)** Prove that relation between  $C_p$  and  $C_v$  is  $C_p - C_v = R$  **04**
  - c)** With neat sketch explain construction and working of pressure gauge. **06**
- Q-3 Attempt all questions (14)**
- a)** A sample of wet steam at a pressure of 25 bar absolute has dryness fraction 0.80. Determine its enthalpy and internal energy. **07**
  - b)** With neat sketch explain working of combine separating and throttling calorimeter. **07**
- Q-4 Attempt all questions (14)**
- a)** For an air standard Otto cycle maximum and minimum temperature are  $1350^\circ$  and  $30^\circ$ . **07**



Heat supplied is 750 kJ/kg of air. Calculate compression ratio, air standard efficiency, workdone/kg of air, ratio of maximum to minimum pressure.

- b) Discuss briefly Diesel cycle with the help of P-V diagram and derive an expression for the ideal efficiency of diesel cycle. **07**

**Q-5 Attempt all questions (14)**

- a) What is the difference between governor and flywheel? **02**  
b) Write advantage of chain drive over belt drive. Draw neat sketches of simple and compound gear train. **05**  
c) Give the classification of Governing system. Explain with neat sketch Hartnell governor. **07**

**Q-6 Attempt all questions (14)**

- a) Explain with neat sketch the working of Babcock and Wilcox boiler. **07**  
b) A six-cylinder 4 stroke I.C. engines to develop 90 kW (Indicated Power) at 800 rpm. **07**  
The stroke to bore ratio is 1.5. Assume  $\eta_{\text{mech}} = 0.85$ . Brake mean effective pressure is 5 bar. Calculate bore and stroke of an engine.

**Q-7 Attempt all questions (14)**

- a) Write in short about the construction and working of a double acting piston type reciprocating pump. **07**  
b) Differentiate between four stroke and two stroke I.C. Engine. **04**  
c) Explain the following term: **03**  
(i) Manometric head  
(ii) Slip  
(iii) Free Air Delivery

**Q-8 Attempt all questions (14)**

- a) Draw a neat diagram of an I.C. Engine and explain the functions of different parts. **07**  
b) Discuss in brief about classification of Air compressor. **07**

