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G. VENKATASWAMY NAIDU COLLEGE (AUTONOMOUS), KOVILPATTI – 628 502.**UG DEGREE END SEMESTER EXAMINATIONS - NOVEMBER 2025.**

(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 & Session: 08.11.2025/AN**Time: 3 hours****Maximum: 75 Marks**

Course Outcome	Bloom's K-level	Q. No.	SECTION – A (10 X 1 = 10 Marks) Answer <u>ALL</u> Questions.
CO1	K1	1.	At ordinary temperature, all gases except _____ show cooling effect in Joule- Kelvin expansion a) Hydrogen b) Helium c) Hydrogen and Helium d) Hydrogen, Helium and oxygen
CO1	K2	2.	The salt used by Debye, Giauque and Macdougall to produce temperature below 1 K in adiabatic demagnetization is _____ a) gypsum salt b) potassium permanganate c) gadolinium sulphate d) sodium chloride
CO2	K1	3.	The I law of thermodynamics is based on _____ a) conservation of energy b) conservation of entropy c) conservation of temperature d) none
CO2	K2	4.	Backward running Carnot's engine is known as _____ a) Otto engine b) Diesel engine c) heat engine d) Refrigerator
CO3	K1	5.	In all irreversible processes, entropy _____ a) always remains constant b) always zero c) always decreases d) always increases
CO3	K2	6.	The Clausius – Clapeyron's equation is _____. a) $dT/dP = L/T(v_2 - v_1)$ b) $dP/dT = L/T(v_2 - v_1)$ c) $d^2T/d^2P = L/T(v_2 - v_1)$ d) $dP/dT = T(v_2 - v_1)^2/L$
CO4	K1	7.	Thermal conductivity of bad conductors is measured by _____ a) Searle's method b) Lee's disc method c) Callender and Barne's method d) none
CO4	K2	8.	Rayleigh – Jeans law of radiation applies to _____ a) smaller wavelengths b) longer wavelengths c) all wavelengths d) Mid-range wavelengths
CO5	K1	9.	The number of microstates in a given macrostate is called _____ a) Probability b) thermodynamic probability c) degenerate states d) non-degenerate states
CO5	K2	10.	Fermions have spin value _____. a) 1/2 b) 1 c) zero d) 2

Course Outcome	Bloom's K-level	Q. No.	SECTION – B (5 X 5 = 25 Marks) Answer <u>ALL</u> Questions choosing either (a) or (b)
CO1	K3	11a.	Solve and obtain Meyer's relation for specific heat capacities. (OR)
CO1	K3	11b.	Interpret the process of liquification of a gas by Linde's process.
CO2	K3	12a.	Interpret the statement of zeroth law of thermodynamics and explain it. (OR)
CO2	K3	12b.	Illustrate the construction and working of petrol engine with a neat diagram.
CO3	K4	13a.	Deduce Clausius – Clapeyron's equation. (OR)
CO3	K4	13b.	Analyse the concept of 'Heat death of Universe'.
CO4	K4	14a.	Deduce Newton's law of cooling from Stefan's law. (OR)
CO4	K4	14b.	Deduce Wien's displacement law for the distribution of energy.
CO5	K5	15a.	Compare Maxwell – Boltzmann, Bose – Einstein and Fermi – Dirac statistics. (OR)
CO5	K5	15b.	Discuss the distinguishing features of microstate and macrostate with suitable examples.

Course Outcome	Bloom's K-level	Q. No.	SECTION – C (5 X 8 = 40 Marks) Answer <u>ALL</u> Questions choosing either (a) or (b)
CO1	K3	16a.	Interpret adiabatic demagnetisation phenomenon and deduce an expression for the fall in temperature due to adiabatic demagnetisation. (OR)
CO1	K3	16b.	Interpret Regnault's method to determine the specific heat capacity of a gas at constant pressure.
CO2	K4	17a.	Deduce an expression for the efficiency of a Carnot's engine. (OR)
CO2	K4	17b.	Illustrate the construction and working of Diesel engine with a neat diagram. Also deduce its efficiency.
CO3	K4	18a.	Deduce Maxwell's thermodynamical relations. (OR)
CO3	K4	18b.	Define entropy. Analyse the change of entropy in reversible process and in an irreversible process.
CO4	K5	19a.	Discuss in detail Forbes method for finding the coefficient of thermal conductivity of a metal. (OR)
CO4	K5	19b.	Discuss Lee's disc method for finding the coefficient of thermal conductivity with necessary theory.
CO5	K5	20a.	Discuss Bose – Einstein statistics and deduce the distribution function. (OR)
CO5	K5	20b.	Discuss Fermi – Dirac statistics and obtain the distribution function.