Reg. No. | | | | | | | | |

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

UG DEGREE END SEMESTER EXAMINATIONS - APRIL 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:28.04.2025/FN **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.	What is the term defined as the total internal energy of all molecules of a substance? a) Temperature b) Latent Heat c) Heat Energy d) None of these
CO1	K2	2.	Write the relation connecting C_V ,C_p and R. a) $C_V - C_p = R$ b) $C_p - C_V = R$ c) $C_V + C_p = R$ d) $C_p - C_V = nR$
CO2	K1	3.	Which of the following is not a state variable? a) Work b) Pressure c) Internal Energy d) Temperature
CO2	K2	4.	Select the efficiency of an ideal heat engine working between the freezing point and boiling point of water. a) 26.8% b) 12.5% c) 20% d) 6.25%
CO3	K1	5.	State the property of Entropy. a) an extensive property b) an intensive property c) a microscopic property d)None of the above
CO3	K2	6.	Select the significance of II law of thermodynamics a) all engines have the same efficiency b) entropy always decreases in reversible cycle c) work can be converted into heat and vice versa d) reversible heat engines are less efficient
CO4	K1	7.	Identify the dimension of Planck's Constant. a) $ML^2 T^{-1}$ b) MLT^{-2} c) MLT^{-1} d) MLT
CO4	K2	8.	Mention the law which gives the relationship between wavelength and temperature. a) Fourier's law b) Newton's law c) Wien's law d) Planck's law
CO5	K1	9.	How many dimensions have the phase space of the particle moving in space? a) 3 b) 6 c) 1 d) 9
CO5	K2	10.	Write the energy term in which the uppermost energy level filled with electrons at zero. a) Zero point energy b) Boltzmann energy c) Kelvin energy d) Fermi energy

Course Outcome	Bloom's K-level	Q. No.	**SECTION – B (5 X 5 = 25 Marks)** **Answer ALL Questions choosing either (a) or (b)**
CO1	K3	11a.	Determine the specific heat of a gas at constant pressure (Cp) by Regnault's method
			(OR)
CO1	K3	11b.	Write Boyle temperature of a gas and give its expression interms of van der Waals constants
CO2	K3	12a.	Write and explain zeroth law of thermodynamics
			(OR)
CO2	K3	12b.	Identify any 5 differences between petrol engine and diesel engine.
CO3	K4	13a.	What do you infer from T-S Diagram of Carnot's engine?
			(OR)
CO3	K4	13b.	How will you deduce Meyer's equation $C_P - C_V = R$ for a perfect gas, using Maxwell's thermo dynamical relation.
CO4	K4	14a.	Give a comment on the distribution of energy in black body radiation
			(OR)
CO4	K4	14b.	How will you derive Newton's law of cooling from Stefan's law of radiation?
CO5	K5	15a.	Categorize different types of ensembles.
			(OR)
CO5	K5	15b.	Determine the method of specifying quantum states in phase space.

Course Outcome	Bloom's K-level	Q. No.	**SECTION – C (5 X 8 = 40 Marks)** **Answer ALL Questions choosing either (a) or (b)**
CO1	K3	16a.	Apply the theory of Joule Kelvin effect and show that the enthalpy remains constant in J.K.effect.
			(OR)
CO1	K3	16b.	Determine the production of low temperature by the method of adiabatic demagnetisation
CO2	K4	17a.	What do you think about Carnot's heat engine and derive the expression for its efficiency?
			(OR)
CO2	K4	17b.	Analyze the workdone by the system during isothermal and adiabatic change.
CO3	K4	18a.	State and derive Maxwell's thermodynamical relations
			(OR)
CO3	K4	18b.	Analyze the change of entropy in reversible and irreversible process
CO4	K5	19a.	Determine the thermal conductivity of a bad conductor by Lee's disc method.
			(OR)
CO4	K5	19b.	Deduce Wein's displacement law from Planck's law of black body radiation
CO5	K5	20a.	Derive an expression for distribution function according to Maxwell-Boltzmann Statistics.
			(OR)
CO5	K5	20b.	Determine the degenerative parameter and give the expression for distribution function according to Fermi-Dirac Statistics