(Pages : 4) R – 3134

Reg. No. : .....

Name : .....

Second Semester B.Sc. Degree Examination, September 2023

First Degree Programme under CBCSS

Physics

Complementary Course for Chemistry

PY 1231.2 : THERMAL PHYSICS

(2018 Admission Onwards)

Time : 3 Hours Max. Marks : 80

PART – A

Answer **all** questions, **Each** question carries **1** mark.

1. State Fick's law of diffusion.

2. Why do gases diffuse faster than liquids?

3. State Clausius's statement of the II law of Thermodynamics.

4. Write the formulae for the work done by an ideal gas in an isothermal process.

5. If the Entropy of the universe continuously increase what happens to the available energy?

6. Why do gases have two specific heats?

7. Define thermodynamic probability.

P.T.O.

8. What is the difference between the working of a heat engine and a refrigerator?

9. Define Gibbs free energy.

10. Why is Carnot's engine not practical?

(10 × 1 = 10 Marks)

PART – B

Answer any **eight** questions, **Each** question carries **2** marks.

11. Discuss Kirchoff's law of heat radiation.

12. State and explain the principle of degradation of energy.

13. What is temperature? Give three units to measure temperature.

14. What is an internal combustion engine?

15. Indicate the merits of a diesel engine.

16. Comment on entropy and disorder.

17. What statistics do electrons obey, what is their spin value?

18. What are the conditions for a process to be reversible?

19. What is an indicator diagram?

20. Explain internal energy of :

    (a) ideal gas

    (b) real gas

21. Explain the cycle of a petrol engine.

22. Write four examples for an irreversible process.

(8 × 2 = 16 Marks)

PART – C

Answer any **six** questions. **Each** question carries **4** marks.

23. Two concentric spherical shells are maintained at 300K and 500K.The narrow space between them is evacuated. Calculate the rate of transfer of energy between the two spheres assuming them to be perfectly black body radiators. Stefan's Constant = $5.669\ 10^{-8}$ SI units.

24. One mole of a gas at 27°C expands adiabatically until its volume is doubled. Calculate the work done. Ratio of specific heat=1.4.

25. Calculate the pressure at which water would freeze into ice at –1°C, if the change in specific volume when 1 Kg of water freezes into ice is 9.1×10^{-5} m^3. Specific Latent heat of fusion of ice = 3.3×10^5 J/Kg.

26. Only gases have two specific heats. Define each of them and explain which of them is greater and why?

27. A Carnot cycle is performed by 1 litre of air initially at 327°C and at a pressure of 12 atmospheres. Each state represents a compression or expansion in the ratio 1:6.Calculate the lower temperature and efficiency of the cycle. Ratio of specific heat=1.4.

28. Plot the energy distribution from the radiations emitted by a black body and explain it.

29. A slab is 2cm thick and .01m^2 in cross section. 4.2 J of heat flows through it per second. If the temperature difference between the end faces of the slab is 100 K, find the thermal conductivity of the material of the slab.

30. Find the change in entropy when a volume of a gas expands isothermally to double its volume.

31. A motor car tyre is pumped to a pressure of 2 atmospheres at 27°C suddenly bursts. What is the final temperature? Ratio of specific heat=1.40.

(6 × 4 = 24 Marks)

PART – D

Answer any **two** questions. **Each** question carries **15** marks.

32. With an indicator diagram show that the change in entropy in a reversible Carnot's cycle is zero.

33. Describe Lee's disc method to find the coefficient of thermal conductivity of a bad conductor.

34. State and explain
    (a) Newton's law of cooling
    (b) Raleigh Jean's Distribution law

35. Explain the working of a Carnot engine.

(2 × 15 = 30 Marks)