

# MAR IVANIOS COLLEGE (AUTONOMOUS) THIRUVANANTHAPURAM

**Reg. No. :....** 

Name :....

Second Semester B.Sc. Degree Examination, June 2015 First Degree Programme under CBCSS Complementary Course: Physics – II (for Chemistry) AUPY231.2b: Thermal Physics

Time: 3 Hours

Max. Marks: 80

## **SECTION – A**

Answer ALL questions in a word or one or two sentences.

1.	Which one is a thermodynamic co – ordinate			
	i). Mass	ii). Volume	iii). Distance	iv). Velocity
2.	Sea breezes are formed due to			
	i). Conduction	ii). Convection	iii). Radiation	iv). Diffusivity
3.	The dimensional formula of thermal conductivity			
	i). MLT <sup>-3</sup> $\theta^{-1}$	ii). $ML^2T^{-3}\theta^{-1}$	iii). $ML^2T^{-2}\theta^{-1}$	iv). MLT <sup>-2</sup> $\theta^{-1}$
4.	Rayleigh – Jeans law deals with the distribution of			
	i). Entropy	ii). Power	iii). Latent heat	iv). Energy
5.	Ratio of thermal conductivity to thermal capacity per unit volume is			
6.	Equation for entropy change during irreversible process is			
7.	In diesel engine	e, heat is abso	orbed by the worl	king substance at constant
	·			
8.	Temperature in which liquid helium - II changes to liquid helium - I is			
	·			

9. Plank's law reduces to Wein's law under shorter wavelengths.(True / False)

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10. For a constant temperature, energy emission from a black body is uniformly distributed at different wavelengths.(True / False)

(10 x 1 = 10 Marks)

### **SECTION – B**

#### Answer any **EIGHT** questions, not exceeding a paragraph.

- 11. Define Graham's law of diffusion.
- 12. Differentiate between emissive and absorptive power of radiation.
- 13. State Weidmann and Franz law.
- 14. Why isothermals are represented by the horizontal lines in a T S diagram?
- 15. What is meant by super fluid ?
- 16. Adiabatic expansion produce cooling. Why?
- 17. State and explain Second law of thermodynamics.
- 18. Give examples of radial flow of heat.
- 19. State the principle of increase in entropy.
- 20. What is an indicator diagram ? Why is it called so ?
- 21. Cooking vessels made up of stainless steel have copper bottom, Why ?
- 22. Write the principle of degradation of energy.

(8 x 2 = 16 Marks)

#### **SECTION – C**

#### Short essay type / Problems : Answer any SIX questions.

- 23. Differentiate between thermal conductivity and thermometric conductivity.
- 24. What will be the efficiency of a carnot engine working between ice point and steam point ?
- 25. Derive an expression for thermal conductivity of a poor conductor by Lees disc method ?
- 26. A gas is adiabatically compressed so that its pressure increases from 1 atmosphere to 150 atmosphere. Given γ of air = 1.4. If the initial temperature of air is 300 K, Calculate i). The rise of temperature and ii). The work done.

- 27. Explain how the temperature of sun can be measured by knowing solar constant ?
- 28. Compare the three distribution laws for spectral distribution in a black body.
- 29. Calculate the change in entropy when 1 kg of water at 90°C is mixed with 0.5 kg of water at 0°C ? Specific heat capacity of water is 4200 Jkg<sup>-1</sup>K<sup>-1</sup>.
- 30. An iron plate has  $10^{-5}$  m<sup>2</sup> area,  $4 \times 10^{-3}$  m thick has its opposite faces maintained at 375 K and 325 K respectively. How much heat flows through the plate per second ? The thermal conductivity of iron is 80 Wm<sup>-1</sup>K<sup>-1</sup>.
- 31. Derive the relation between isothermal and adiabatic elasticity.

(6 x 4 = 24 Marks)

## **SECTION – D**

## Long essay type : Answer any TWO questions.

- 32. Explain the working of a Diesel engine. Derive the expression for its efficiency ?
- 33. With necessary theory, describe an experiment to find the thermal conductivity of a rubber tube by radial flow method ?
- 34. What is meant by Temperature Entropy (T S) diagram ? Draw the T S diagram of carnot cycle and hence derive an expression for the thermal efficiency of a carnot engine ?
- 35. Describe the experiment, results and conclusions drawn from the study of distribution of energy spectrum of a black body ?

(2 x 15 = 30 Marks)