Reg. No.: .....

Name: .....

University of Kerala

U8788

Second Semester FYUGP Degree Examination, April 2025

Discipline Specific Core Course

PHYSICS

UK2DSCPHY102 - Optics and Thermodynamics

Academic Level: 100-199

Time: 1 Hour 30 Minutes(90 Mins.) **Max. Marks: 42**

Part A. 6 Marks.Time:6 Minutes.(Cognitive Level:Remember(RE)/Understand(UN)) Objective Type. 1 Mark Each.Answer all questions

Qn No.	Question	CL	CO
1	List two examples of an irreversible process.	RE	2
2	Define dispersion.	RE	1
3	Explain concept of internal energy	UN	2
4	Discuss Kelvin - Plank statement of second law of thermodynamics.	UN	2
5	Explain Fermat's principle of extremum path.	UN	1
6	Explain the working principle of heat engine	UN	2

Part B.8 Marks.Time:24 Minutes.(Cognitive Level:Understand(UN)/Apply(AP))Short Answer. 2 marks each.Answer all questions

Qn No.	Question	CL	CO
7	Explain the phenomenon of superposition of light	UN	1
8	Define indicator diagram. Explain its significance.	UN	2
9	Discuss why red light travels faster in glass than violet light.	AP	1
10	A sample of an ideal gas is compressed isothermally at a temperature of 400 K. The initial pressure is 100 kPa, and the initial volume is 5.0 L. If the final volume after compression is 2.0 L, determine the final pressure of the gas.	AP	2

Part C. 28 Marks.Time:60 Minutes (Cognitive Level:Apply(AP)/Analyse(AN)/Evaluate(EV)/Create(CR)) Long Answer.7 marks each.Answer all 4 Questions choosing among options * within each question

Qn No.	Question	CL	CO
11	A) a) Illustrate the concept of entropy. Apply above concept to demonstrate the change in entropy of a reversible cycle. b) Sketch the complete cycle of operation of a Carnot cycle to elucidate the total change in entropy. OR B)	AP	2, 2

Qn No.	Question	CL	CO
	The efficiency of Carnot engine is 20%. When the temperature of the source is increased by 25℃ then its efficiency is found to increase to 25%. Calculate the temperature of source and sink		
12	A) (a) Analyse the changes in path of light when light encounters reflection and refraction on an interface. (b) Analyse the change in angle of refraction when the refractive index of the second medium is changed. OR B) Investigate the diffraction patterns produced by a single slit and a double slit diffraction element.	AN	1, 1
13	A) Evaluate the conditions for bright and dark fringes in the interference pattern due to reflected light. OR B) Consider a Newton's ring arrangement with the diameter of the 4^{th} and 12^{th} dark rings as 4 mm and 7 mm respectively. Evaluate the diameter of the 20^{th} dark ring.	EV	1, 1
14	A) Generate a relation connecting refractive index, optical path length and geometric path length OR B) Design an experiment to obtain the interference pattern produced by a double slit.	CR	1, 1