PARUL UNIVERSITY
FACULTY OF AGRICULTURE
B.Tech (FOA) winter 2019-20 Examination

Semester: 1   Date: 18/12/2019
Subject Code: 20103107   Time: 10:30am to 12:30pm
Subject Name: Elements of Mechanical engineering   Total Marks: 50

Instruction
1. All questions are Compulsory.
2. Figures to the right indicate full marks
3. Make Suitable assumptions wherever necessary
4. Start new question on new pages

Q.1

A) **Fill in the Blanks(each of 0.5 Mark)**   **(05)**
- i. The SI unit of Work…………?   (Newton, Joule, kilogram)
- ii. R is known as………   (Characteristics gas constant, pressure constant, volume constant)
- iii. The expression (W) cycle= (Q) cycle applies only to systems undergoing cycles..
(true , false)
- iv. The Volume of gas is ……………..with increase in temperature
(increases, decreases, constant)
- v. When a gas is cooled or compressed it becomes a………..   (solid, gas, liquid)
- vi. The dryness (x) fraction of superheated steam is taken as……….   (0, 0.8, 1)
- vii. …………..is known as vapour form of water   (Gas, steam ,Air)
- viii. Throttling Calorimeter gives……….value of dryness fraction
(approximate ,accurate, one)
- ix. The velocity ratio of the belt drive.....due to slip.   (decreases, increases, Constant)
- x. Wood is a ………….fuel.   (solid ,liquid ,gas)

B) **Multiple Choice questions(Each of 0.5 Marks)**   **(10)**
- i. A students caries a bag weighing 5 kg from the ground floor to his class on the first floor that is 2 m high. The work done by the boy is………(g=10 m/s2)
  a) 10 J   b) 20 J   c) 30 J   d) 100 J
- ii. Specific internal energy is a path Function. The statement is……….
  a) True   b) False   c) Always true   d) None of the mentioned
- iii. The enthalpy of a substance(denoted by h), is defined as……….
  a) h=u-pv   b) h=u+pv   c) h=-u+pv   d) h=-u-pv
- iv. The formula of potential energy is…………
  a) mgh   b) mv^2 c) 2gh   d) u+pv
- v. Total amount of energy in the universe is…..
  a)increasing   b) decreasing   c) constant   d)none of the above
- vi. In an isothermal process
  a) Temperature constant   b) Pressure constant   c) Volume constant   d) Kinetic energy constant
- vii. Which property of a system in constant in reversible adiabatic process?
  a) pressure   b) volume   c) Temperature   d) entropy
- viii. Thermodynamics is the study of
  a)energy   b)equilibrium   c)entropy   d) all of the above
- ix. Mathematical form of adiabatic process is
  a)$pv^n = C$ b)$pv^2 = C$ c) Pv =C   d) None
- x. Centrifugal pump is a_____
  a) Turbomachinery   b) Flow regulating device
  c) Drafting device   d) Intercooling device
- xi. Centrifugal pumps transfer energy from _____
  a) Rotor to fluid   b) Fluid to rotor   c) Draft to rotor   d) Rotor to draft
- xii. What is the unit of flow rate?
  a) kg.m   b) kg/m   c) m3/s   d) N/s

Reciprocating pump is a _____

xiii. a) Negative displacement pump   b) Positive displacement pump
c) Diaphragm pump   d) Gear pump

Reciprocating air compressor is best suited for......

xiv. a)Large quantity of air at high pressure   b)Small quantity of air at high pressure
c)Small quantity of air at low pressure   d)Large quantity of air at low pressure

In a centrifugal pump the liquid enters the pump ....

xv. a)At the top   b)At the bottom   c)At the centre   d) From sides

The unit of pressure is…….

xvi. a) Pascal   b) N/m2   c) bar   d) all of the above

Which kind of energy fuel posses

xvii. a) mechanical   b) electrical   c) thermal   d) chemical

The phase change from solid to vapour is called………..

xviii. a) Sublimation   b) Vaporisation   c) fusion   d) none of the
above

The First law of thermodynamics is the law of

xix. a) energy Conservation   b) work   c) pressure   d) temperature

A process in which no heat is supplied or rejected is called

xx. a) polytrophic   b)isothermal   c) adiabatic   d) constant volume

The COP is always……

xxi. a) =1   b) <1   c) >1   d)=0

In a domestic Vapour compression refrigerator, the refrigerant commonly used is

xxii. a)ammonia   b) air   c) CO2   d) Freon-12

Q.2
A)   Define the Following(Any Five out of Seven question)   (05)
1 a) Force   b) Pressure
2 a) Open system   b) Closed system
3 a) Isolated system   b) Superheated Steam
4 a) Dryness Fraction   b) Degree of superheat
5 a)Heat Engine   b) Air Standard efficiency
6 a)Conventional Energy b)Non-conventional Energy
7 a)Boiler   b) ton of Refrigeration

B)   Answer the Following (Any Five out of Seven question)   (05)
1 A gas is compressed from a pressure of 1 bar and Volume 0.9 m3 to a pressure 5 bar while its
temperature remains constant. Determine volume of gas aster Compression.
2 Differentiate isothermal process and adiabatic process
3 Find the Enthalpy of 1 kg of steam at 12 bar when 1) steam is dry saturated and 2) steam is 22% wet.
4 Define 1) wet steam, 2) dry saturated steam.
5 Explain Carnot Cycle
6 Give Comparison Between Reciprocating Compressor and Rotodynamic Compressor
7 Write function of Fusible Plug

Q.3   Write Short notes (Any Five out of Six question)   (10)
1 Prove that Cp - Cv = R
2 Explain Throttling Calorimeter with Neat sketch.
3 Give classification of Pump and Explain centrifugal pump with neat sketch.
4 Explain Various types of belt drive with Sketch.
5 Write short notes on LPG fuel.
6 Explain Water level indicator with sketch.

Q.4   Long Question (Any Three out of Four question)   (15)
1 Derive equation for air standard efficiency of Diesel engine.
2 Explain Babcock and Wilcox water tube Boiler with neat sketch.
3 Explain Cochran Boiler with neat sketch.
4 Compare Belt Drive, Chain drive and gear Drive with sketch