VCD 26/10/23 S.Y. B.Sc. PHYSICS-I III- SEMESTER 75MARKS 21/2HRs

Note: i) All the questions are compulsory.
ii) Numbers indicate in the right hand side are marks
iii) Use of non programmable calculator is allowed.

Q.1A) Answer the following questions.(ANY 1) **(10M)**

i. Derive an expression for efficiency of otto engine.
ii. Derive an expression for work done in a carnot's cycle.

Q.1B) Answer the following questions.(ANY2) **(10M)**

i. For a reversible engine ,show that $\sum \frac{Q}{T} = 0$.
ii. Show that all reversible engines working between the same two temperatures have the same efficiency.
iii. State various statements of the second law of thermodynamics.
iv. Find the efficiency of Carnot engine working between 127°C and 27°C. It absorb 80 calories of heat. How much heat is rejected.

Q.2A) Answer the following questions.(ANY 1) **(10M)**

i. Derive an expression for the change in entropy of perfect gas in terms of temperature and Volume.
ii. If 100 grams of water at 0°C is mixed with an equal mass of water at 86°C,Calculate the resultant increase in entropy.

Q.2B) Answer the following questions.(ANY2) **(10M)**

i. What is the change in entropy, if 10 gm of water is heated from 313 K to 353K?
ii. Write a short note on Entropy and disorder.
iii. Define Entropy. Explain Entropy remains constant of a closed system during reversible process.
iv. Write a short note on heat death of universe.

Q.3A) Answer the following questions.(ANY 1) **(10M)**

i. What is thermocouple? Explain different type of thermocouple in detail with their neat and labelled diagram.
ii. Explain in detail Semiconductor Diode Temperature Sensor.

Q.3B) Answer the following questions.(ANY2) **(10M)**

i. With neat and labelled diagram explain construction of resistance thermometer.
ii. Distinguish between thermistor and thermocouple.
iii. Write short note on Ultrasonic temperature transducer.
iv. Write short note on Platinum thin film sensor.

Q.4) Answer the following questions.(ANY3) **(15M)**

i. A 10 gm of water is heated from 40°C to 80°C. Calculate the change in entropy.
ii. An ideal heat engine operates according to Carnot's cycle and receives 600 cal from heat source every cycle. The temperature of the heat source is 400 K and that of the sink 300K. Find the work done by the Carnot cycle and amount of heat rejected to the sink for the cycle.
iii. Give advantages and disadvantages of RTD.
iv. What is pyrometer? Describe, in brief, a disappearing filament type of optical pyrometer.
v. Give Comparison of Otto engine and diesel engine.
vi. What is Reversible and Irreversible Processes?

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