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G. VENKATASWAMY NAIDU COLLEGE (AUTONOMOUS), KOVILPATTI – 628 502.



UG DEGREE END SEMESTER EXAMINATIONS - NOVEMBER 2024.

(For those admitted in June 2023 and later)

PROGRAMME AND BRANCH: B.Sc., PHYSICS

SEM	CATEGORY	COMPONENT	COURSE CODE	COURSE TITLE
II	PART - III	CORE-2	U23PH202	HEAT, THERMODYNAMICS AND STATISTICAL PHYSICS

Date &amp; Session: 05.11.2024/AN

Time : 3 hours

Maximum: 75 Marks

Course Outcome	Bloom's K-level	Q. No.	SECTION - A (10 X 1 = 10 Marks) Answer ALL Questions.
CO1	K1	1.	The temperature of inversion ( $T_i$ ) of a gas is. a. $a/Rb$ b. $2a/Rb$ c. $8a/27Rb$ d. $27/8 Rb/a$
CO1	K2	2.	The last gas to be liquefied was. a. Oxygen                      b. Hydrogen                      c. Nitrogen                      d. Helium
CO2	K1	3.	The Physics underlying the working of a refrigerator closely resembles the physics underlying. a. Ice formation                      b. Heat engine c. Vapour compression machine                      d. vaporization of water
CO2	K2	4.	The efficiency of Carnot's engine working between $127^\circ\text{C}$ and $27^\circ\text{C}$ is. a. 25%                      b. 50%                      c. 75%                      d. 100%
CO3	K1	5.	Entropy is maximum in which state. a. Solid                      b. liquid                      c. gas                      d. can be any
CO3	K2	6.	Entropy remains constant in a. a. adiabatic process                      b. isothermal process c. isochoric process                      d. isolated process
CO4	K1	7.	For a perfectly black body, the absorptive power is. a. 1                      b. 0.5                      c. 0                      d. $\infty$
CO4	K2	8.	A perfectly black body is that which. a. is totally black in colour b. can radiate all its energy c. is made of ideal gas names Krishnika d. absorbs all the radiations incident on it
CO5	K1	9.	Boson particles obey Pauli's exclusion principle: a. True                      b. False c. Sometimes true sometimes false                      d. can't determined
CO5	K2	10.	Boson have spin value. a. 0                      b. 1                      c. $\frac{1}{2}$ d. 0 or 1

Course Outcome	Bloom's K-level	Q. No.	<b>SECTION – B (5 X 5 = 25 Marks)</b> <b>Answer ALL Questions choosing either (a) or (b)</b>
CO1	K3	11a.	Point out the difference between the two principal specific heats of a gas and show that for an ideal gas $C_p - C_v = R$ <b>(OR)</b>
CO1	K3	11b.	Explain how very low temperature is achieved using adiabatic demagnetisation.
CO2	K3	12a.	State and explain zeroth law of thermodynamics. What is its importance? <b>(OR)</b>
CO2	K3	12b.	Explain how first law of thermodynamics leads to the concept of internal energy.
CO3	K4	13a.	Define entropy. Derive an expression for entropy of an ideal gas. <b>(OR)</b>
CO3	K4	13b.	Explain Kelvin's thermo dynamical scale of temperature.
CO4	K4	14a.	Using Wien's law, calculate the temperature of the sun. <b>(OR)</b>
CO4	K4	14b.	Derive Rayleigh – Jeans law from Planck's law.
CO5	K5	15a.	Discuss the postulates of quantum Statistics. <b>(OR)</b>
CO5	K5	15b.	What are the different types of ensembles?

Course Outcome	Bloom's K-level	Q. No.	<b>SECTION – C (5 X 8 = 40 Marks)</b> <b>Answer ALL Questions choosing either (a) or (b)</b>
CO1	K3	16a.	Describe Regnault's method to find the specific heat of a gas at constant pressure. <b>(OR)</b>
CO1	K3	16b.	Explain Linde's Process for the liquefaction of gas.
CO2	K4	17a.	Draw and Explain P-V diagram representing isothermal and adiabatic process. <b>(OR)</b>
CO2	K4	17b.	Describe with necessary theory, the construction and working of a Diesel engine. Explain its merits over otto engine.
CO3	K4	18a.	State and explain with example the third law of thermodynamics. Prove that it is impossible to obtain absolute zero temperature. <b>(OR)</b>
CO3	K4	18b.	Derive Maxwell's four thermo dynamical equations and hence find two T.dS equations.
CO4	K5	19a.	Describe Lee's method for determining the thermal conductivity of a bad conductor. <b>(OR)</b>
CO4	K5	19b.	Deduce of Newton's law of cooling from Stefan's law.
CO5	K5	20a.	Obtain the expression for Maxwell-Boltzmann distribution function. <b>(OR)</b>
CO5	K5	20b.	Discuss the thermodynamic probability in B-E statistics. Obtain an expression for Bose-Einstein statistics distribution law.

