PHOOL SINGH BISHT RAJKIYA MAHAVIDYALAYA NAUGHAR, LAMBGAON, TEHRI GARHWAL B.Sc. III SEM [PHYSICS, PAPER-I : THERMODYNAMICS AND STATISTICAL PHYSICS] TEACHING PLAN FOR ACADEMIC SESSION 2023-24			
COURSE TEACHER: **Dr. VIJAY SINGH RANA**			
COURSE TITLE AND OTHERS PECIFICATION			
Course Title: Course No.: Maximum Marks:		**Thermodynamics and Statistical Physics** **PAPER-I** **External Exam+ Internal Assessment: 75+25**	
Course Description		This course is very beneficial for student. This course contains basic knowledge of Thermodynamics and Statistical Physicsand applied approach in mechanical applications.	
Total No. of Lectures-Tutorials-Practical (in hours per week): 4-0-0			
UNIT	**TOPIC**	**Number of Lectures**	**Name of the Course teacher**
Unit1: Basic concepts and First law of thermodynamics	Thermodynamic Systems, Thermal equilibrium and Zeroth law of thermodynamics, Equation of state and First law of thermodynamics	3	Dr. Vijay S Rana
	Discussion of Heat and Work, Quasi-static Work; Reversible and Irreversible; Path Dependence	2	
	Heat Capacities Adiabatic Processes, Vander Wall equation, Distinction between Joule	3	
	Joule- Thompson and Adiabatic expansion of a gas.	2	
UNIT II: Second law of Thermodynamics and Entropy	Insufficiency of first law of thermodynamics, Condition of Reversibility	2	Dr. Vijay S Rana
	Carnot's Engine and Carnot's Cycle, Second law of thermodynamics, Carnot‟s Theorem	2	
	Thermodynamic scale of temperature and its identity to perfect gas, scale of temperature. Entropy, Mathematical formulation of Second law of thermodynamics	3	
	Entropy of an ideal gas, T-S diagram and its applications, Evaluation of Entropy changes in simple cases, Third law of thermodynamics.	3	
UNIT III: Thermodynamic Relations	Thermodynamic potentials, Maxwell‟s equation from thermodynamic potentials, Some useful manipulations with partial derivatives (cooling in adiabatic processes	6	

	and Adiabatic stretching of a wire),		
	The Clausius– Clapeyron‟s equations, Triple point,	2	
	Applications of Maxwell's thermo dynamical relations.	2	
UNIT IV: Transport of Heat and Kinetic theory of Gases	Black body radiation, Thermodynamics of radiations inside a hollow enclosure	2	Dr. Vijay S Rana
	Kirchoff‟s Laws, Derivation of Stefan Boltzmann Law, Wein‟s displacement law	3	
	Black body spectrum formulaearly attempts, Raleigh Jean‟s Law, Quantum theory of Radiation, Planck‟s formula for black body spectrum, Wien‟s law, Radiation as a photon gas	5	
	Degree of Freedom Law of Equipartition of Energy	2	
	Distributive law of velocities, Most Probable speed, Average and root mean square velocities.	3	
	mono-atomic and diatomic gases	3	
UNIT V: Fundamentals of Statistical Mechanics	Probability and thermodynamic probability, postulates of statistical mechanics, macrostates and microstates	3	Dr. Vijay S Rana
	Equilibrium and fluctuation constraints, ensemble and average properties, phase space, -space and gamma space, division of phase space into cells	4	
	Micro canonical, canonical and grand canonical ensembles, Entropy and probability, interpretation of second law of thermodynamics, Boltzmann canonical distribution law	5	
	Classical and Quantum statistics, Comparison of three statistics	3	

Suggested Reading

1. S. Loknathan : Thermodynamics, Heat and Statistical Physics
2. Sharma and K.K. Sarkar : Thermodynamics, and Statistical Physics
3. Brijlal and Subrahmanyam : Heat and Thermodynamics
4. Garg, Bansal and Ghose: Thermal Physics, McGraw Hill,2012.
5. M.W. Zemansky, R. Dittman, "Heat and Thermodynamics", McGraw Hill,1997.
6. R. K Pathria, Statistical Mechanics, Elsevier
7. Meghnad Saha, B.N. Srivastava, "A Treatise on Heat", Indian Press,1973

Suggested Online Link:

1. MIT Open Learning - Massachusetts Institute of Technology, https://openlearning.mit.edu/
2. National Programme on Technology Enhanced Learning (NPTEL), https://www.youtube.com/user/nptelhrd 3.

SwayamPrabha - DTH Channel, https://www.swayamprabha.gov.in/index.php/program/current_he/8

This course can be opted as an elective by the students of following subjects: The course can be opted as an elective, which is open to all students.

