Enrollment No: _____ Exam Seat No:_____

C.U.SHAH UNIVERSITY

Summer Examination-2016

Subject Name : Elements of Mechanical Engineering

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

Semester : 1 Date : 27/04/2016 Time : 10:30 To 01:30 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) The component of the engine that regulates the variation of speed due to change in load is known as
(a) Flywheel (b) Governor (c) Fuel pump (d) Fuel injector

b) The Porter governor is classified as
(a) Centrifugal Governor (b) Dead weight Governor
(c) both a & b (d) spring controlled governor.

c) Two stroke Diesel cycle is completed in _____ revolution of crank shaft
a) One b) Two c) Three d) Four

d) $PV^n=C$ represents Constant Temperature Process, when the value of n is
a) n b) 0 c) γ d) 1

e) Priming is necessary in
a) Centrifugal pump b) Vapour Compression refrigeration system
c) 4-Stroke Diesel Engine d) Babcock Wilcox boiler

f) Carburetor is used to supply
a) Diesel and Air Mixture b) Petrol and Air mixture
c) Diesel only d) Petrol only

g) One ton of refrigeration is equal to the refrigeration effect corresponding to melting of 1000 kg of ice
(a) in 1 hour (b) in 1 minute (c) in 24 hours (d) in 12 hours

h) In S.I. unit, one ton of refrigeration is equal to
(a) 210 kJ/min (b) 21 kJ/min (c) 420 kJ/min (d) 840 kJ/min

i) Equivalent evaporation is the amount of water evaporated in a boiler from and at
(a) 0°C (b) 100°C
(c) saturation temperature at given pressure (d) room temperature

j) Cochran boiler is a
(a) horizontal fire-tube boiler (b) horizontal water-tube boiler
(c) veritcal water-tube boiler (d) vertical fire tube boiler

k) The unit of temperature in S.I. units is
(a) Centigrade (b) Celsius (c) Fahrenheit (d) Kelvin

l) Which law states that the internal energy of a gas is a function of temperature
(a) Charles' law (b) Joule's law (c) Regnault's law (d) Boyle's law

m) An open system is one in which
(a) Mass does not cross boundaries of the system, though energy may do so
(b) Neither mass nor energy crosses the boundaries of the system
(c) Both energy and mass cross the boundaries of the system
(d) Mass crosses the boundary but not the energy

n) The type of break commonly used on railway train wheels is _____
(a) External block brake (b) Band break
(c) Internal expanding shoe brake (d) Disc brake

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

Q-2 **Attempt all questions**

a) Explain Thermodynamic system classification with figure. **(05)**

b) How prime movers are classified? Explain different sources of energy used by them. **(05)**

c) Define & Explain: Internal Energy, Enthalpy & Entropy. **(04)**

Q-3 **Attempt all questions**

a) Prove that relation between C_P and C_V is $C_P - C_V = R$ **(07)**

b) One kg of an ideal gas is heated from 18^o C to 98^o C. Assuming R = 0.27 KJ/kgK and $\gamma = 1.18$ for gas, Calculate: (i) Specific heats (Cp and Cv) (ii) Change in Internal Energy (iii) Change in enthalpy. **(07)**

Q-4 **Attempt all questions**

a) Explain very briefly the function of following mountings : **(06)**
(i) Steam stop valve (ii) Feed check valve (iii) Blow-off cock (iv) Water level indicator (v) Pressure gauge (vi) Safety valve.

b) Drawing a neat and clean diagram of babcock and wilcox boiler explain its construction and working. **(08)**

Q-5 **Attempt all questions**

a) Explain with a sketch the working of a four stroke Petrol engine. **(07)**

b) The following observation were recorded during the trial run of single cylinder, Two-stroke oil engine, Engine torque = 650 N.m, Speed = 400 rpm, Cylinder diameter = 20 cm, Stroke length = 30 cm, Oil consumption = 8.5 kg/hr, Mean effective pressure = 5.5 bar, Calorific Value = 42500 KJ/Kg **(07)**
Calculate : (1) Mechanical efficiency (2) Indicated thermal efficiency (3) Brake thermal efficiency (4) Specific fuel consumption

Q-6 **Attempt all questions**

a) Name different methods of governing. How they differ from one another? **(07)**

b) Write the difference between clutch and coupling. **(07)**

Q-7 **Attempt all questions**

a) Explain working of single acting reciprocating pump with air vessels. **(04)**

b) List the desirable properties of good refrigerant. **(04)**

c) State the application, advantages and disadvantages of (i) belt drive (ii) chain drive (iii) gear drive **(06)**

Q-8 **Attempt all questions**

a) Derive an expression for compressor without clearance $W = P * V * \log e^{(P2/P1)}$ for isothermal compression. **(07)**

b) Derive equation of efficiency of the Carnot engine working between the temperature units T_1 and T_2. **(07)**