A.G& S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE

VUYYURU-521165, KRISHNA Dt., A.P.(Autonomous)

Accredited by NAAC with "A" Grade

2022-2023



DEPARTMENT OF PHYSICS MINUTES OF BOARD OF STUDIES

ODD SEMESTER

26-10-2022

Minutes of the meeting of Board of studies in Physics for the Autonomous course of A.G. & S.G. Siddhartha Degree College of Arts & Science, Vuyyuru held at 2.30 P.M on 26 - 10 - 2022 in the Department of Physics.

Sri J. Hareesh Chandra

Presiding

Members Present:

(Sri. J. Hareesh Chandra)

2) (Dr. M. Rami Reddy)

Nominee (Dr. P.V. Ramana)

(Dr. T. Srinivasa Krishna)

5) ... (Sri I. Chittibabu)

(Sri B. Dileep Kumar)

(Sri M. Sateesh)

8) M . P . D . Das (Smt. M.P.D. Parimala)

- balles (Sri J. Dileep)

10) (Sri U.Ram prasad)

Chairman

University Nominee

Academic Council

Academic Council Nominee

Representative from Industry

Alumni

Member

Member

Member

Member

Head, Department of Physics A.G. &S.G.S. Degree College of Arts & Science, Vuyyuru - 521165

Registrar Krishna University, Machilipatnam.

H.O.D. Dent. of Physics, SRI DNR Women's College, Palakollu.

Associate Professor, H.O.D, Dept. of Physics, P.B.Siddhartha College of & Science, Arts Vijayawada

Sub Divisional Engineer BSNL, Vijayawada.

Lecturer in Physics, Dept.ofPhysics,IIIT, Nuzivid.

Lecturer in Physics, A.G.&S.G.S.Degree College of Arts & Science, Vuyyuru 521165. Lecturer in Physics A.G. & S.G.S.Degree College of Arts & Science, Vuyyuru -521165.

Lecturer in Physics A.G.&S.G.S.Degree College of Arts & Science, Vuyyuru - 521165.

Lecturer in Physics. A .G.& S.G.S.Degree. College of Ārt. & Science, Vuyyuru -521165

Agenda for B.O.S Meeting

- To recommend the syllabi (Theory & Practical) and model paper for I semester of I Degree B.Sc (MPC, MPCS) Physics for the Academic year 2022-2023.
- To recommend the syllabi (Theory & Practical) and model paper for III semester of II Degree B.Sc (MPC, MPCS) Physics for the Academic year 2022-2023.
- To recommend the syllabi (Theory & Practical) and model paper for V semester of III Degree B.Sc (MPC, MPCS) Physics for the Academic year 2022-2023.
- To recommend Skill Development Course "ELECTRICAL APPLIANCES" for II year (III SEMESTER) students in this academic year 2022-23.
- 5. To recommend the Blue print of question papers for I, III & V semesters of B.Sc. Physics for the Academic year 2022-2023.
- 6. To recommend the Guidelines to be followed by the question paper setters in Physics for I, III & V Semester end exams.
- To recommend the teaching and evaluation methods to be followed under Autonomous status.
- 8. Any suggestions regarding seminars, workshops, Guest lecture to be organized.
- Recommend the panel of paper setters and Examiners to the controller of Examinations of autonomous Courses of A.G. & S.G.S.Degree colleges of Arts & Science, Vuyyuru.
- 10. Any other matter.

-v. Horsechchardra Chairman

RESOLUTIONS

The following resolutions are made in Board of studies in Physics for UG Programs of Odd - semester to recommend to the Academic Council for its approval.

- It is resolved and recommended to continue the course with title "Mechanics, Waves and Oscillations" in I semester of B.Sc.(M.P.C & M.P.Cs.) for both theory and practical with no modifications for the batch of students admitted in 2022-23 and onwards. Model paper is prepared with levels of Bloom's Taxonomy.
- 2. It is resolved and recommended to continue the course with title "Heat and Thermodynamics" in the III semester of B.Sc (M.P.C & M.P.Cs) for both theory and practical with no modifications for the batch of students admitted in the academic year 2021-22 and onwards. Model paper is prepared with levels of Bloom's Taxonomy.
- It is resolved and recommended the Skill Development Course
 "ELECTRICAL APPLIANCES" in the III semester for the students admitted in the academic year 2021-22 and onwards.
- 4. As per the direction of APSCHE and Krishna University, it is mandatory to introduce Skill Enhancement courses for Semester-V. Therefore, the BOS committee choosen one pair from three alternate pairs from SECs. The titles of the courses are "APPLICATIONS OF ELECTRICITY AND ELECTRONICS" and "ELECTRONIC INSTRUMENTATION" for both theory and practical in the V-semester of B.Sc. (M.P.C, M.P.CS) and VI-semester of B.Sc. (M.P.C & M.P.CS) for the students admitted in the academic year 2020-21 and onwards. The modifications are made as per the recommendations of the BOS committee.
- As per the direction of APSCHE and Krishna University, an INTERNSHIP is mandatory for final year B.Sc. students. So, the BOS committee recommended and approved the same.

- 1. It is resolved to follow the changed syllabi and model papers for I semester of I B.Sc. as per APSCHE guidelines from the Academic year 2022-2023.
- 2. It is resolved to follow the changed syllabi and model papers for III semester of II B.Sc. as per APSCHE guidelines from the Academic year 2022-2023.
- 3. It is resolved to follow the changed syllabi and model papers for v semester of III B.Sc. as per APSCHE guidelines from the Academic year 2022-2023.
- 4. It is resolved to follow the Blue prints as proposed by members of BOS I,III& V semester of Degree B.Sc.for the Academic year 2022-2023.
- 5. It is resolved to follow the guidelines to be followed by the question paper setters of physics for I, III& V semesters of Degree B.Sc. for the Academic Year 2022-2023.
- 6. It is resolved to continue the following teaching and evolution methods for Academic year 2022-2023.

Teaching Methods:

Besides the conventional methods of teaching, we use modern technology i.e. using of LCD projector, U boards, virtual lab etc, for better understanding of concepts.

Evaluation of a student is done by the following procedure: Internal Assessment Examinations:

- For I B.Sc (sem I), out of 100 marks in each paper, 30 marks shall be allocated for internal assessment.
- For II B.Sc (sem III), out of 100 marks in each paper, 25 marks shall be allocated for internal assessment.
- For III B.Sc (sem V), out of 100 marks in each paper, 30 marks shall be allocated for internal assessment
- For I st Semester, Out of these 30 marks, 20 marks are allocated for announced tests (i.e. IA-1 & IA-2). Two announced tests will be conducted and average of these two tests shall be deemed as the marks obtained by the student, 5 marks are allocated on the basis of candidate's percentage of attendance, 5 marks are allocated for assignment /Activity.
- For III rd semester, Out of these 25 marks, 15 marks are allocated for announced tests (i.e. IA-1 & IA-2). Two announced tests will be conducted and average of these two tests shall be deemed as the marks obtained by the student, 5 marks are allocated for assignment, 5 marks are allocated for component (class room seminars/group discussion).

 for V th Semester, Out of these 30 marks, 20 marks are allocated for announced tests (i.e. IA-1 & IA-2). Two announced tests will be conducted and average of these two tests shall be deemed as the marks obtained by the student, 5 marks are allocated on the basis of candidate's percentage of attendance, 5 marks are allocated for assignment / class room seminars.

<u>Semester – End Examination:</u>

- The maximum marks for I B.SC, I Semester End examination shall be 70 marks and duration of the examination shall be 3 hours.
- The maximum marks for II B.SC, III Semester End examination shall be 75 marks and duration of the examination shall be 3 hours.
- The maximum marks for III B.SC. Semesters End examination shall be 70 marks and duration of the examination shall be 3 hours.
- Semester End examinations in theory papers and practical Examinations shall be conducted at the end of every semesters I, III & V
- 7. Discussed and recommended for organizing seminars, Guest lecturers, workshops to upgrade the knowledge of students, for the approval of the academic council.
- 8. Discussed and empowered the Head of the department of Physics to suggest the panel of paper setters and examiners to the controller of examinations.
- 9. Nil.

J. Horsechchardra Chairman

LIST OF THE COURSES REVISED/ INTRODUCED IN I, III and V SEMESTERS 2022-2023

S.N O	Course	Course Code	Offered in SEM	Type of the Paper	Year of Introductio n	Year of Revisio n	Revision /Introduce	OBE with BTL	Offerd to
1	Mechanics, waves and oscillations	PHYT11B	I	Core	2020-2021	2021- 2022	No Revision	yes	B.Sc. (MPC & MPCS)
2	Mechanics, waves and oscillations lab	PHYP11B	Ι	Core lab	2020-2021	Nil	No Revision	yes	B.Sc. (MPC & MPCS)
3	Heat and Thermodynami cs	PHYT31A	III	Core	2020-2021	2021- 2022	No Revision	yes	B.Sc. (MPC & MPCS)
4	Heat and Thermodynami cs lab	PHYP31A	III	Core lab	2020-2021	Nil	No Revision	yes	B.Sc. (MPC & MPCS)
5	ELECTRICAL APPLIANCES	SDCPHYT01	III	SDC	2020-2021	Nil	No Revision	yes	
6	Optical instruments and optometry	6A	V	Skill Enhancement course (Elective)	2022-2023	-	Introduced	yes	B.Sc. (MPC,MP CS)
7	Optical instruments and optometry lab	6A	V	Skill Enhancement course (Elective)	2022-2023	-	Introduced	yes	B.Sc. (MPC.MP CS)
8	Optical Imaging and photography	7A	V	Skill Enhancement course (Elective)	2022-2023	-	Introduced	yes	B.Sc. (MPC,MP CS)
9	Optical Imaging and photography lab	7A	V	Skill Enhancement course (Elective)	2022-2023	-	Introduced	yes	B.Sc. (MPC,MP CS)
10	Low temperature physics and refrigeration	6B	V	Skill Enhancement course (Elective)	2022-2023	-	Introduced	yes	B.Sc. (MPC,MP CS)
11	Low temperature physics and refrigeration lab	6B	V	Skill Enhancement course (Elective)	2022-2023	-	Introduced	yes	B.Sc. (MPC,MP CS)
12	Solar Energy and applications	7B	V	Skill Enhancement course (Elective)	2022-2023	-	Introduced	yes	B.Sc. (MPC,MP CS)
13	Solar Energy and applications lab	7B	V	Skill Enhancement course (Elective)	2022-2023	-	Introduced	yes	B.Sc. (MPC,MP CS)
14	Applications of Electricity and Electronics	SECPHY501 C	V	Skill Enhancement course (Elective)	2022-2023	-	Introduced	yes	B.Sc. (MPC,MP CS)
15	Applications of Electricity and Electronics lab	SECPHY501 P	V	Skill Enhancement course (Elective lab)	2022-2023	-	Introduced	yes	B.Sc. (MPC,MP CS)
16	Electronic Instrumentation	SECPHY502 C	V	Skill Enhancement course (Elective)	2022-2023	-	Introduced	yes	B.Sc. (MPC,MP CS)
17	Electronic Instrumentation lab	SECPHY502 P	V	Skill Enhancement course(Electi ve lab)	2022-2023	-	Introduced	yes	B.Sc. (MPC,MP CS)

				MARKS	MARKS	DURATION
PHYT11B	Mechanics, waves and oscillations	4	3	30	70	3 Hrs.
PHYP11B	Mechanics, waves and oscillations lab	2	2	10	40	3 Hrs.