Suggested Continuous Evaluation (25 Marks):

Continuous internal evaluation shall be based on allotted assignment and class tests. The marks shall be as follows:

Class Test/Assignment/ attendance- (10+10+5)

Course Prerequisites: Passed Certificate course in Basic Physics.

Counter signed [Principal] Sig. [Head] Sig. [Course teacher]

PHOOL SINGH BISHT RAJKIYA MAHAVIDYALAYA NAUGHAR, LAMBGAON, TEHRI GARHWAL B.Sc. IV SEM [PHYSICS, PAPER-I : OPTICS] TEACHING PLAN FOR ACADEMIC SESSION 2023-24			
COURSE TEACHER: **Dr. VIJAY SINGH RANA**			
COURSE TITLE AND OTHERS PECIFICATION			
Course Title: Course No.: Maximum Marks: 100		**Mechanics** **PAPER-I** **External Exam+ Internal Assessment: 75+25**	
Course Description		This course contains basic knowledge about Optics and applied approach related with applications.	
Total No. of Lectures-Tutorials-Practical (in hours per week): 4-0-0			
UNIT	**TOPIC**	**Number of Lectures**	**Name of the Course teacher**
Geometrical Optics:	Fermat's Principle: Principle of extremum path and its application to deduce laws of reflection and refraction	3	Dr. Vijay S Rana
	Gauss's general theory of image formation: Coaxial symmetrical system	3	
	Cardinal points of an optical system, general relationship, thick lens and lens combinations	4	
UNIT II: Optical Instruments:	Entrance and exit pupils, need for a multiple lens eyepiece	3	Dr. Vijay S Rana
	Ramsden's, Hygen's and Gaussiaqn eyepieces, Astronomical refracting telescope, Spectrometer	5	
	Aberrations in images: Chromatic aberrations, achromatic combination of lenses in contact and separated lenses	3	
	Monochromatic aberrations and their reduction: aspherical mirrors and Schmidt corrector plates	3	
	aplantic points, oil immersion objectives meniscus lens.	2	
UNIT III: Interference of Light:	The principle of superposition, Two slit interference	3	Dr. Vijay S Rana
	Coherence, Division of wave front and amplitude, Optical path retardations lateral shift of fringes	4	
	Fresnel biprism, Interference with multiple reflection, Thin films, Application for precision measurements, Haidinger fringes,	4	

	Fringes of equal thickness and equal inclination.		
	Application for precision measurements, Haidinger fringes, Fringes of equal thickness and equal inclination.	4	
UNIT IV: Diffraction of Light:	Fresnel Diffraction: Half-period zones, Zone plate	3	Dr. Vijay S Rana
	Fresnel Diffraction pattern of a straight edge, a slit and a wire using half-period zone analysis.	3	
	Fraunhofer diffraction: Diffraction of a Single slit; Double Slit, Multiple slits and Diffraction grating.	4	
UNIT V: Polarization of Light	Transverse nature of light waves, Concept of Plane polarized light – production and analysis	3	Dr. Vijay S Rana
	Malus law, Brewster's law, Nicol prism,	3	
	Circular and elliptical polarization, Double refraction	4	

Suggested Reading

Fundamentals of Optics, F A Jenkins and H E White, 1976, McGraw-Hill
Principles of Optics, B. K. Mathur, 1995, Gopal Printing
Fundamentals of Optics, H. R. Gulati and D.R. Khanna, 1991, R. Chand Publication
A Textbook of Optics, N. Subramanyam and Brijlal.
Optics and Atomic Physics, D. P. Khandelwal.
Physical Optics, A. K. Ghatak.
Optics, Eugene Hecht, Pearson Publishers.
Optics, Satya Prakash.

Suggested Online Link:

MIT Open Learning Massachusetts Institute of Technology, https://openlearning.mit.edu/
2 National Programme on Technology Enhanced Learning (NPTEL), https://www.youtube.com/user/nptelhrd
3. Swayam Prabha - DTH Channel, https://www.swayamprabha.gov.in/index.php/program/current_he/8

Suggested equivalent online courses:

This course can be opted as an elective by the students of following subjects: The course can be opted as an elective, which is open to all students.

Suggested Continuous Evaluation (25Marks):

Continuous internal evaluation shall be based on allotted assignment and class tests. The marks shall be as follows:

Class Test/Assignment/ attendance- (10+10+5)

Course Prerequisites: Passed Certificate course in Basic Physics and Passed Semester III.

Countersigned [Principal] Sig. [Head] Sig. [Course Teacher]