Enrollment No: _____ Exam Seat No:_____

C.U.SHAH UNIVERSITY

Summer Examination-2018

Subject Name: Elements of Mechanical Engineering

Subject Code: 4TE01EME1 Branch: B.Tech (All)

Semester: 1 Date: 27/3/2018 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) Temperature measurement by mercury in glass thermometer is based on
(a) Zeroth law (b) First law (c) Both a and b (d) None of these

b) In the engine, working on diesel cycle, the heat is supplied at (a) Constant temperature (b) Constant volume (c) Constant pressure (d) Constant heat

c) Cp - Cv is equal to
(a) 0 (b) R (c) n (d) Rv (e) γ

d) Babcock & Wilcox boiler is a type of ……boiler.
(a) Fire tube (b) Low pressure water tube (c) High pressure water tube (d) Vertical tube

e) Throttling is a……..Process
(a) Isothermal (b) Constant volume (c) Constant pressure (d) Isenthalpic

f) The compression ratio is defined as the ratio of
(a) clearance volume to cylinder volume (b) swept volume to clearance volume
(c) clearance volume to swept volume (d) cylinder volume to clearance volume

g) The efficiency of carnot cycle is
(a) 1-T1/T2 (b) 1- T2/T1 (c) 1+T1/T2 (d) 1+ T2/T1

h) The type of brake widely used in automobiles is
(a) Cone brake (b) Block brake (c) Internal expanding shoe brake (d) Simple band brake

i) 1 TR equals to
(a) 5.25 KW (b) 100 kJ/min (c) 200 kJ/min (d) 3.52 kW

j) Wetness fraction of steam is equal to (a) x-1 (b) x (c) 1-x (d) 1

k) Heat is rejected by a refrigerant during a refrigeration cycle in a
(a) Evaporator (b) Compressor (c) Throttle Valve (d) Condenser

l) Which one of the following is a Dead weight type governor
(a) Porter governor (b) Hartnell governor (c) Wilson-Hartnell governor (d) Watt governor

m) For same compression ratio, the thermal efficiency of otto cycle is…….diesel cycle.
(a) Less than (b) Greater than (c) Equal to (d) Less than or equal to

n) Compressor & Turbine is an example of
(a) Open system (b) Closed system (c) Isolated system (d) None of these

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

Q-2 **Attempt all questions**

a) State Zeroth law of thermodynamics and Second law of thermodynamics & write the limitations of First law of thermodynamics. **(07)**

b) Derive PV^{γ}=constant, where γ=Cp/Cv **(07)**

Q-3 **Attempt all questions**

a) Differentiate among wet, dry, saturated, superheated steam and define dryness fraction of steam. **(07)**

b) Explain any one type of calorimeter with neat sketch and also write its working and calculation of dryness fraction. **(07)**

Q-4 **Attempt all questions**

a) Discuss briefly Otto cycle with the help of P-V diagram and derive an expression for the ideal efficiency of Otto cycle. **(07)**

b) An engine operating on standard Diesel cycle has maximum pressure and temperature of 39 bar and 1100^0 C. Pressure and temperature at the beginning of compression are 1 bar and 20^0 C. Calculate air standard efficiency of the cycle. **(07)**

Q-5 **Attempt all questions**

a) Compare between mountings and accessories. Enlist all types of mountings and accessories. **(07)**

b) Differentiate between Petrol engine and Diesel engine with suitable examples. **(07)**

Q-6 **Attempt all questions**

a) Define the following with formula: **(07)**
(i) Indicated power (ii) Brake power (iii) Friction power (iv) Mechanical efficiency (v) Thermal efficiency (vi) Brake thermal efficiency (vii) Relative efficiency.

b) A four cylinder four stroke petrol engine develops 200 kW BP at 2500 rpm, The stroke to bore ratio is 1.2. If mean effective pressure is 10 bar and η_m= 81 % calculate bore and stroke of engine. Also calculate indicated thermal efficiency and brake thermal efficiency if 65 kg/hr of petrol is consumed CV= 42000 kJ/kg. **(07)**

Q-7 **Attempt all questions**

a) Classify various types of brakes, explain any one with neat sketch and also write its functions. **(07)**

b) What is the function of a compressor? Explain with neat sketch, working of centrifugal compressor. **(07)**

Q-8 **Attempt all questions**

a) Define refrigeration and types of refrigerant and explain with a neat sketch, describe the working of vapour compression refrigeration. **(07)**

b) Discuss various types of belt drives with neat sketch. **(07)**