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Reg. No. :

Name : .....

Second Semester B.Sc. Degree Examination, August 2018
First Degree Programme under CBCSS
Complementary Course
PY 1231.2 – THERMAL PHYSICS
(For Chemistry and Polymer Chemistry)
(2013 Admission Onwards)

Time : 3 Hours Max. Marks : 80

SECTION – A

Answer **all** questions. **Each** question carries **one** mark.

1. Write down the diffusion equation.
2. State Wien's displacement law.
3. What is an indicator diagram ?
4. Give the Clausius statement of the second law of thermodynamics.
5. What is emissivity ?
6. Draw the T-S diagram for an adiabatic process.
7. Define a perfect black body.
8. Define coefficient of diffusivity.
9. Why is an adiabatic process called isentropic process ?
10. State the principle of increase of entropy. **(10×1=10 Marks)**

SECTION – B

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

11. What are the different ways of transmission of heat ?
12. State Wiedemann and Franz law. How does the thermal and electrical conductivities of metals change at low temperatures ?

P.T.O.

13. Distinguish between isothermal process and adiabatic process.

14. What are the advantages of Diesel engine ?

15. Find the efficiency of a Carnot engine working between steam point and ice point.

16. Good emitters are good absorbers but bad reflectors. Justify.

17. State Rayleigh-Jean's law. What was its limitation ?

18. Compare the processes of heat conduction and liquid diffusion.

19. Explain the energy distribution in a black body spectrum.

20. Distinguish between first and second order phase transitions.

21. Explain Fountain effect.

22. "Entropy is a measure of disorder". Comment. **(8×2=16 Marks)**

SECTION – C

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

23. Show that Planck's law reduces to Wien's law for shorter wavelengths.

24. State and prove Kirchhoff's laws of heat radiation.

25. Explain how the thermal conductivity of a material is determined by the spherical shell method.

26. Show that the work done during an adiabatic process depends only upon the initial and final temperatures.

27. A body at 1500 K emits maximum energy of wavelength 2000 nm. If the sun emits maximum energy of wavelength 550 nm, what would be the temperature of the sun ?

28. A Carnot engine has the same efficiency (i) between 100 K and 500 K and (ii) T K and 900 K. Calculate the value of T.

29. The efficiency of a Carnot engine is found to increase from 1/6 to 1/3 by lowering the temperature of the sink by 65 K. Calculate the initial temperatures of the source and the sink.

30. Calculate the change in entropy when 0.0273 kg of ice at 0°C is converted into water at the same temperature. Latent heat of ice = 336 J/g.

31. A motor car tyre having a pressure of 2 atmospheres at the room temperature of 27°C suddenly bursts. Find the resulting temperature. **(6×4=24 Marks)**

SECTION – D

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

32. Distinguish between thermal conductivity and thermometric conductivity. Explain with necessary theory how thermal conductivity of a poor conductor is determined by Lee's disc method.

33. Explain the various stages in a Carnot's cycle. Derive an expression for the efficiency of a Carnot's engine.

34. Describe with necessary theory the working of a Diesel engine and derive an expression for its efficiency.

35. Explain the concept of entropy. Show that the entropy of a system remains constant in a reversible cycle while it increases during an irreversible cycle.

(2×15=30 Marks)