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**PRESIDENCY UNIVERSITY  
BENGALURU**

**SCHOOL OF ENGINEERING  
MID TERM EXAMINATION - APR 2023**

**Semester :** Semester VI -2020

**Course Code :** PET2009

**Course Name :** Sem VI - PET2009 - Thermodynamics of Reservoir Fluids

**Program :** PET

**Date :** 18-APR-2023

**Time :** 9:30AM - 11AM

**Max Marks :** 60

**Weightage :** 30%

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**Instructions:**

- (i) Read all questions carefully and answer accordingly.
  - (ii) Question paper consists of 3 parts.
  - (iii) Scientific and non-programmable calculator are permitted.
  - (iv) Do not write any information on the question paper other than Roll Number.
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**PART A**

**ANSWER ALL THE QUESTIONS**

**(5 X 2 = 10M)**

1. What are the different equilibrium system?

(CO1) [Knowledge]

2. State second law of thermodynamics. Write its mathematical expression.

(CO1) [Knowledge]

3. List the primary properties sufficient for defining a thermodynamic state.

(CO1) [Knowledge]

4. Define state and path function with example.

(CO1) [Knowledge]

5. Define thermodynamic system.

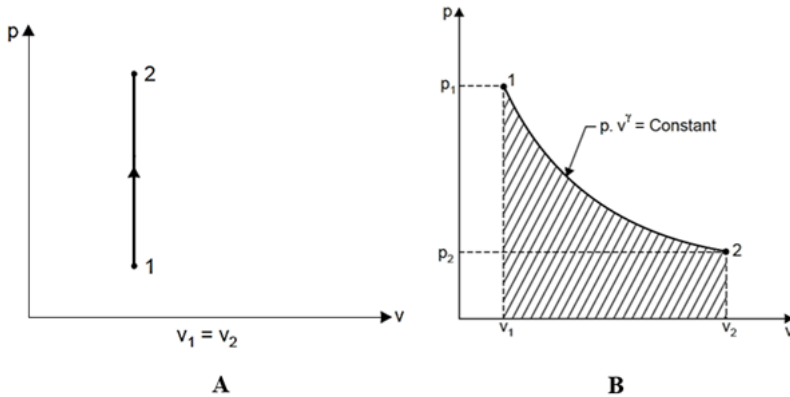
(CO1) [Knowledge]

## PART B

ANSWER ALL THE QUESTIONS

(3 X 10 = 30M)

6. Identify the thermodynamic process given in Figure A and B and give the expression for internal energy, work done and heat.



(CO1) [Comprehension]

7. Entropy change for reversible process is zero and for irreversible process is always positive. Justify the statement by taking carnot cycle as a reversible process and isobaric, isochoric process as irreversible.

(CO1) [Comprehension]

8. Degree of freedom can be used to find the minimum number of properties required to define any system. Justify this statement by taking phase diagram of water. Find the degree of freedom for
- triple point of water,
  - along the sublimation line and
  - any random point in the phase diagram.

(CO1) [Comprehension]

## PART C

ANSWER THE FOLLOWING QUESTION

(1 X 20 = 20M)

9. A heat engine is working between a high temperature source at 373K and a low temperature sink at 275 K. During the process the engine receives 50kJ of heat from a high temperature region. Sketch the process and identify the thermodynamic law to find
- the minimum work required during the process
  - the efficiency of the process
  - the amount of heat released

(CO1) [Application]