<u>SEMESTER – I</u>

SEMESTER-III

Course	Title of the Course	Instruction Hours per week	Credit		Evaluatio	n
Code			s	CIA		SEE
				MARKS	MARKS	DURATION
		<u> </u>				
РНҮТ31А	Heat and Thermodynamics	4	3	25	75	3 Hrs.
РНҮРЗ1А	Heat and Thermodynamics lab	2	2	10	40	3 Hrs.
SDCPHY T01	ELECTRICAL APPLIANCES	2	2	10	40	2 Hrs.

<u>SEMESTER – V</u>

		Instructio			
Course Code	Title of the Course	n Hours	Credits		Evaluation
		per week			
				CIA	

				MARK		SEE
				S	MARKS	DURATION
6A	Optical instruments and optometry	3	3	30	70	3 Hrs.
6A	Optical instruments and optometry lab	3	2	25	25	3 HRS
7A	Optical Imaging and photography	3	3	30	70	3 HRS
7А	Optical Imaging and photography lab	3	2	25	25	3 HRS
6B	Low temperature physics and refrigeration	3	3	30	70	3 HRS
6B	Low temperature physics and refrigeration lab	3	2	25	25	3 HRS
7B	Solar Energy and applications	3	3	30	70	3 HRS
7B	Solar Energy and applications lab	3	2	25	25	3 HRS
SECPHY501 C	Applications of Electricity and Electronics	3	3	30	70	3 HRS
SECPHY501 P	Applications of Electricity and Electronics lab	3	2	25	25	3 HRS
SECPHY502 C	Electronic Instrumentation	3	3	30	70	3 HRS
SECPHY502 P	Electronic Instrumentation lab	3	2	25	25	3 HRS



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Title of the Paper: MECHANICS, WAVES AND OSCILLATIONS

Course Type: Co	ore (TH) SEM	ESTER: I	Max.Time: 3 Hours		
Course Code	PHYT11B	Course Delivery Method	Class Room / Blended Mode - Both		
Credits	3	CIA Marks	30		
No. of Lecture Hours / Week	4	Semester End Exam Marks	70		
Total Number of Lecture Hours per semester	60	Total Marks	100		
Year of Introduction: 2020-21	Year of Offering: 2021 -22	Year of Revision: 2021-22	Percentage of Revision: NIL		
CLASS:	I B.Sc (MPC & MP	Cs)	1		

Course Prerequisites (if any):

To be eligible for BSc Physics admission, students need to graduate 10+2 with PCBM, or PCM as compulsory subjects.

Course Description:

The students would learn about the behaviour of physical bodies it provides the basic concepts related to the motion of all the objects around us in our daily life. The course builds a foundation of various applied field in science and technology; especially in the field of mechanical engineering. The course comprises of the study laws of motion, momentum, energy, rotational motion, gravitation, special relativity and study of superposition of harmonic oscillations, waves motion (general), oscillators, sound.

Course Objectives:

- 1. provide an in-depth understanding of the principles of Newtonian mechanics and apply them to solve problems involving the dynamic motion of classical mechanical systems
- 2. explain the limitations of Newtonian mechanics for motion at very high velocities, and thus introduce the special theory of relativity
- 3. provide hands-on experience to perform experiments to study some properties of matter and oscillations
- 4. By Learning Fourier analysis, student can analyse different mechanical, optical and electro-magnetic waves
- 5. To attain the knowledge of Ultrasonic waves and apply to different fields

Course outcomes:

On successful completion of this course, the students will be able to:

- CO1: Remember the rotational kinematic relations and its applications such as freely rotating symmetric top. Comprehend the general characteristics of central forces and the application of Kepler's laws to describe the motion of planets and satellite in circular orbit through the study of law of Gravitation.
- **CO2**: Understand Newton's laws of laws of motion, reference frames, and its applications i.e., projectile motion, Rocket motion.
- **CO3**: Apply the rotational kinematic relations, the principle and working of gyroscope and it applications and the processional motion of a freely rotating symmetric top.
- CO4: Analyze the features of central forces with respect to planetary motion, waves and oscillations and formulate the problem of coupled oscillations and solve them to obtain normal modes of oscillation and their frequencies in simple mechanical systems.
- **CO5**: Figure out the formation of harmonics and overtones in a stretched string and acquire knowledge on Ultrasonic waves, their production and detection and their applications in different fields.

SYLLABUS

Unit	Learning Units	Lecture Hours
	1.Mechanics of Particles (5 hrs)	
I	Review of Newton's Laws of Motion, Motion of variable mass system,	
	Multistage rocket, Concept of impact parameter, scattering cross-section,	
	Rutherford scattering-Derivation.	12
	2.Mechanics of Rigid bodies (7 hrs)	12
	Rigid body, rotational kinematic relations, Equation of motion for a rotating	
	body, Angular momentum and Moment of inertia tensor, Euler equations,	
	Precession of a spinning top, Gyroscope, Precession of the equinoxes	
	3.Celestial mechanics	
	Central force - definition and examples, characteristics of central forces,	
	conservative nature of central forces, Equation of motion under a central force	
П	4. Orbital mechanics	12
	Kepler's laws of planetary motion- Proofs, Motion of satellites - escape	
	velocity, orbital velocity, Basic idea of Global Positioning System (GPS)	
	5.Frames of reference and transformation (5 hrs)	
	Introduction to relativity, Frames of reference - Galilean transformations,	
ш	absolute frames, Michelson-Morley experiment & negative result.	
	6. Consequences of relativistic transformations (7 hrs)	12
	Postulates of Special theory of relativity, Lorentz transformation, time	
	dilation, length contraction, variation of mass with velocity, Einstein's mass-	
	energy relation	
	7.Undamped, Damped and Forced oscillations: (07 hrs)	
	Simple harmonic oscillator, damped harmonic oscillator, forced harmonic	
	oscillator - differential equations and its solutions, Resonance, Logarithmic	
IV	decrement, Relaxation time and Quality factor.	12
	8.Fourier analysis (05 hrs)	12
	Fourier theorem (Statement & limitations), evaluation of the Fourier	
	coefficients using Fourier's theorem, analysis of periodic wave functions -	
	square wave, triangular wave.	
	9.Vibrating Strings: (07 hrs)	
	Transverse wave propagation along a stretched string, General solution of	
v	wave equation and its significance, Modes of vibration of stretched string	
	clamped at ends, Overtones and Harmonics.	12
	10.Ultrasonics: (05 hrs)	
	Ultrasonics, General Properties of ultrasonic waves, Production of ultrasonics	
	by piezoelectric and magnetostriction methods, Detection of ultrasonics,	
	Applications of ultrasonic waves, SONAR	

TEXT BOOKS

- 1. B. Sc. Physics, Vol.1, Telugu Academy, Hyderabad
- 2. Unified Physics Waves and Oscillations, Jai PrakashNath&Co.Ltd.

REFERENCE BOOKS:

- 1. Fundamentals of Physics Vol. I Resnick, Halliday, Krane, Wiley
- 2. College Physics-I. T. Bhimasankaram and G. Prasad. Himalaya Publishing House.
- 3. University Physics-FW Sears, MW Zemansky& HD Young, Narosa Publications, Delhi
- 4. Mechanics, S.G. Venkatachalapathy, Margham Publication, 2003. Waves and Oscillations. N. Subramanyam and Brijlal, VikasPulications
- 5. Waves & Oscillations. S. Badami, V. Balasubramanian and K.R. Reddy, Orient Longman.
- 6. The Physics of Waves and Oscillations, N.K. Bajaj, Tata McGraw Hill
- 7. Science and Technology of Ultrasonics- Baldevraj, Narosa, New Delhi, 2004

STUDENT ACTIVITY

- 1. Seminars
- 2. Assignments.

LIBRARY ACTIVITY

Student visit library to refer and gather information regarding seminar topics and assignments.

Course Delivery method: Face-to-face / Blended

Course has focus on: Foundation & Employability



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<u>SEMESTER – I</u>

MODEL PAPER (W.E.F 2022 - 2023)

Time : 3Hrs

Max.Marks:70M

Answer ALL the following questions, Choosing one question from (a) andone question from (b) in each question(5x14 = 70M)

1. A) i) What is Rutherford scattering? Obtain an expression for number of particles scattered per unit area. (CO1, L1)---- 10 M

(OR)

ii) What is precessional motion? Find angular velocity of precession of a spinning top.Show that the rate of precession is independent of mass but depends on the distribution of mass. (CO2, L1).----- 10M

B) i) State Newton's laws of motion and give two examples each. (CO1, L1)----4M

(OR)

ii) The kinetic energy of metal disc rotating at a constant speed of 5 revolutions per second is joules. Find the angular momentum of the disc. (CO2, L3)---- 4M

2. A) i) What is conservative force ? Show that central forces are conservative.(CO2, L2)----10 M

(OR)

ii) State Kepler's third law of motion. And prove that the square of period of revolution of a planet moving in a circular orbit round the sun is proportional to the cube of its distance from the sun. (CO2, L2)----10 M

B) i) Explain central forces with examples. (CO2, L1)----- 4 M

(OR)

ii) If the Earth be one-half of its present distance from the sun, what will be the number of days in a year (CO2, L3)----- 4 M

3.A)i) State the fundamental postulates of special theory of relativity and deduce the Lorentz transformations. (CO3,L2)----10 M

(OR)

ii) Describe the Michelson-Morley experiment and explain the physical significance of negative results. (CO3,L2)----10 M





ii) A rocket ship is 100 meter long on the ground when it is in flight, its length, is 99 eters to anobserver on the ground. What is its speed?(CO3, L3) --- 4 M

4. A) i) What are damped oscillations? Derive the differential equation of damped Harmonic oscillator and discuss the case of under damping. (L2, CO3)---- 10 M

(OR)

- ii) StateFourier Theorem and evaluate Fourier coefficients. (L2, CO4)---10 M
- B) i) What is logarithmic decrement and relaxation time? (CO4, L1)---- 4 M

(OR)

ii) If the energy note of frequency 100Hz decreases to one half of tis original value in one second, calculate the Q-factor, (CO4, L3)----- 4 M

5. A) i)What are transverse waves? Obtain the equation of velocity of transverse wave in a wire kept under tension. (L3. CO5)----- 10 M

(OR)

ii) What are ultrasonics? Describe Magnetostriction method of producing ultrasonics (L3, CO5)-----10 M

B) i)Explain overtones and harmonics. (CO5, L1)-----4M

(OR)

ii) A piezoelectric crystal has a thickness of 0.002m. If the velocity of sound wave in crystal is 5750m/s, calculate the fundamental frequency of crystal. (CO5, L3)----4M

A. G & S.G. SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE VUYYURU-521165. NAAC reaccredited at 'A' level *Autonomous -ISO 9001 – 2015 Certified* Title of the Paper: MECHANICS, WAVES AND OSCILLATIONS

Offered to: I B.Sc. (MPC&MPCs) Course Type: Core (L) Year of Introduction: 2020-21 Percentage of Revision: Nil Semester: I Hours Taught: 30 hrs. per Semester

Year of Revision: Nil

Credits: 02 Max. Time: 2 Hours

Course outcomes (Practicals):

On successful completion of this practical course, the student will be able to:

- CO 1. Perform experiments on Properties of matter such as the determination of moduli of elasticity viz., Young's modulus, Rigidity modulus of certain materials; Surface tension of water, Coefficient of viscosity of a liquid, Moment of inertia of some regular bodies by different methods and compare the experimental values with the standard values.
- **CO 2**. Know how to determine the acceleration due to gravity at a place using Compound pendulum and Simple pendulum.
- **CO 3**. Notice the difference between flat resonance and sharp resonance in case of volume resonator and sonometer experiments respectively.
- CO 4. Verify the laws of transverse vibrations in a stretched string using sonometer and comment on the relation between frequency, length and tension of a stretched string under vibration.

