



**HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN**  
**B.Sc. PHYSICS-SEMESTER – III**  
**TYPE OF COURSE: MULTI DISCIPLINE SPECIFIC COURSE**

**PROGRAM CODE: SCIUG101    COURSE CODE: SC23MDSCPHY303**  
**COURSE NAME: THERMODYNAMICS & OPTICS**

(Effective from June 2024 under NEP 2020)

|                                  |        |                     |
|----------------------------------|--------|---------------------|
| Total Credit : 02                | THEORY | External Marks : 25 |
| Teaching Hours per Week : 02     | MDC    | Internal Marks : 25 |
| Teaching Hours Per Semester : 30 |        |                     |

**Course Objective:**

- To understand the principles of Heat and Thermodynamics, Mathematical Theorems, Liquification of Gases.
- To develop knowledge about Maxwell's equation, Heat capacity, Thermal Expansivity and Compressibility
- To get sufficient knowledge of Polarization and learn basic concepts of Retarders.
- To develop sufficient knowledge about Fermat's principle and laws for it.

**Course Outcome:**

After the successful completion of the course, students will be able to

- Understand the principles of Heat and Thermodynamics, Mathematical Theorems, Liquification of Gases.
- Develop knowledge about Maxwell's equation, Heat capacity, Thermal Expansivity and Compressibility
- Get sufficient knowledge of Polarization and learn basic concepts of Retarders.
- Develop sufficient knowledge about Fermat's principle and laws for it.

**Syllabus**

|        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |   |    |
|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|----|
| Unit-1 | <b>Thermodynamics:</b><br><b>Heat and Thermodynamics:</b><br>Characteristic functions, Enthalpy(11.1), The Helmholtz and Gibb's function(11.2), Two Mathematical Theorems(11.3), Maxwell's equation(11.4), The T-dS equations(11.5), Internal Energy equation(11.6), Heat capacity equation, The Thermal Expansivity (11.9), Compressibility(11.10), Joule-Kelvin effect (Porous plug Experiment) (12.1) Liquification of Gases by Joule-Kelvin Effect (12.2) <i>(Related Examples, Problems, MCQ &amp; Short Questions)</i><br><br><b>Basic Reference:</b><br><i>Heat and Thermodynamics by Mark W. Zemansky (5th Edition)</i>                                                                                                                         | 1 | 15 |
| Unit-2 | <b>OPTICS:</b><br><b>Fermat's Principle :</b> Fermat's principle (2.1), Fermat's principle of least time(2.2), law of reflection and law of refraction(2.3)<br><br><b>Polarization:</b> Introduction(20.1), Polarization by double refraction(20.5.5), Double refraction(20.8.3), Huygens' explanation of double refraction(20.9 & 20.9.1), Types of Polarized light(20.15), Retarders or Wave plate (Quarter wave plate) (20.17.1), (Half wave plate)(20.17.2), Production of Elliptically polarized light(20.18), Detection of Elliptically polarized light(20.18.1).<br><i>(Related Examples &amp; Problem, MCQ, SQ)</i><br><br><b>Basic Reference:</b> <i>A text book of OPTICS by Dr. N. Subrahmanyam, Brijlal, Dr. M. N. Avadhanulu - S Chand</i> | 1 | 15 |



**HEMCHANDRACHARYANORTHGUJARATUNIVERSITY,PATAN**

**B.Sc.PHYSICS-SEMESTER –III (PRACTICALCOURSE)**

PROGRAMMECODE:SCIUG101

(EffectivefromJune2024UnderNEP–2020)

**COURSE NAME: MDC(MULTIDISCIPLINARY COURSE PRACTICAL)**

**COURSECODE: SC23PMDSCPHY303 CREDIT: 2**

| TYPE OFCOURSE                                                                                        | CREDIT | Marks                  | COURSECODE      |
|------------------------------------------------------------------------------------------------------|--------|------------------------|-----------------|
| MultiDisciplineCoreCourse(MDSCP)                                                                     | 2      | 25 CCE +<br>25 SEE =50 | SC23PMDSCPHY303 |
| <b>TeachingHours</b><br>TeachingHoursperWeek:04 Hours for 2 Credit practical (60 Hours per Semester) |        |                        |                 |

**::LABORATORYEXPERIMENTS::**

1. To Find out Viscosity co- efficient of liquid using co-axial viscometer.
2. To find out the value of  $e/k$  using power transistor (PNP →CK 100 or NPN→SL -100 ).
3. To Determine Self Inductance of inductor by Anderson Bridge.
4. To Find out The Wave Length of Light using Newton's Rings.
5. Stirling's formula (Numerical Interpolation).
6. Obtain the Characteristics of UJT and Determination of  $R_{BB}$ ,  $V_d$  &  $\eta$
7. Absorption Co-Efficient of Liquid using Photocell.
8. Obtain the Characteristics of PNP Common Base Transistor.
9. Construction of AND, OR, NOT Gates Using NAND & NOR Universal Gates.
10. Numerical Analysis (Minimum Class Method)

  
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