Department of Mechanical Engineering (2017-18)

Class Test I | **Course Code: MEU 302** | **Course Name: Engineering Thermodynamics**

Date: 04.08.2017 | **Time: 10.30 to 11.30 a.m.** | **Maximum Marks: 15**

Q. 1 Answer the following questions briefly (*one mark each)*

(a) A can of soft drink at room temperature is put into the refrigerator so that it will cool. Would you model the can of soft drink as a closed system or as an open system? Explain.

(b) For a system to be in thermodynamic equilibrium, do the temperature and the pressure have to be the same everywhere?

(c) A gas in a piston–cylinder device is compressed, and as a result its temperature rises. Is this a heat or work interaction?

(d) What are point and path functions? Give some examples.

(e) Determine the energy required to accelerate an 800 kg car from rest to 100 km/h on a level road. **(05 marks)**

Q. 2

(a) What is thermodynamic equilibrium? Elaborate on the conditions to be fulfilled for achieving (i) Thermal (ii) Mechanical & (iii) Chemical equilibrium. **(02 marks)**

(b) Actually, by 'energy conservation' what is meant is the conservation of quality of energy, not the quantity. Establish the veracity of the statement by giving example. Why it is not possible to convert all of heat (thermal energy) into work? **(03 marks)**

Q. 3

(a) A vacuum gauge connected to a tank reads 15 kPa at location where the barometric reading is 750 mm of Hg. Determine the absolute pressure in the tank. Take $\rho_{Hg} = 13{,}590\ kg/m^3$. **(2.5 marks)**

(b) Determine the energy required to accelerate a 1300 kg car from 10 to 60 km/h on an uphill road with a vertical rise of 40 m. **(2.5 marks)**

DEPARTMENT OF MECHANICAL ENGINEERING
(2013-2014)
CLASS TEST I
Course Code & Name.: MEU 302 Engineering Thermodynamics
Date: 07.08.2013 **Time: 3.00 to 4.00 p.m.**
Maximum Marks: 15

Instruction: All questions are compulsory.

Q.1 Answer the following concept questions briefly.

(a) Why does a bicyclist pick up speed on a downhill road even when he is not pedaling? Does this violate the conservation of energy principle?
(b) For a system to be in thermodynamic equilibrium, do the temperature and the pressure have to be the same everywhere?
(c) What is the difference between the macroscopic and microscopic forms of energy?
(d) An insulated room is heated by burning candles. Is this a heat or work interaction? Take the entire room, including the candles, as the system.
(e) The engine of a 1500-kg automobile has a power rating of 75 kW. Determine the time required to accelerate this car from rest to a speed of 100 km/h at full power on a level road. Is your answer realistic?

(One mark each)

Q. 2

(a) Determine the atmospheric pressure at a location where the barometric reading is 750 mm Hg. Take the density of mercury to be 13,600 kg/m3.

(2 marks)

(b) Why it is incorrect to represent work as ΔW and why is it that the integral of δW *is not* $W_2 - W_1$.

(3 marks)

Q. 3 Comment on the fact that both heat and work are directional quantities. Elaborate on the sign convention used for them. List the similarities between heat and work transfer as energy transfer mechanisms.

(5 marks)