EXPERIMENTS LIST:

- 1. Young's modulus of the material of a bar (scale) by uniform bending
- 2. Young's modulus of the material a bar (scale) by non- uniform bending
- 3. Surface tension of a liquid by capillary rise method
- 4. Simple pendulum- normal distribution of errors-estimation of time period and the error of the mean by statistical analysis
- 5. Determination of 'g' by compound/bar pendulum
- 6. Verification of laws of vibrations of stretched string -Sonometer
- 7. Bifilar suspension Moment of inertia of a regular rectangular body.
- 8. Rigidity modulus of material of a wire-Dynamic method (Torsional pendulum)
- 9. Volume resonator experiment
- 10. Viscosity of liquid by the flow method (Poiseuille's method)
- 11. Determination of the force constant of a spring by static and dynamic method. Coupled oscillators
- 12. Determination of frequency of a bar -Melde's experiment.

Note :

9 (NINE) experiments are to be done and recorded in the lab. These experiments will

be evaluated in CIA.

- 2. For certification minimum of 7 (Seven) experiments must be done and recorded by student who had put in 75 % of attendance in the lab.
- 3. Best 6 experiments are to be considered for CIA.
- 4. 10 marks for CIA.
- 5. 40 marks for practical exam.

The marks distribution for the Semester End practical examination is as follows:

Formula/ Principle / Statement with explanation of symbols	05
Diagram/Circuit Diagram / Tabular Columns	05
Setting up of the experiment and taking readings/Observations	10
Calculations (explicitly shown) + Graph + Result with Units	05
Procedure and precautions	05
Viva-voce	05
Record	05

Total Marks

40



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Title of the Paper: HEAT AND THERMODYNAMICS

Course Type: Core (TH) SEMESTER: III N

Max.Time: 3 Hours

Course Code	РНУТ31А	Course Delivery Method	Class Room / Blended Mode - Both
Credits	3	CIA Marks	25
No. of Lecture Hours / Week	4	Semester End Exam Marks	75
Total Number of Lecture Hours per semester	60	Total Marks	100
Year of Introduction: 2020-21	Year of Offering: 2021 -22	Year of Revision: 2021-22	Percentage of Revision: NIL
CLASS:	II B.Sc (MPC & MP	Cs)	

Course Description:

The course makes the students able to understand the basic physics of heat and temperature and their relation with energy, work, radiation and matter. The students also learn how laws of thermodynamics are used in a heat engine to transform heat into work. The course contains the study of laws of thermodynamics, thermodynamic description of systems, thermodynamic potentials, kinetic theory of gases.

Course Objectives:

- 1. Introduce the microscopic approach through kinetic theory of gases and basic statistical thermodynamics
- 2. Give the fundamentals of thermodynamic systems, the laws of thermodynamics and their application to thermodynamic problems
- 3. Provide essential tools to analyze Carnot engine, heat engines and refrigerators with the help of their thermodynamic cycles
- 4. Highlight the use of mathematical methods to derive thermodynamic relationships
- 5. Analyses thermal conductivity and black body radiation

COURSE OUTCOMES

Upon successful completion of this course, students should have the knowledge and skills to:

- CO1 State the First Law and define heat, work, thermal efficiency and the difference between various forms of energy and describe energy exchange processes, reversible and irreversible process.
- CO2 Understand the microscopic behavior of molecules, interactions and the concepts of transport phenomena of heat transfer, mass transfer and momentum transfer.
- CO3 Use kinetic theory of gases to derive expressions for pressure of an ideal gas, heat capacities of solids and gases and transport properties
- CO4 Understand very low temperatures like the concept of Joule Thomson effect, Liquefaction of gases and the properties at very low temperatures.
- CO5 Ability to evaluate entropy changes in a wide range of processes and determine the reversibility or irreversibility of a process from such calculations. Examine the nature of black body radiations and the basic theories.

SYLLABUS

Unit	Learning Units	Lecture Hours
I	 Kinetic Theory of gases-Introduction, Maxwell's law of distribution of molecular velocities, Mean free path, Degrees of freedom, Principle of equipartition of energy (Qualitative ideas only), Transport phenomenon in ideal gases: viscosity, Thermal conductivity and diffusion of gases. 	12
II	 3. Introduction to Thermodynamics Introduction- Isothermal and Adiabatic processes - Work done in these processes, Heat engines - Reversible and irreversible processes, Carnot's engine and its efficiency, Second law of thermodynamics, Carnot's theorem, Thermodynamic scale of temperature and its identity with perfect gas scale. 4. Entropy Entropy and its Physical significance, change in entropy in reversible and irreversible processes; Entropy and disorder-Entropy of Universe; Temperature-Entropy (T-S) diagram and its uses, change of entropy when ice changes into steam (Qualitative). 	12
III	5Thermodynamic potentials - Internal Energy, Enthalpy, Helmholtz Free Energy, Gibb's Free Energy and their significance, Derivation of Maxwell's thermodynamic relations from thermodynamic potentials, 6.Applications of Maxwell's thermodynamic relations : (i) Clausius-Clapeyron's equation (ii) Value of C_P - C_V (iii) Value of C_P/C_V (iv) Joule-Kelvin coefficient for ideal and Van der Waals' gases	12
IV	 Low temperature Physics: (12hrs) 7. Methods for producing very low temperatures: Joule Kelvin effect - Porous plug experiment, Joule expansion, Distinction between adiabatic and Joule Thomson expansion, Expression for Joule Thomson cooling 8. Production of low temperature: Adiabatic demagnetization, Principle of Refrigeration, effects of chloro and fluoro carbons on ozone layer. 	12
V	 9. Radiation Laws: (7 hrs) Blackbody and its spectral energy distribution of black body radiation, Kirchoff's law, Wein's displacement law, Stefan-Boltzmann's law and Rayleigh-Jean's law (No derivations), Planck's law of black body radiation- Derivation, Deduction of Wein's law and Rayleigh- Jean's law from Planck's law. 10. Measurement of Radiation (5 hrs) Pyrometers: Angstrom pyrheliometer and determination Solar constant, Estimation of surface temperature of Sun. 	12

TEXT BOOKS

- 1. BSc Physics, Vol.2, Telugu Akademy, Hyderabad
- Unified Physics Vol.2, Optics & Thermodynamics, Jai Prakash Nath &Co.Ltd., Meerut

REFERENCE BOOKS:

- 1. Thermodynamics, R.C. Srivastava, S.K. Saha & Abhay K. Jain, Eastern Economy Edition.
- 2. Fundamentals of Physics. Halliday/Resnick/Walker.C. Wiley India Edition 2007
- 3. Heat, Thermodynamics and Statistical Physics-N Brij Lal, P Subrahmanyam, P S Hemne, S. Chand& Co., 2012
- 4. Heat and Thermodynamics- MS Yadav, Anmol Publications Pvt. Ltd, 2000
- 5. University Physics, HD Young, MW Zemanski Sears, Narosa Publishers, New Delhi

STUDENT ACTIVITY

- 1. Seminars
- 2. Assignments.

LIBRARY ACTIVITY

Student visit library to refer and gather information regarding seminar topics and assignments.

Course Delivery method: Face-to-face / Blended

Course has focus on: Foundation & Employability

A.G & S.G Siddhartha Degree College of Arts and Science (Autonomous), Vuyyuru - 521165

SEMESTER – III

Title of the Paper: Heat and Thermodynamics MODEL PAPER (W.E.F 2022 - 2023)

Max.Marks: 75M

Section-A

Answer ALL questions :-

1. a) Derive an expression for Maxwell's law of distribution of molecular speeds in a gas. (CO1, L1)

(OR)

b) Define coefficient of viscosity. On the basis of kinetic theory of gases, derive an expression for the coefficient of viscosity. (CO1, L1)

2. a) Describe the working of Carnot's reversible engine and derive an expression for its efficiency. (CO2, L2)

(OR)

b) What are reversible and irreversible processes? How does the entropy change in each of these processes? (CO2, L2)

3. a) Define the four thermodynamic potentials. Obtain Maxwell's thermodynamic equations using these potentials. (CO3, L3)

(OR)

b) State and explain Joule-kelvin effect. Obtain an expression for Joule-kelvin coefficient. (CO3, L3)

4. a) What is adiabatic demagnetization? How is this principle used in producing low temperatures? (CO3, L2)

(OR)

b) Explain Joule-kelvin effect. Derive an expression for Joule-Thompson cooling. (CO4, L2)

5. a) Derive the Planck's formula for the distribution of energy in black body radiation. (CO5, L2)

(OR)

b) What is a pyrometer? Describe the construction and working of Angstrom pyrheliometer (CO5, L2)



Time : 3Hrs

(5X10=50M)

Section-B

Answer any THREE of the following:

3X5=15M

2X5=10M

- 6. Write a note mean free path. (CO1, L1)
- 7. Explain the second law of thermodynamics in terms of entropy. (CO2, L2)
- 8. Prove $C_p C_v = R$ (CO3, L3)
- 9. Write the principle of refrigeration. (CO4, L3)
- 10. How did you find the solar constant. (CO5, L2)

Section-C

Answer any TWO of the following:

- 11. Find the R.M.S velocity of hydrogen at N.T.P and at C? (CO1, L3)
- 12. Calculate the efficiency of a reversible engine that operates between the temperatures 200° Cand 120° C? (CO1, L3)
- 13. Calculate the temperature inversion of helium gas. Given $a=3.44 \times 10^{-3}$ ntm⁴/mol² and b = 0.023 \times 10^{-3} m³/mol. (CO1, L3)
- 14. Find the wavelength at which maximum energy is radiated by a black at a temperature of 227°c and wien's constant is 2.877x10⁻³mk. (CO1, L3)

A. G & S.G. SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE VUYYURU-521165. NAAC reaccredited at 'A' level *Autonomous -ISO 9001 – 2015 Certified* Title of the Paper : HEAT AND THERMODYNAMICS (LAB)

Offered to : II B.Sc (MPC&MPCs) Course Type: Core (L) PHYP31A Year of Introduction: 2020-21 Percentage of Revision:NIL Semester: III Hours Taught: 30 hrs. per Semester

Year of Revision: NIL

Credits: 02 Max.Time: 2 Hours

Course Description

Students would gain practical knowledge about heat and radiation, thermodynamics, thermo emf, RTD etc. and perform various experiments.

