

Enrollment No: \_\_\_\_\_

Exam Seat No: \_\_\_\_\_

# C. U. SHAH UNIVERSITY

## Winter Examination-2022

**Subject Name: Elements of Mechanical Engineering**

**Subject Code: 4TE01EME1**

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

**Semester: 1**

**Date: 11/01/2023**

**Time: 11:00 To 02:00**

**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) Work is considered positive when
  - (a) Work is done on the system
  - (b) work is done by the system
  - (c) both (a) and (b)
  - (d) none of the above
- b) Specific heat is defined as the amount required
  - (a) To raise unit degree of temperature of a substance
  - (b) To raise unit mass of a substance through unit degree of temperature
  - (c) To raise unit mass of a substance through 10 deg C
  - (d) None of the above.
- c) Constant Volume Process is also known as
  - (a) Isentropic Process
  - (b) Isobaric Process
  - (c) Isothermal Process
  - (d) Isochoric Process
- d) Dryness fraction of wet steam is \_\_\_\_\_
  - (a) greater than 1
  - (b) =1
  - (c) less than 1
  - (d) 0
- e) The process of Carnot cycle are
  - (a) Two isothermal and two constant volume
  - (b) Two constant pressure and two constant volume
  - (c) Two isothermal and two isentropic
  - (d) Two isothermal and two adiabatic
- f) Which one of the following is vertical boiler?
  - (a) Lancashire
  - (b) Cochran
  - (c) Cornish
  - (d) Locomotive
- g) Two stroke Diesel cycle is completed in \_\_\_\_\_ revolution of crank shaft.
  - (a) One
  - (b) Two
  - (c) Three
  - (d) Four
- h) Carburetor is used to supply
  - (a) Diesel and Air Mixture
  - (b) Petrol and Air mixture
  - (c) Diesel only
  - (d) Petrol only
- i) Hit and miss governing is considered as
  - (a) Quantity governing
  - (b) Quality governing
  - (c) mixed type- quantity as well as quality governing
  - (d) none of these
- j) A operation of filling passage ways with liquid from outside source before starting pumps is known as
  - (a) Cavitation
  - (b) Cleaning
  - (c) Priming
  - (d) Chocking
- k) The work done on compressor is least when the compression is



- (a) Isothermal (b) Adiabatic (c) Polytropic (d) None of the above
- l) During refrigeration cycle, heat is absorbed by refrigerant in  
(a) Compressor (b) Evaporator (c) Condenser (d) Expansion Valve
- m) Which of the following elements is used to connect two shafts\_\_\_\_  
(a) clutch (b) brakes (c) Couplings (d) none of above
- n) When driving and driven shafts are at comparatively larger distance apart, the type of drive suitable is :  
(a) Gear drive (b) Belt drive (c) friction drive (d) chain drive

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

- Q-2 Attempt all questions (14)**  
 (a) How prime movers are classified? Explain different sources of energy used by them. (07)  
 (b) Derive characteristics equation of a perfect gas with the help of Boyle's law and Charle's law. (07)
- Q-3 Attempt all questions (14)**  
 (a) What do you mean by Dryness fraction? Describe Combined Calorimeter with a neat sketch. (07)  
 (b) Derive the equation of thermal efficiency of Carnot Cycle. Why it cannot be used in practice? Discuss. (07)
- Q-4 Attempt all questions (14)**  
 (a) Explain with a neat sketch the Babcock and Wilcox water tube boiler. (07)  
 (b) With neat sketch explain working of four stroke petrol engine. (07)
- Q-5 Attempt all questions (14)**  
 (a) State the function of (i) Fusible Plug (ii) Economiser (iii) Safety valves (iv) Water level indicator (v) Superheater (vi) Pressure gauge (vii) Air pre-heater. (07)  
 (b) During a test on a single cylinder four stroke engine having compression ratio of 6, following data is recorded. Bore =10cm, Stroke=12.5 cm, imep =2.6 bar, dead load on dynamometer =60N, spring balance reading =19 N, Effective radius of flywheel =40cm, fuel consumption =1Kg/hr. Calorific value of fuel is 42,000 KJ/ Kg, speed =2000 r.p.m. Determine its indicated power, brake power, mechanical, overall efficiency, air standard and relative efficiency. (07)
- Q-6 Attempt all questions (14)**  
 (a) What is governor? What are the various types of governors? Explain briefly Watt governor with a neat sketch. (07)  
 (b) State the different types of centrifugal pumps. Describe diffuser type of centrifugal pump. (07)
- Q-7 Attempt all questions (14)**  
 (a) Derive an equation for work done in case of single stage single acting reciprocating air compressor neglecting clearance. (07)  
 (b) Explain Vapor Compression Refrigeration system with neat sketch. (07)
- Q-8 Attempt all questions (14)**  
 (a) What are the different types of couplings? Explain the centrifugal clutch. (07)  
 (b) What is belt drive? Describe briefly types of belt drives. (07)

