Code No RT21033 **R13** SET - 1

II B. Tech I Semester Supplementary Examinations, May - 2019
THERMODYNAMICS
(Com. to ME, AE, AME)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1. a) What do you mean by equality of temperature (4M)
   b) What do you mean by throttling process (4M)
   c) What are the causes of irreversibility (4M)
   d) Define a pure substance. Is water a pure substance (3M)
   e) What is meant by dew point temperature (3M)
   f) What are the processes involved in Brayton cycle. Represent them in the P-V diagram (4M)

PART -B

2. a) Sow that work is a path function and not the property of system (6M)
   b) The resistance R of platinum varies with temperature t^0C as measured on the gas scale according to the equation (10M)
   $R_t = R_o (1+at-bt^2)$
   Where $a=3.8x10^{-4}$,$b=n5.6x10^{-7}$, Calculate the platinum temperature corresponding to a gas scale temperature of 400^0 C. Why is there a difference between these values

3. a) Show that the internal energy is a property of the system (8M)
   b) A house hold refrigerator contains fresh food and it is closed. 1 kWh of electric energy is consumed in a cooling the food and the internal energy of the system decreases by 500 kJ as the temperature drops. Find the magnitude and sign of heat transferred for the process. Assume the entire refrigerator and its contents as system. (8M)

4. a) With the help of schematic diagram of a heat pump, derive the expression for coefficient of performance as a heat pump (8M)
   b) An inventor claims to have a device which receives 1000 watts of energy as heat but puts out only 750 watts of electrical power. The rest of the energy is put out as mechanical work and dissipated outside his device by friction. Discuss the validity of these claims (8M)
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5. a) Describe with neat sketch the working of a throttling calorimeter (8M)
   b) Dry and saturated steam at a pressure of 11 bar is contained in a closed metallic drum. Due to cooling ,the temperature in the drum reduces to 105^0C.Calculate (8M)
   i) Pressure in the vessel and ii) heat lost in cooling

6. a) Discuss the methods for preparing a psychometric chart (6M)
   b) During a steady flow humidification process water enters the humidifier at 20^0 C and air enters at 1.1 bar,20^0C and a specific humidity of 0.01 kg/kg of air. The steam leaving the apparatus has a pressure of 1.05 bar, a temperature of 40^0C and a relative humidity of 90 percent. Determine the amount of heat transfer to the humidifier per kg of water evaporated (10M)

7. The pressure limits in an Otto air cycle are 100 kN/m^2 and 2000 kN/m^2,respectively. The compression ratio is 4.Calculate (16M)
   a) Thermal efficiency and
   b) mean effective pressure. Take Υ=1.4 for air