Course Objectives:

- 1. The primary objective of this course is to provide the fundamental knowledge to understand the behaviour of thermal systems.
- 2. This course provides a detailed necessary transfer through solids, fluids, and experimental analysis, including the application and heat vacuum.
- 3. Convection, conduction, and radiation heat transfer in one and two dimensional steady and unsteady systems are examined.

COURSE OUTCOMES

Upon successful completion of this course, students should have the knowledge and skills to:

- CO1: Determine the thermal conductivity of bad conductor-Lee's method, thermal conductivity of rubber and Coefficient of thermal conductivity of copper by using Searle's apparatus.
- CO2: Study the heating efficiency of electrical kettle with varying voltages.
- CO3: Determine Specific heat of a liquid by Joule's calorimeter and study Barton's radiation correction by plotting a graph between temperature and time and Specific heat of a liquid by applying Newton's law of cooling correction.
- CO4: Study temperature variation of resistance in a thermostat.

List of experiments

- 1. Study of variation of resistance with temperature Thermistor.
- 2. Thermal conductivity of bad conductor-Lee's method
- 3. Thermal conductivity of rubber.
- 4. Measurement of Stefan's constant emissive method

- 5. Heating efficiency of electrical kettle with varying voltages.
- 6. Specific heat of a liquid –Joule's calorimeter –Barton's radiation correction
- 7. Specific heat of a liquid by applying Newton's law of cooling correction.
- 8. Thermo emf- thermo couple Potentiometer
- 9. Thermal behavior of an electric bulb (filament/torch light bulb)
- 10. Measurement of Stefan's constant

Note :

 9 (NINE) experiments are to be done and recorded in the lab. These experiments will

be evaluated in CIA.

- 2. For certification minimum of 7 (Seven) experiments must be done and recorded by student who had put in 75 % of attendance in the lab.
- 3. Best 6 experiments are to be considered for CIA.
- 4. 10 marks for CIA.
- 5. 40 marks for practical exam.

The marks distribution for the Semester End practical examination is as follows:

Formula/ Principle / Statement with explanation of symbols	05
Diagram/Circuit Diagram / Tabular Columns	05
Setting up of the experiment and taking readings/Observations	10
Calculations (explicitly shown) + Graph + Result with Units	05
Procedure and precautions	05
Viva-voce	05
Record	05

Total Marks:

A. G & S.G. SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE.

VUYYURU-521165.

NAAC reaccredited at 'A' level Autonomous -ISO 9001 – 2015 Certified **Title of the Paper: ELECTRICAL APPLIANCES**

(AS PART OF SKILL DEVELOPMENT COURSES)

Semester: III

Course Code	SDCPHYT01	Course Delivery Method	Class Room / Blended Mode - Both
Credits	2	CIA Marks	10
No. of Lecture Hours / Week	2	Semester End Exam Marks	40
Total Number of Lecture Hours per semester	30	Total Marks	50
Year of Introduction: 2020-21	Year of Offering: 2021 -22	Year of Revision: 	Percentage of Revision: NIL
CLASS :	II B.Sc		

Learning Outcomes:

By successful completion of the course, students will be able to:

- CO 1. Acquire necessary skills/hand on experience/ working knowledge on multimeters, galvanometers, ammeters, voltmeters, ac/dc generators, motors, transformers, single phase and three phase connections, basics of electrical wiring with electrical protection devices.
- CO2. Understand the working principles of different household domestic appliances.
- CO3. Check the electrical connections at house-hold but will also learn the skill to repair the electrical appliances for the general troubleshoots and wiring faults.

SYLLABUS

(6 hrs)

(10 hrs)

Voltage, Current, Resistance, Capacitance, Inductance, Electrical conductors and Insulators, Ohm's law, Series and parallel combinations of resistors, Galvanometer, Ammeter, Voltmeter, Multimeter, Transformers, Electrical energy, Power, Kilowatt hour (kWh), consumption of electrical power.

UNIT-II

Direct current and alternating current, RMS and peak values, Power factor, Single phase and three phase connections, Basics of House wiring, Star and delta connection, Electric shock, First aid for electric shock, Overloading, Earthling and its necessity, Short circuiting, Fuses, MCB, ELCB, Insulation, Inverter, UPS.

UNIT-I



Principles of working, parts and servicing of Electric fan, Electric Iron box, Water heater; Induction heater, Microwave oven; Refrigerator, Concept of illumination, Electric bulbs, CFL, LED lights, Energy efficiency in electrical appliances, IS codes & IE codes.

<u>Co-curricular Activities (Hands on Exercises):</u> (04 hrs)

[Any four of the following may be taken up]

- 1. Studying the electrical performance and power consumption of a given number of bulbs connected in series and parallel circuits.
- 2. Measuring parameters in combinational DC circuits by applying Ohm's Law for different resistor values and voltage sources
- 3. Awareness of electrical safety tools and rescue of person in contact with live wire.
- 4. Checking the specific gravity of lead acid batteries in home UPS and toppingup with distilled water.
- 5. Identifying Phase, Neutral and Earth on power sockets.
- 6. Identifying primary and secondary windings and measuring primary and secondary voltages in various types of transformers.
- 7. Observing the working of transformer under no-load and full load conditions.
- 8. Observing the response of inductor and capacitor with DC and AC sources.
- 9. Observing the connections of elements and identify current flow and voltage drops.
- 10. Studying electrical circuit protection using MCBs, ELCBs
- 11. Assignments, Model exam etc.

Reference Books:

- 1. A Text book on Electrical Technology, B.L.Theraja, S.Chand& Co.
- 2. A Text book on Electrical Technology, A.K. Theraja.
- 3. Performance and design of AC machines, M.G.Say, ELBSEdn.,
- 4. Handbook of Repair & Maintenance of domestic electronics appliances; BPB Publications
- 5. Consumer Electronics, S.P.Bali, Pearson
- 6. Domestic Appliances Servicing, K.P.Anwer, Scholar Institute Publications

A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYYURU. ACADEMIC YEAR-2022-23

SEMESTER - III COURSE CODE : SDCPHYT01 PAPER TITLE : ELECTRICAL APPLIANCES Model Paper Maximum marks : 40 M Time: 2 Hours Pass marks : 16M SECTION-A Answer any Two Questions . Each question carries 5 marks. (2X5=10Marks)

2)

1)

3)

4)

SECTION-B

Answer any THREE Questions. Each question carries 10 marks. (3X10=30M)

- 5)
- 6)
- 7)
- 8)
- 9)
- 10)

The Guidelines to be followed by the question paper setters in PHYSICS for the III-Semester - end exams. ACADEMIC YEAR-2022-23

Weightage for the question paper - ELECTRICAL APPLIANCES

syllabus	Section-A (Short answer questions)	Section-B (Essay questions)
Unit-1 (30Marks)	2	2
Unit-2 (25Marks)	1	2
Unit-3 (25Marks)	1	2

- Each Short answer question carries 5 marks in Section –A
- Each Essay question carries 10 marks in Section –B
- The Question papers setters are requested to cover all the topics in the syllabus stipulated as per the weightage given by us.



A. G & S.G. SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE, VUYYURU-521165. NAAC reaccredited at 'A' level Autonomous -ISO 9001 – 2015 Certified

Title of the Paper: OPTICAL INSTRUMENTS AND OPTOMETRY

Semester: V/VI [Skill Enhancement Course (Elective)] Offered to: III B.Sc (MPC & MPCs)

Course Type: Core (TH)

Course Code	6A	Course Delivery Method	Class Room / Blended Mode
Credits	3	CIA Marks	30
No. of Lecture Hours / Week	3	Semester End Exam Marks	70
Total Number of Lecture	45	Total Marks	100
Hours			
Year of Introduction :	Year of Offering:	Year of Revision:	Percentage of Revision: 0
2022-23	2022-23		

I. Learning Outcomes: Students at the successful completion of the course will be able to:

1. Understand the construction and working principles of various optical instruments used in daily life.

2. Acquire a critical knowledge on the various defects of eye and their correcting methods with suitable lenses.

- 3. Demonstrate skills of using biological microscope through hands on experience.
- 4. Understand the various techniques used in optometry and computer based eye testing.
- 5. Comprehend the various applications of microscopes and telescopes.

II. Syllabus: (Total Hours: 90 including Teaching, Lab, Field Training, Unit tests etc.)

UNIT-I OPTICAL MICROSCOPES (9hrs)

Introduction to Microscopes, Need of a Microscope, Different types of microscopes and their uses, Simple microscope-Construction, Magnifying power, normal adjustment; Compound microscope-Construction, Magnifying power, normal adjustment, Phase contrast microscope-Operating principle, Travelling microscope-Construction, working and uses

UNIT-II TELESCOPES (9hrs)

Introduction to Telescopes, Different types of Telescopes and their uses, Refracting Telescopes and Reflecting telescopes, Construction, working and magnifying power of Astronomical Telescope and Terrestrial Telescopes, Binoculars – working principle and applications.

UNIT-III APPLICATIONS OF OPTICAL INSTRUMENTS (9hrs)

Introductory ideas and applications of various microscopes *viz.*, (i) Optical microscopes (Compound microscope, Stereo microscope, Confocal microscope) (ii) Electron microscopes (TEM, SEM), (iii) Scanning Probe microscope (iv) Scanning Acoustic microscope and (v) X-ray microscope.

Introductory ideas and applications of various telescopes *viz.*, (i) Optical telescopes (ii) Radio telescopes (iii) Solar telescopes (iv) Infrared telescope (v) Ultraviolet telescope (vi) X-ray telescope and (vii) Gamma ray telescope

UNIT-IV OPTICAL VISION (9hrs)

Introduction to optical Vision, Eye as an optical instrument, Formation of image in the eye and the camera, Ophthalmic lenses, Power of the lenses, Far point and near points, Myopia and Hypermetropia defects, Removal of defects in vision using ophthalmic lenses, Contact lenses-Working principle, Different types of Contact lenses.

