Enrollment No: _____ Exam Seat No:_____

C.U.SHAH UNIVERSITY

Winter Examination-2018

Subject Name: Elements of Mechanical Engineering
Subject Code: 4TE01EME1 Branch: B.Tech (All)
Semester: 1 Date: 03/12/2018 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)**

1 The substance which is homogeneous and invariable in chemical composition throughout its mass is called as ____. **01**
A)ideal substance B)pure substance C)solid substance D)none of the above

2 In a IC engine from which of the following source energy is converted into mechanical energy **01**
A)Chemical Energy of fuel B)potential energy C) kinetic energy D)all of the above

3 Homogeneous system consists **01**
A) any one phase among solid, liquid and gas B)only solid phase not liquid and gas C)all three phases at particular temperature D) none of the above

4 In the Polytropic Process $PV^n = C$, if $n = \infty$, the process is called **01**
A) Isochoric B) Isobaric C) Isothermal D) Adiabatic

5 Heat transfer is **01**
A) a point function B) a path function C) a transfer function D) none of the above

6 The amount of heat transferred to convert unit mass of solid to vapour or vice versa is called as **01**
A) latent heat of vaporization B) latent heat of fusion C) latent heat of sublimation D) specific heat

7 The sum of partial volumes of all gases in a mixture is equal to **01**
A) less than the total volume of the mixture B) the total volume of the mixture C) more than the total volume of the mixture D) cannot predict

8 Refrigerator is used **01**
A) to transform low grade rejected heat into high temperature heat source B) to transform high grade rejected heat into low temperature heat sink C) both a. and b. D) none of the above

9 The Process of Carnot cycle are **01**

	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

10 Which one of the following is not a friction clutch? **01**

A) Disc clutch	B) Cone clutch	C) Centrifugal clutch	D) Jaw clutch

11 Normally which type of brake is used for automobile? **01**

A) Internal expanding shoe brake	B) external shoe brake	C) block brake	D) band brake

12 Which one of the following gear has self-locking features? **01**

A) Bevel gear	B) Spur gear	C) Helical gear	D) Worm gear

13 Roots blower is a _____ Compressor. **01**

A)positive displacement reciprocating	B)radial flow dynamic	C)axial flow dynamic	D)positive displacement rotary

14 The process of filling liquid, which is to be pumped up to delivery valve, is called. **01**

A) Idling	B) Pre-starting	C) Priming	D) Charging

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

Q-2 **Attempt all questions** **(14)**

a) Explain Separating Calorimeter with neat sketch. **04**

b) A sample of wet steam at a pressure of 25 bar absolute has dryness fraction 0.80. Determine its enthalpy and internal energy. **04**

c) Define the following with formula: **06**

(i) Compression Ratio
(ii) Dryness Fraction
(iii) Coefficient of Performance
(iv) Slip
(v) Free Air Delivery
(vi) Adiabatic Process

Q-3 **Attempt all questions** **(14)**

a) 1 kg of air at 7 bar pressure and 90˚ C temperature undergoes a non-flow polytropic process. The low of expansion is $pV^{1.1}$ = constant. The pressure falls to 1.4 bar during the process. Calculate : (1) Final temperature (2) Work done (3) Change in internal energy (4) Heat exchange **07**

Take R = 287 J/kg K and $\gamma = 1.4$ for air.

b) What is difference between water tube and fire tube boiler? Explain with neat sketch any one water tube boiler. **07**

Q-4 **Attempt all questions** **(14)**

a) Derive equation for efficiency of Carnot cycle. Also state limitation of it. **07**

b) List various mountings and accessories and describe Dead weight safety valve. **07**

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

a) Give comparison between a flywheel and a governor. **04**

b) Explain with sketch watt governor. **04**

	c)	Differentiate between Petrol engine and Diesel engine with suitable examples.	**06**
Q-6		**Attempt all questions**	**(14)**
	a)	Derive an expression for compressor without clearance W = P V loge (P2/P1) for isothermal compression.	**07**
	b)	A six cylinder 4 stroke I.C. Engines to develop 90 kW (IP) at 800 rpm. The stroke to bore ratio is 1.5. Assume $Ø_{mech}$ = 0.85. Brake mean effective pressure is 5 bar. Calculate bore and stroke of an engine.	**04**
	c)	Classify the pumps based on their principle of working, construction and fluid flow direction in pump.	**03**
Q-7		**Attempt all questions**	**(14)**
	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 clutch in an automobile vehicle? What are various types of clutches?	**04**
	c)	Which coupling can be used to couple two shafts whose axis intersects? Give names of different parts of this coupling.	**03**
Q-8		**Attempt all questions**	**(14)**
	a)	Describe any three types of gears with neat sketch.	**06**
	b)	Discuss various types of belt drives with neat sketch.	**06**
	c)	Explain different parts of a pulley with neat sketch.	**02**