Enrollment No......................................

Faculty of Engineering
End Sem Examination Dec-2023
RA3CO25 Basic of Thermal Engineering

Programme: B.Tech.   Branch/Specialisation: RA

Duration: 3 Hrs.   **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

Q.1   i.   An isolated system is one, _____   **1**
   (a) Which can transfer neither matter nor energy to and from its surroundings
   (b) Which can transfer both energy and matter
   (c) Which can transfer matter only
   (d) Which can transfer energy only

   ii.   Which of the following is extensive property?   **1**
   (a) Mechanical Loading   (b) Mass
   (c) Volume   (d) All of these

   iii.   Which of the following is not a state function?   **1**
   (a) Internal energy   (b) Enthalpy
   (c) Work   (d) Volume

   iv.   Thermodynamics does not consider: **1**
   (a) Initial and final state   (b) Time factor
   (c) Bulk of matter   (d) Energy change

   v.   What is the value of the absolute thermodynamic temperature scale?   **1**
   (a) 3K   (b) 0K   (c) 1K   (d) 4K

   vi.   Which of the following is the standard fixed point of thermometry?   **1**
   (a) The steam point   (b) The triple point of water
   (c) The ice point   (d) All of these

   vii.   What is the firing order of a four-cylinder engine?   **1**
   (a) 1-3-4-2   (b) 1-4-3-2   (c) 1-2-3-4   (d) 4-3-2-1

viii. Which of the following does not relate to spark ignition engine? **1**
    (a) Spark plug   (b) Carburettor
    (c) Fuel injector   (d) Ignition coil

ix. Gas turbines work on which of the following cycle? **1**
    (a) Diesel cycle   (b) Brayton cycle
    (c) Rankine cycle   (d) None of these

x. Which of the following can be used as fuels in gas turbines? **1**
    (a) Petroleum   (b) Diesel
    (c) Natural gases   (d) All of these

Q.2   Attempt any two:

i. Explain about the system, control volume, surrounding, **5**
boundaries.

ii. How you can define Quasi static process? **5**

iii. Explain reversible and Irreversible process in detail. **5**

Q.3   Attempt any two:

i. Explain the zeroth law of thermodynamics **5**

ii. Derive the expression for work done of adiabatic process. **5**

iii. An ideal gas is heated at constant volume until its temperature is **5**
3 times the original temperature. It is then expanded isothermally
till it reaches its original pressure. The gas is then cooled at
constant pressure till it is restored to its original state. Represent
the cycle on PV diagram and determine the net work done per kg
of gas. Take the initial temperature as 350K and express your
answer in terms of gas constant R.

Q.4   Attempt any two:

i. Explain the working of the otto cycle with the help of PV **5**
diagram.

ii. Explain the working of the diesel cycle with the help of TS **5**
diagram.

iii. Explain the Rankine cycles with their different stages of **5**
processes.

Q.5   Attempt any two:

i. Explain the working principles of two-stroke engines. **5**

ii. Explain the valve and port timing diagrams of four stroke engine. **5**

iii. What is a fuel system? How does a fuel injection system work? **5**

Q.6   Attempt any two:

i. Explain the constant volume gas turbine with their advantage. **5**

ii. Draw the Brayton cycle and derive the expression for the thermal **5**
efficiency of the cycle.

iii. Explain the different system procedure used to improve the **5**
thermal efficiency and power output of the gas turbine.

*****