UNIT-V OPHTHALMIC TECHNIQUES AND OPTOMETRY (9hrs)

Ophthalmoscope and keratometer and their working principles, Evaluation of eye disorders, Guidelines for standardized eye chart preparation, Simple phoropter and its working principle and its uses, Checking the power of lenses, Principles of Computer based eye testing

References:

1. Optics and Optical Instruments: An Introduction by B. K. Johnson, Dover Publications.

2. Modern Optical Instruments and their construction by or ford Henry-Publisher: Biblio Life, LLC.

3. A Text Book of Optics by Brj Lal and N.Subramanyam, S.Chand& Co.

4. Practical Optics by Menn Naftly, Elsevier Science Publishing.

5. Applications of Optics in daily life | CK-12 Foundation. https://flexbooks.ck12.org >

6. Web sources suggested by the teacher concerned and the college librarian including Reading material.

Course 6A: Optical Instruments and Optometry

PRACTICAL SYLLABUS (30 Hrs. Max Marks: 50)

IV. Learning Outcomes: On successful completion of this practical course, student shall be able to:

1. List out, identify and handle various equipments like binoculars, telescopes and microscopes.

2. Learn the procedures of operation of various optical instruments.

3. Demonstrate skills on testing the power of lenses, improving the resolution of telescopes and microscopes.

4. Acquire skills in observing and measuring the power, focal length and different refractive errors of eye.

5. Perform some techniques related to testing the blood and other biological samples.

6. Understand the technique of operation of Computer eye testing and evaluation.

V. Practical (Laboratory) Syllabus: (30 hrs)

1. Evaluation of magnifying power of simple microscope.

2. Measurement of reflection and transmission coefficient of certain materials using a microscope.

3. Resolving power of telescope

4. Determination of radii of different capillary tubes using travelling microscope.

5. Refractive index of a liquid (water) using (i) concave mirror and (ii) convex lens and a plane mirror.

6. Removal of refractive errors of eye using combination of lenses.

7. Determination of power of a convex lens by finding its focal length.

VI. Lab References:

1. A Practical Guide to Experimental Geometrical Optics byYuriy A. Garbovskiy-Cambridge Univ. Press

2.https://physics.columbia.edu/sites/default/files/content/Lab%20Resources/1292%20Lab%20Ma nual.pdf

3. https://www.lnmiit.ac.in/Department/Physics/uploaded_files/lab-manual.pdf

4. Basic Optics Experiments -http://www.phys.unm.edu > Optics Lab > Basics

5. A Practical Guide to Experimental Geometrical Optics by Yuriy A. Garbovskiy, Anatoliy V. Glushchenko, Cambridge Univ. Press

6. Web sources suggested by the teacher concerned.

http://www.phy.olemiss.edu/~thomas/weblab/Optics_lab_Items/Telescope_Microscope VII. Co-Curricular Activities

(a) Mandatory: (Training of students by teacher in field related skills: (lab:10 + field: 05)

1. For Teacher: Training of students by the teacher (if necessary, by a local expert) in laboratory/field for a total of not less than 15 hours on the field techniques/skills on the familiarization of various optical instruments available in the laboratory; construction of different types of telescopes and their comparison in construction, operation and their utility and limitations; the details of construction of eye and various defects in the eye sight, emerging techniques in the design of eye lenses including contact lenses and making the student to understand on the testing of a biological sample using a clinical microscope

For Student: Students shall (individually) visit and observe the functioning of optical instruments at any one of the following places /centres like (a) pathological laboratory **or** (b) a local ophthalmologist **or** (c) a local optician to understand the various types of eye lenses **or** (d) a local computer based eye testing centre**or**(e) an optician, who fixes contact lenses **or** (f) a local cinema theatre **or** (g) a planetarium.Student shall write the observations and submit a handwritten Fieldwork/Project work not exceeding 10 pages in the given format to the teacher. 2. Max marks for Fieldwork/Project work: 05.

3. Suggested Format for Fieldwork/Project work: *Title page, student details, index page, details of place visited, observations, findings and acknowledgements.*

4. Unit tests (IE).

(b) Suggested Co-Curricular Activities

1. Training of students by related industrial experts.

2. Assignments (including technical assignments like identifying tools in the lens grinding, frame fitting, lens cleaning culture and other operational techniques with safety and security, IPR)

3. Seminars, Group discussions, Quiz, Debates etc. (on related topics).

4. Preparation of videos on tools and techniques in optical instruments and optical lenses, contact lenses.

5. Making a model microscope and measuring its magnification.

6. Making a simple astronomical telescope using two convex lenses.

7. Checking the power of your spectacles or lenses at home.

8. Students shall take up making their own (i) Telescope and (ii) Binoculars with the accessories available at home.

https://paksc.org/pk/science-experiments/physics-experiments/how-to-make-astronomical-telescope

https://kids.nationalgeographic.com/nature/article/make-a-telescope

https://learning-center.homesciencetools.com/article/how-to-make-a-telescope-optical-science-project/

http://scipop.iucaa.in/Amateurs/telemaking.html

9. Collection of material/figures/photos related to various types of lenses and their power.

10. Visit to any eye research laboratories, if available

11. Invited lectures and presentations on related topics by field/industrial experts

The Guidelines to be followed by the question paper setters in PHYSICS for the V/VI- Semester - end exams

SEMESTER – V/VI	PAPER CODE : 6A	
PAPER TITLE : OPTICAL INSTRUMENTS AND OPTOMETRY		
ACADEMIC YEAR-2022	-2023	

Weightage for the question paper :

syllabus	Section-A (Short answer questions)	Section-B (essay questions)
Unit-1 (20 Marks)	2	1
Unit-2 (25Marks)	1	2
Unit-3 (25Marks)	2	1
Unit-4 (30Marks)	2	2
Unit-5 (15 Marks)	1	2

- Each Short answer question carries 5 marks in Section –A
- Each Essay question carries 10 marks in Section –B
- The Question papers setters are requested to cover all the topics in the syllabus stipulated as per the weightage given by us.

& S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE

(AUTONOMOUS), VUYYURU.

(Accredited at "A" Grade by NAAC, Bangalore)

III B.Sc, PHYSICS SEMESTER – V/VI

PAPER CODE : 6A

PAPER TITLE : OPTICAL INSTRUMENTS AND OPTOMETRY Paper : 6 A

ACADEMIC YEAR-2022-2023

Time: 3Hours

Maximum marks: 70

Minimum marks: 28

(4X5=20M)

(5X10=50M)

MODEL PAPER

Section - A

Answer any Four of the following :-

- 1. What are the uses of travelling microscope .
- 2. Explain the need of microscope.
- 3. Explain the principle of Astronomical telescope.
- 4. Write any five uses of telescope.
- 5. Explain the principle of X-ray microscope.
- 6. Explain the principle of Ultraviolet telescope.
- 7. Distinguish between Myopia and Hypermetropia defects.
- 8. How to check the power of lenses? Explain.

<u>Section - B</u>

Answer any Five of the following :-

- 9. Briefly explain the different types of microscopes.
- 10. Explain the construction and working of travelling microscope.
- 11. Explain about Refracting and Reflecting telescopes.
- 12. Explain working principle of Binoculars. Write the applications.
- 13. Write a short note on Electron microscopes (TEM, SEM).
- 14. Discuss the applications of various telescopes.
- 15. Whatdo you mean by optical Vision ? Explain the formation of image in the eye and the camera.
- 16. Explain the working principles of ophthalmoscope and keratometer.



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Title of the Paper : Course 7A: OPTICAL IMAGING AND PHOTOGRAPHY_ Semester: V/VI

[Skill Enhancement Course (Elective)] Offered to : III B.Sc (MPC & MPCs)Course Type: Core (TH)

Course Code	7A	Course Delivery Method	Class Room / Blended Mode
Credits	3	CIA Marks	30
No. of Lecture Hours / Week	3	Semester End Exam Marks	70
Total Number of Lecture	45	Total Marks	100
Hours			
Year of Introduction :	Year of Offering:	Year of Revision:	Percentage of Revision:
2022-23	2022-23		

I. Learning Outcomes: Students after successful completion of the course will be able to:

1. Identify the different types of cameras and camera lenses according to different purposes.

2. Identify and understand the focal length of the different types of lenses

3. Acquire a critical knowledge on natural and artificial sources of light and their application in photography.

4. Demonstrate skills of camera usage especially Digital Cameras.

5. Understand the various Image development and editing techniques.

6. Comprehend the concept of different types of common shooting techniques.

II. Syllabus: (Total Hours: 90 including Teaching, Lab, Field Training, Unit tests etc.)

Unit-I: INTRODUCTION TO PHOTOGRAPHY: (9 hrs)

Photography-Introduction, working principle of a camera, Image formation in simple camera and human eye, Types of cameras, Pin-hole camera, Single Lens Reflex (SLR) camera, Twin Lens Reflex (TLR) camera, Digital Single-lens reflex camera (DSLR), Digital camera, Drone flying cameras, Care and maintenance of camera, Factors influencing choice of camera

Unit-II: DIGITAL PHOTOGRAPHY: (9 hrs)

Different types of Digital cameras and their parts, Working of DSLR camera, Types of lenses-Normal, Wide angle, telephoto, Zoom lenses, Digital Image formation, Digital camera image sensors, Size of the image, Depth of focus, Depth of field, Exposure time, Aperture, Shutter speed, ISO, filters, knowledge on pixels and their uses , resolution, Camera accessories

Unit-III: PHOTOGRAPHIC LIGHT SOURCES: (9 hrs)

Need for the light in photography, Light sources- Natural light, Sun light, Moon light, Ambient light, Artificial light sources-Flood light, Spot light, Halogen light, Halogen flash light, Digital lights, Exposure, Studio photography

Unit-IV: PHOTOGRAPHIC SHOOTING TECHNIQUES: (9 hrs)

Significance and role of Camera lens in photo shooting, Arrangement of lenses in a Camera-Positioning, Techniques involved in the use of DSLR cameras, Usage of Filters, Techniques of Photomicrography, High speed Photography with motor driven camera, Basic ideas on Underwater Photography, Medical Photography, Astronomical Photography, Infra-Red (IR) Photography, Ultra Violet (UV) Photography and Forensic Photography.

Unit-V: PHOTO MANIPULATION :(9 hrs)

Developing and printing the photographs, equipment and materials used in developing and printing, image mixing and printing, Image editing through image editing software's like Adobe Photoshop – Adjustment of Brightness, Contrast, Tonal and Colour Values, Factors influencing quality of digital image, Methods of storing and processing, Image transportation through Pendrive, CD, HDD and CLOUD [Internet]

III Reference Books:

1. Object and image; An introduction to photography by George M Craven, PHI

- 2. An Introduction to Digital Photo Imaging Agfa, 1994
- 3. Advance Photography by M. Langford.
- 4. Digital Photography-A hands on Introduction by Phillip Krejcarek, Delmer Publishers
- 5. Multimedia An Introduction by John Villamil, PHI

6. https://www.adobe.com/in/creativecloud/photography/discover/dslr-camera.html

7. Web sources suggested by the teacher concerned and the college librarian including reading material.

Course 7A: Optical Imaging and Photography

PRACTICAL SYLLABUS (30 Hrs, Max Marks: 50)

IV. Learning Outcomes: On successful completion of this practical course, student shall be able to:

1. List out, identify and understand various image formation techniques including Eye.

2. Learn the procedures of using Analog and Digital cameras.

3. Demonstrate the focusing techniques of Analog and Digital cameras.

4. Acquire skills in the editing and development of photos and videos.

5. Perform some experimental skills related to images, videos using the equipment available in the lab or in a local studio.

V. Practical (Laboratory) Syllabus: (30 hrs)

1. Construction of a simple pin hole Camera and study it's working.

2. Capture an image using a Digital Camera and apply editing techniques.

3. Understanding various image formats and convert one image format intoother (For ex: JPEG to BMP)

4. Convert a video stream into image stream by using a suitable editingsoftware.

- 5. Evaluate the number of pixels and size of digital Image.
- 6. Comparison of the quality of a 8-bit, 16-bit and 32 bit images.
- 7. Perform the reduction and enlargement of a given Digital Image.

8. Change the appearance of an image by applying the filters (For ex: from the

IR image of the given digital Image by suitable IR filter)

VI. Lab References:

1. DSLR Photography for Beginners by Brian Black

- 2. The Art of Photography by Bruce Barnbaum
- 3. Photoshop for Photographers by John Slavio
- 4. https://www.youtube.com/channel/UCwWyFRy2l6aUFMsRemP51Sw. You Tube resource.
- 5. https://www.udemy.com/course/complete-photography-course/
- 6. Web sources suggested by the teacher concerned.

VII. Co-Curricular Activities

(a) Mandatory:(*Training of students by teacher in field related skills: (lab:10 + field: 05)*:

1. For Teacher: Training of students by the teacher (if necessary, by a local expert) in laboratory/field for not less than 15 hours on the field techniques/skills of Image formation by using lenses and mirrors. Also to make students to understand the construction, operation and the Physics principles involved in a normal Camera and Digital Camera.

2. For Student: Students shall (individually) visit a local Photo studio or any such facility in a university/research organization/private and observe (i) the operation of different digital cameras, compact and SLR and in taking photographs using different types of lenses by varying aperture, shutter speed for still camera, video camera, CCTV and spy camera or (ii) the use of natural light, tungsten light, fluorescent light, electronic flash reflectors, exposure meters, studio flash and its accessories or (iii) the usage of various lighting techniques for different lenses and will do practice on special areas of photography in outdoor and indoor conditions or (iv) the different processes viz., audio video recording, mixing, editing, dubbing of sound, using different types of microphones or (v) the handling of the digital video cameras, DVD, HDD, accessories and exposure to take different common shots, dimension of images and movements as per requirement or (v) the computer system by digital editing software, printing the photographs taken by digital cameras and the image transportation to the storage media, sending photographs through E-mail and Scanning the photographs, capture frames and analysis of images and record their observations and submit a hand-written Fieldwork/Project work not exceeding 10 pages in the given format to the teacher.

3. Max marks for Fieldwork/Project work: 05.

4. Suggested Format for Fieldwork/Project work: *Title page, student details, index page, details of place visited, observations, findings and acknowledgements.*

5. Tests (IE).

(b) Suggested Co-Curricular Activities:

1. Training of students by a related skilled person from a Photo studio.

2. Assignments (including technical assignments like identifying the tools &techniques involved in photography and handling, operational techniques of different Cameras with safety and security)

3. Seminars, Group discussions, Quiz, Debates etc. (on related topics).

4. Preparation of videos on tools and techniques related to Image formation and Photographic Techniques.

5. Practice taking outdoor photographs with a digital camera in (i) Black & White and (ii) Colour in the following conditions:

Landscapes – Street / Building – Sculpture – Insect / Animal movement – Industrial plant (outside view) – Children, birds (close up / long shot / model photography)- slow and fast moving objects-Night photography etc.

6. Shooting of different areas and topics such as sports, wildlife, modeling, drama, documentary, serial, story board making, news, interview, seminar/ workshop, industrial, live broadcasting, musical event, advertisement, etc.

7. Collection of material/figures/photos related to various components of a Camera, writing and organizing them in a systematic way in a file.

8. Visits to any local Photo Studio or any Lab in universities, research organizations, private firms, etc.

9. Invited lectures and presentations on related topics by field/industrial experts.

SEMESTER – V/VI	PAPER CODE : 7A
PAPER TITLE : OPTICAL IMAGING AND	PHOTOGRAPHY
ACADEMIC YEAR-2022	-2023

Weightage for the question paper :

syllabus	Section-A (Short answer questions)	Section-B (essay questions)
Unit-1 (20 Marks)	2	1
Unit-2 (25Marks)	1	2
Unit-3 (25Marks)	2	1
Unit-4 (30Marks)	2	2
Unit-5 (15 Marks)	1	2

- Each Short answer question carries 5 marks in Section –A
- Each Essay question carries 10 marks in Section –B
- The Question papers setters are requested to cover all the topics in the syllabus stipulated as per the weightage given by us.

A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE

(AUTONOMOUS), VUYYURU.

(Accredited at "A" Grade by NAAC, Bangalore)

III B.Sc ,PHYSICS , SEMESTER

PAPER CODE: 7A

PAPER TITLE : OPTICAL IMAGING AND PHOTOGRAPHY Paper : 7 A

ACADEMIC YEAR-2022-2023

Time: 3Hours

-V/VI

Maximum marks: 70

Minimum marks: 28

MODEL PAPER

Section A

Answer any Four of the following

- 1. Explain about drone flying camera.
- 2. Write a short note on factors influencing choice of camera.
- 3. Explain the procedure of digital image formation.
- 4. What do you mean by ISO? Explain.
- 5. What do you mean by studio photography.
- 6. Explain the significance and role of camera lens in photo shooting.
- 7. Explain image transportation through pendrive.
- 8. How photographs are developed and printed?

Section – B

Answer any Five of the following :-

- 9. Explain the working principle of a camera. Mention different types of cameras.
- Briefly explain Twin Lens Reflex (TLR) camera, Digital Single-lens reflex camera (DSLR).
- 11. Explain different types of digital cameras and their parts.
- 12. Give a brief account on pixels and write their uses.
- 13. What is light? Explain various light sources used in photography.
- 14. Discuss about different artificial light sources.
- 15. Write a note on techniques involved in the use of DSLR cameras.
- 16. Explain the procedure of image editing through Adobe photoshop software.

(5X10=50 M)___

(4X5=20M)



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Title of the Paper : Low Temperature Physics & Refrigeration Semester: V/VI

[Skill Enhancement Course (Elective)] Offered to : III B.Sc (MPC & MPCs) Course Type: Core (TH)

Course Code	6B	Course Delivery Method	Class Room / Blended Mode
Credits	3	CIA Marks	30
No. of Lecture Hours / Week	3	Semester End Exam Marks	70
Total Number of Lecture	45	Total Marks	100
Hours			
Year of Introduction :	Year of Offering:	Year of Revision:	Percentage of Revision:
2022-23	2022-23		

Course Objectives:

- 1. To acquire the knowledge of producing refrigerating effect or cooling which is used in air refrigeration cycles.
- 2. To understand the different methods of producing low temperatures & necessity of low temperature in various fields.
- 3. To know the techniques of measuring low temperatures by using various thermometers with accuracy and to estimate the internal energy possessed by the system.
- 4. Gives the idea on Methodology involved in both refrigeration cycle, network of refrigerated components to understand the transient simulations of whole system.
- 5. To acquire the knowledge on benefits of Cryogenics in various fields like Preservation of biological material & food, Macroscopic quantum phenomena, Cryo surgery, Medical field, Data centers, and Satellites

Course Outcomes: Students after successful completion of the course will be able to

- 1. Identify various methods and techniques used to produce low temperatures in theLaboratory.
- 2. Acquire a critical knowledge on refrigeration and air conditioning.
- 3. Demonstrate skills of Refrigerators through hands on experience and learns aboutrefrigeration components and their accessories.
- 4. Understand the classification, properties of refrigerants and their effects on environment.
- 5. Comprehend the applications of Low Temperature Physics and refrigeration.

UNIT-I PRODUCTION OF LOW TEMPERATURE (9 hrs)

(a) Production of low temperatures-Introduction, Freezing mixtures, Joule-Thomson effect (concept only), Regenerative cooling,

(b) Different methods of liquefaction of gases, liquefaction of air, Production of liquid hydrogen and nitrogen, Adiabatic demagnetization, Properties of materials at low temperatures. Superconductivity

UNIT-II MEASUREMENT OF LOW TEMPERATURE (9 hrs)

(a) Gas thermometer and its correction and calibration, Secondary thermometers, resistance thermometers, thermocouples.

(b) Vapour pressure thermometers, Magnetic thermometers, Advantages and drawbacks of each type of thermometer.

UNIT-III PRINCIPLES OF REFRIGERATION (9 hrs)

(a) Introduction to Refrigeration- Natural and artificial refrigeration, Stages of refrigeration, Types of refrigeration - Vapor compression and vapor absorption refrigeration systems, Refrigeration cycle and explanation with a block diagram, Introductory ideas on air- conditioning.

(b) Refrigerants-Introduction, Ideal refrigerant, Properties of refrigerant, Classification of refrigerants, commonly used refrigerants, Eco-friendly refrigerants

UNIT-IV COMPONENTS OF REFIGERATOR (9 hrs)

(a) Refrigerator and its working, Block diagram, Coefficient of Performance (COP), Tons of refrigeration (TR) and Energy Efficiency Ratio (EER)

(b) Refrigerator components: Types of compressors, evaporators and condensers and their functional aspects, defrosting in a refrigerator, Refrigerant leakage and detection

UNIT-V: APPLICATIONS OF LOW TEMPERATURE &

REFRIGERATION (9 hrs.)

(a) Applications of Low temperatures: Preservation of biological material, Food freezing, liquid nitrogen and liquid hydrogen in medical field, Superconducting magnets in MRI- Tissue ablation (cryosurgery) - Cryogenic rocket propulsion system.

(b) Applications of refrigeration: Domestic refrigerators, Water coolers, Cold treatment of metals, Construction field, Cold storages, Ice plants, Food preservation methods, Chemical and Process industries, Desalination of water, Data centers (Field visit and it's report).

References:

- 1. Heat and Thermodynamics by Brij Lal &N.Subramanyam, S.Chand Publishers.
- 2. Thermal Physics by S C Garg, R M Bansal & C K Ghosh, McGrawHill Education,India
- 3. Heat and Thermodynamics by M MZemansky, McGrawHill Education (India).
- 4. Low-Temperature Physics by Christian E. & Siegfried H., Springer.
- 5. Thermal Engineering by S. Singh, S.Pati, Ch:18 Introduction to Refrigeration.
- 6. The Physics Hyper Text Book. Refrigerators.https://physics.info/refrigerators/
- 7. Refrigeration and Air Conditioning by Manohar Prasad, New age international (P)limited, New Delhi
- 8. A course in Refrigeration and Air Conditioning by S.C. Arora and S. Domkundwar, Dhanpatrai and sons, Delhi
- 9. https://trc.nist.gov/cryogenics/Papers/Revi ew/2017-Low_Temperature_Applications_and_Cha llenges.pdf
- 10.

https://nptel.ac.in/content/storage2/courses/112105129/pdf/RAC%20Lecture%203.pdff

11. Other Web sources suggested by the teacher concerned and the reading material.<u>https://nptel.ac.in</u>

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PHYSICS	Semester – V/VI	2022-2023	B.Sc. (MPC&MPCs)

Credits – 2

TITLE : 6B : Low Temperature Physics & Refrigeration Lab

Learning Outcomes: On completion of practical course, student shall be able to

- 1. List out, identify and handle equipment used in refrigeration and low temperature lab.
- 2. Learn the procedures of preparation of Freezing Mixtures.
- 3. Demonstrate skills on developing various Freezing mixtures and materials and theirapplications in agriculture, medicine and day to day life.
- 4. Acquire skills in observing and measuring various methodologies of very lowtemperatures
- b. Perform some techniques related to Refrigeration and Freezing in daily life.

Practical (Laboratory) Syllabus: (Max marks: 50))

- 1. Record the Principles and applications of Refrigerators and Freezers.
- 2. Measure the temperatures below Melting point of Ice using a thermometer available in the Lab.
- 3. Make a freezing mixture by adding different salts viz., Sodium chloride, Potassium Hydrate (KOH), Calcium chloride to ice in different proportions and observe the temperature changes.
- 4. Study the operation of a refrigerator and understand the working of different parts.
- 5. Study the properties of refrigerants like chlorofluorocarbonshydrochlorofluoro- carbons and record the lowest temperatures obtained.
- 6. Consider a simple faulty refrigerator and try to troubleshoot the simple problems by understanding its working.
- 7. Understand the practical problem of filling the Freon Gas into the Refrigerator.
- 8. Get the Liquid Nitrogen or Liquid Helium from nearby Veterinary Hospital and measure their temperatures using chromel-alumel thermocouple or mercury thermometer and observe their physical properties like colour, smell etc and precautions to be taken for their safe handling.
- 9. Preparation of freeze drying food with Dry ice and liquid nitrogen
- 10. Preparation of freeze drying food with liquid nitrogen

The Guidelines to be followed by the question paper setters in PHYSICS for the V/VI- Semester - end exams

SEMESTER – V/VI	PAPER CODE : 6B	
PAPER TITLE : Low Temperature Physics & Refrigeration		
ACADEMIC YEAR-2022	-2023	

Weightage for the question paper :

syllabus	Section-A (Short answer questions)	Section-B (essay questions)
Unit-1 (20 Marks)	2	1
Unit-2 (25Marks)	1	2
Unit-3 (25Marks)	2	1
Unit-4 (30Marks)	2	2
Unit-5 (15 Marks)	1	2

- Each Short answer question carries 5 marks in Section –A
- Each Essay question carries 10 marks in Section –B
- The Question papers setters are requested to cover all the topics in the syllabus stipulated as per the weightage given by us.



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III B.Sc PHYSICS , SEMESTER – V/VI

PAPER CODE : 6B

PAPER TITLE : LOW TEMPERATURE PHYSICS & REFRIGERATION

ACADEMIC YEAR-2022-2023

Time: 3Hours

Maximum marks: 70 <u>MODEL PAPER</u> <u>Section A</u>

Minimum marks: 28

Answer any Four of the following

(4X5=20M)

- 1. Explain Joule Thomson effect. L2, CO1
- 2. Explain the properties of materials at low temperatures.L2, CO1
- 3. Write about Resistance thermometer. L1, CO2
- 4. Explain the advantages and drawbacks of magnetic thermometers. L2, CO2
- 5. Explain briefly refrigeration by vapor absorption method. L2, CO3
- 6. What is an ideal refrigerant?L1,CO3.
- 7. Explain the term Energy Efficiency ratio. L1, CO4
- 8. Explain the working of water coolers. L3, CO5

Section -B

Answer any FIVE of the following	(5X10=50M)
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- 9. Explain the liquefaction of Air with neat diagram. L2, CO1
- 10. Explain the production of low temperatures by adiabatic demagnetization method .

		L2, CO-1
11. Explain abo	ut gas thermometers and their calibration.	L3, CO2
12. Explain vap	our pressure thermometer.	L3, CO2
13. Explain Nat	ural and artificial refrigeration & various stages involved	in refrigeration
		L2, CO3
14. Explain var	ious types of refrigerants and their properties.	L2, CO3 .
15. Explain the	e principle & working of refrigerator with block diagram	L3, CO4
16 . Explain the	applications of low temperatures in various fields.	L3,CO5.



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Title of the Paper: 7 B: Solar Energy and Applications, Semester: V/VI

[Skill Enhancement Course (Elective)] Offered to : III B.Sc (MPC & MPCs) Course Type: Core (TH)

Course Code	7B	Course Delivery Method	Class Room / Blended Mode
Credits	3	CIA Marks	30
No. of Lecture Hours / Week	3	Semester End Exam Marks	70
Total Number of Lecture	45	Total Marks	100
Hours			
Year of Introduction :	Year of Offering:	Year of Revision:	Percentage of Revision:
2022-23	2022-23		

Course Objectives:

- 1. Acquire knowledge on solar radiation principles with respect to solar energy estimation.
- 2. Get familiarized with various collecting techniques of solar energy and its storage
- 3. Learn the solar photovoltaic technology principles and different types of solar cells for

energy conversion and different photovoltaic applications.

Course Outcomes:

After successful completion of the course, the student will be able to:

- 1. Understand Sun structure, forms of energy coming from the Sun and its measurement.
- 2. Acquire a critical knowledge on the working of thermal and photo voltaic collectors.
- 3. Understand testing procedures and fault analysis of thermal collectors and PV modules.
- 4. Comprehend applications of thermal collectors and PV modules.

Syllabus:

Unit-I: BASIC CONCEPTS OF SOLAR ENERGY

(a) Spectral distribution of solar radiation, Solar constant, zenith angle and Air-Mass, standard time, local apparent time, equation of time, direct, diffuse and total radiations.

(b) Pyroheliometer-workingprinciple,directradiationmeasurement,PyrometerworkingPrinciple,diffuseradiation measurement, Distinction between the two meters.

Unit-II: SOLAR THERMAL COLLECTORS(10hrs)

(a) Solar Thermal Collectors-Introduction, Types of Thermal collectors, Flat plate collector – liquid heating type, Energy balance equation and efficiency, Evacuated tube collector, collect or overall heat loss co efficient.

(b) Definitions of collector efficiency factor, collector heat-removal factor and collector flow factor, Testing of flat-plate collector, solar water heating system, natural and forced circulation types. Concentrating collectors, Solar cookers, Solar dryers, Solar declinators.

Unit-III : FUNDAMENTALS OF SOLARCELLS (10hrs)

(a) Semi conductor interface, Types, homo junction, hetero junction and Schottky barrier, advantages and drawbacks, Photo voltaic cell, equivalent circuit, output parameters (Field Visit and its report), conversion efficiency, quantum efficiency (b)Measurement of IV characteristics, series and shunt resistance, their effect on efficiency, Effect of light intensity, inclination and temperature on efficiency

Unit-IV: TYPESOFSOLARCELLSANDMODULES(10hrs)

(a)Types of solar cells, Crystalline silicon solar cells, I-V characteristics, poly-Sicells, Amorphous silicon cells, Thin film solar cells-CdTe/CdSandCuInGaSe2/CdS cell configurations, structures, advantages and limitations

(b)Multi junction cells – Double and triple junction cells. Module fabrication steps, Modules in series and parallel, Bypass and blocking diodes.

Unit-V: SOLAR PHOTOVOLTAIC SYSTEMS(10hrs)

(a) Energy storage in PV systems, Energy storage modes, electrochemical storage, Batteries, Primary and secondary.

(b) Solid-state battery, Molten solvent battery, lead acid battery and dry batteries, Mechanical storage –Flywheel, Electrical storage –Super capacitor

References:

- 1. Solar Energy Utilization by G. D. Rai, Khanna Publishers
- 2. Solar Energy- Fundamentals, design, modelling and applications by G.N. Tiwari, Narosa Publications, 2005.
- 3. Solar Energy-Principles of thermal energy collection & storage by S.P. Sukhatme, TataMc-GrawHill Publishers, 1999.
- 4. Science and Technology of Photo voltaics, P. Jayarama Reddy, CRC Press(Taylor &Francis Group), Leiden &BS Publications,Hyderabad,2009.
- 5. Solar Photo voltaics-Fundamentals, technologies and applications, Chetan Singh Solanki, PHI Learning Pvt. Ltd.,

6.

Websourcessuggested by the teacher concerned and the college librarian including reading material.

- (a) $\underline{https://courses.edx.org/c4x/DelftX/ET.3034TU/asset/solar_energy_v1.1.pdf}$
- (b)

https://www.sku.ac.ir/Datafiles/BookLibrary/45/John%20A.%20Duffie,%20

William%2 0A.%20Beckman(auth.)-Solar%20Engineering%20of%20Thermal%20Processes,%20Fourth%20Editi on%20(2013).pdf

Solar Energy and Applications – Practical (lab)work (MaxMarks:50)

Learning Outcomes: On successful completion of this practical course, student shall be able to:

- 1. Listoutandidentifyvariouscomponentsofsolarthermalcollectorsandsystems, solar photo voltaic modules and systems.
- 2. Learn the procedures for measurement of direct, global and diffuse solar radiation,I-Vcharacteristics and efficiency analysis of solar cells and modules.
- 3.

Demonstrateskillsacquiredinevaluatingtheperformanceofsolarcell/moduleinconnecting them appropriately to get required power output.

- 4. Acquire skills in identification and elimination of the damaged panels without affecting the output power in a module / array.
- 5.

Perform procedures and techniques related to general maintenance of solar thermal and photovoltaic modules.

I. **Practical(Laboratory)** Syllabus: (30hrs)(Max.50Marks)

- 1. Measurement of direct radiation using pyrheliometer.
- 2. Measurement of global and diffuse radiation using pyranometer.
- 3. Evaluation of performance of a flat plate collector
- 4. Evaluation of solar cell / module efficiency by studying the I –V measurements.
- 5. Determination of series and shunt resistance of a solar cell/module.
- 6. Determination of efficiency of two solar cells/ modules connected in series.
- 7. Determination of efficiency of two solar cells/ modules connected in parallel.
- 8. Study the effect of input intensity on the performance of solar cell / module.
- 9. Study the influence of cell /module temperature on the efficiency.
- 10. Study the effect of cell / module inclination on the efficiency.

The Guidelines to be followed by the question paper setters in PHYSICS for the V/VI- Semester - end exams

SEMESTER – V/VI	PAPER CODE : 7B		
PAPER TITLE : Solar Energy and Applications			
ACADEMIC YEAR-2022-2023			

Weightage for the question paper :

syllabus	Section-A (Short answer questions)	Section-B (essay questions)
Unit-1 (20 Marks)	2	1
Unit-2 (25Marks)	1	2
Unit-3 (25Marks)	2	1
Unit-4 (30Marks)	2	2
Unit-5 (15 Marks)	1	2

- Each Short answer question carries 5 marks in Section –A
- Each Essay question carries 10 marks in Section –B
- The Question papers setters are requested to cover all the topics in the syllabus stipulated as per the weightage given by us.



A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYYURU.

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III B.Sc , PHYSICS SEMESTER – V/VI

PAPER CODE : 7B

PAPER TITLE : SOLAR ENERGY AND APPLICATIONS

ACADEMIC YEAR-2022-2023

Time: 3Hours

Maximum marks: 70

MODEL PAPER

Answer any **Four** of the following

1. Distinguish direct and diffuse radiations. L2, CO1

- 2. How can you measure direct radiation? L3, CO1
- 3. What is collector heat removal factor and collector flow factor ? L3, CO2
- 4. Explain Testing of Flat Plate Collector . L1, CO2
- 5. What is schottky barrier? L1, CO3
- 6. Explain about I-V characteristics of solar cell. L1, CO3
- 7. Explain Advantages and Limitations of solar cells. L3, CO4
- 8. Write about super capacitor. L1, CO5

Section - B

Answer any FIVE of the following

(5X10=50M)

Minimum marks: 28

(4X5=20M)

- 9. Explain spectral distribution of solar radiation. L1, CO1
- 10. Describe the working of pyroheliometer. L1, CO1
- 11. Write about Flat plate collector and its efficiency. L1, CO2
- 12. What are the types of solar water heating system? Explain natural circulation type. L2, CO2

13. Define homo junction and hetero junction. What are the advantages and drawbacks? L2, CO3 $$\rm L2, CO3$$

14.	Explain the effect of light intensity, inclination and temperature on effici	ency of
PVc	cell.	L1, CO3

15. What are the types of solar cells? Write about CdTe/Cds solar cell. L2, CO4

16 . Write about various energy storage modes.L2, C05



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Domain Subject: **PHYSICS** Title of the Paper : APPLICATIONS OF ELECTRICITY & ELECTRONICS Semester: V/VI

[Skill Enhancement Course (Elective)] Offered to : III B.Sc (MPC & MPCs) Course Type: Core (TH)

Course Code	SECPHY501C	Course Delivery Method	Class Room / Blended Mode
Credits	3	CIA Marks	30
No. of Lecture Hours / Week	3	Semester End Exam Marks	70
Total Number of Lecture	45	Total Marks	100
Hours			
Year of Introduction :	Year of Offering:	Year of Revision:	Percentage of Revision:
2022-23	2022-23		

Course Objectives:

- To help students to understand the principles and laws of electricity which is essential to constantly emerging newest technologies
- To create interest among the students about the communication systems by studying electricity and electronics
- Students will be able to understand applications of passive elements, AC, DC circuits and power supplies

Course Outcomes:

At the end of this course, students should be able to:

- CO1 Understand the types of resistors, Inductors and capacitors and its applications
- CO2 Distinguish between AC and DC sources and understand about the batteries and Network theorems for DC circuits
- CO3 Explain the working principle and construction of Generators and transformers
- CO4 Learn the applications of EM induction and power supplies

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Unit	Learning Units	Lecture Hours
	UNIT-I: INTRODUCTION TO PASSIVE ELEMENTS	
Ι	 a) Passive elements Resistor - Types of Resistors, Color coding, Combination of Resistors – Series combination (Voltage division), Parallel combination (Current division), Ohms Law and its limitation. Inductor - Principle, Types of Inductors. Capacitor - Principle, Charging and discharging of a Capacitor, Types of Capacitors. b) Applications of Passive elements: Applications of a Resistor as a heating element in heaters and as a fuse element. Applications of Inductors, Application of choke in a fan and in a radio tuning circuit, Series resonance circuit as a Radio tuning circuit. Applications of Capacitor in power supplies, motors (Fans). 	9
Π	 UNIT-II: POWER SOURCES (BATTERIES) a) Power sources: Types of power sources-DC & AC sources, Different types of batteries, Rechargeable batteries - Lead acid batteries, Li-ion batteries, Series, Parallel & Series-Parallel configuration of batteries b) Network Theorems for DC circuits Thevenin's theorem, Norton's theorem, Maximum Power transfer theorem, Constant Voltage source - Constant Current Source-Applications of Current sources & Voltage sources. 	9
III	 UNIT-III: ALTERNATING & DIRECT CURRENTS a) A.C Generator, Construction and its working principle, DC Generator, Construction and its working principle, advantages and disadvantages, Differences between DC and AC generators b) Transformers- Construction and its working principle, Open circuit and short circuit tests, Types of Transformers - Step-down and Step-up Transformers, Relation between primary and secondary turns of the transformer with emf, Use of Transformer in a regulated Power supply 	9
IV	 UNIT-IV: MODULATION CIRCUITS (Skill Based) a) Amplitude modulation: Amplitude modulation, modulation index, Waveforms, Power relations, AM transmitter, AM Receiver, Demodulation, Diode detector b) Frequency modulation: Frequency modulation, modulation index, Waveforms, FM Transmitter, FM Receiver 	9
V	 Unit-V: Applications of EM Induction & Power Supplies (Skill Based) a) DC motor – Construction and operating principle, Calculation of power, voltage and current in a DC motor, Design of a simple Motor (Fan) with suitable turns of coil b) Working of a DC regulated power supply, Construction of 5 volts regulated power supply, Design of a step-down (ex:220-12V) and step-up (ex:120-240V) transformers-Simple Design of FM Radio circuit using LCR series resonance (tuning) circuit, Design of a simple 5 volts DC charger 	9

References:

1. Grob's Basic Electronics by Mitchel Schultz , TMH or McGraw Hill

2. Electronic and Electrical Servicing by Ian Robertson Sinclair, John Dunton, Elsevier

Publications

3. Troubleshooting Electronic Equipment by R.S.Khandapur, TMH

4. Web sources suggested by the teacher concerned and the college librarian including reading material.

Course : Applications of Electricity & Electronics

PRACTICAL (Laboratory) SYLLABUS (Max Marks: 50)

EXPERIMENTS LIST

Minimum SIX experiments are to be done and recorded

- 1. Measurement of R using Color coding of Resistors and measurement of R using multimeter Resistors of different values, Multimeters
- Connect two or three resistors or capacitors or inductors and measure the Series, Parallel Combination values using a Multimeter and compare the values with the calculated values - Capacitors of different values
- 3. Use the Digital Multimeter and Analog Multimeter to measure the output voltage of an AC & DC power supply Digital Multimeters, Analog Multimeters
- Use the Multimeter to check the functionality of a Diode and Transistor. Also test whether the given transistor is PNP or NPN - Different types of Transistors and Diodes
- 5. Construct a series electric circuit with R, L and C having an AC source and study the frequency response of this circuit. Find the Resonance Frequency. Series Resonance Experiment (Function generators)
- 6. Construct a Parallel electric circuit with R, L & C having an AC source and study the frequency response of this circuit .Find the resonant frequency. Parallel Resonance Experiment (Function generators)
- 7. Test whether a circuit is a Open circuit or Short Circuit by measuring continuity with Multimeter and record your readings. Experimental Kit to do the tests
- 8. AM Generation Kit
- 9. FM generation Kit

Project Work:

- 1. Acquainting with the soldering techniques
- 2. Design and Construction of a 5 Volts DC unregulated power supply
- 3. Construction of a Step down Transformer and measurement of its output voltage. And to compare it with the calculated value.

Lab References:

- 1. Laboratory Manual for Introductory Electronics Experiments by Maheshwari, L.K. Anand, M.M.S., New Age International (P) Ltd.
- 2. Electricity-Electronics Fundamentals: A Text-lab Manual by <u>Paul B. Zbar</u>, <u>Joseph</u> <u>Sloop</u>, & <u>Joseph G. Sloop</u>, McGraw-Hill Education
- 3. Laboratory Manual Basic Electrical Engineering by Umesh Agarwal, Notion Press
- 4. Basic Electrical and Electronics Engineering by <u>S.K. Bhattacharya</u>, Pearson Publishers.
- 5. Web sources suggested by the teacher concerned.

The Guidelines to be followed by the question paper setters in PHYSICS for the V/VI- Semester - end exams

SEMESTER – V/VI	PAPER CODE : SECPHY501C		
PAPER TITLE : Applications of Electricity & Electronics			
ACADEMIC YEAR-2022-2023			

Weightage for the question paper :

syllabus	Section-A (Short answer questions)	Section-B (essay questions)
Unit-1 (30 Marks)	2	2
Unit-2 (30Marks)	2	2
Unit-3 (30Marks)	2	2
Unit-4 (15Marks)	1	1
Unit-5 (15 Marks)	1	1

- Each Short answer question carries 5 marks in Section –A
- Each Essay question carries 10 marks in Section –B
- The Question papers setters are requested to cover all the topics in the syllabus stipulated as per the weightage given by us.

A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE

(AUTONOMOUS), VUYYURU.

(Accredited at "A" Grade by NAAC, Bangalore)

III B.Sc ,PHYSICS SEMESTER – V/VI

PAPER CODE : SECPHY501C

PAPER TITLE : APPLICATIONS OF ELECTRICITY & ELECTRONICS

ACADEMIC YEAR-2022-2023

Time: 3Hours

Maximum marks: 70

Minimum marks: 28

MODEL PAPER

Section – A

Answer any Four of the following

- 1. What is Ohm's law? Explain. (CO1, L1)
- 2.. Explain the Series resonance circuit as a Radio tuning circuit. (CO1, L1)
- 3. Explain series-parallel configuration of batteries. (CO2, L1)
- 4. Write the applications of current and voltage sources. (CO2, L1)
- 5. Write the Differences between DC and AC generators. (CO3, L2)
- 6. Explain the use of a Transformer in a regulated Power supply. (CO3, L1)
- 7. Briefly explain the concept of demodulation. (CO4, L1)
- 8. Write a short note on step-down and step-up transformers. (CO5, L1)

Section - B

Answer any FIVE of the following

9. Briefly explain the different types of resistors and capacitors. (CO1, L1)

10. Write a note on applications of passive and active elements. (CO1, L1)

- 11. Describe Li- ion batteries. (CO2, L2)
- 12. Briefly explain the Thevenin's theorem. (CO2, L2)
- 13. Explain the construction and working principle of AC generator. (CO3, L1)

14. Explain the construction and working principle of Transformers. (CO3, L1)

- 15. What is amplitude modulation? Explain. (CO4, L2)
- 16. Explain the construction and operating principle of DC motor. (CO5, L1)



(4X5=20M)

(5X10 = 50M)

(110 2010)

A. G & S.G. SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE VUYYURU-521165. NAAC reaccredited at 'A' level Autonomous -ISO 9001 – 2015 Certified

Domain Subject: PHYSICS

Title of the Paper : ELECTRONIC INSTRUMENTATION Semester: V/VI

[Skill Enhancement Course (Elective)] Offered to : III B.Sc (MPC & MPCs)Course Type: Core (TH)

Course Code	SECPHY502C	Course Delivery Method	Class Room / Blended Mode
Credits	3	CIA Marks	30
No. of Lecture Hours / Week	3	Semester End Exam Marks	70
Total Number of Lecture	45	Total Marks	100
Hours per semester			
Year of Introduction :	Year of Offering:	Year of Revision:	Percentage of Revision:
2022-23	2022-23		

Course Objectives:

- Explain basic concepts and definitions in measurement.
- Describe the bridge configurations and their applications.
- Elaborate discussion about the importance of electronic instruments

COURSE OUTCOMES

On successful completion of this course, the students will be able to:

- **CO1** Understand the basic measurements of Instruments (accuracy, precision, range, resolution, sensitivity and errors). Understand the theory, working principle, specifications and significance of Multimeter.
- **CO2** Describe the function of basic building blocks of Cathode Ray Oscilloscope. Measure the appropriate parameters (Voltage, Time Period, Frequency and Phase angle)
- CO3 Understand the A/D & D/A converters and display instruments
- CO4 Gain knowledge about amplifiers, oscillators and biomedical instruments
- **CO5** Understand the fundamental theory of Transducers and bridges

SYLLABUS

Unit	Learning Units	Lecture Hours
I	 UNIT-1 INTRODUCTION TO INSTRUMENTS a) Basic of measurements: Instruments accuracy, precision, sensitivity, resolution, range, errors in measurement, Classification of Instruments, Analog instruments & Digital Instruments, Construction and working of an Analog Multimeter and Digital Multimeter (Block diagram approach), DC Voltmeter and AC Voltmeter, Sensitivity, Sources of errors in the Measurement of resistance, voltage and current b) Specifications of multimeter and their significance, Basic ideas on Function generator (brief explanation)Balancing and damping Moving iron instruments &PMMC instruments - extension of range. 	9
П	 UNIT-II OSCILLOSCOPE a) Cathode ray oscilloscope – Principle and block diagram of CRO - Cathode Ray Tube – functioning – various controls b) Applications CRO: Measurement of voltage (dc and ac), frequency& time period, Different types of oscilloscopes and their uses, Digital storage Oscilloscope 	9
III	 UNIT-III TRANSDUCERS AND BRIDGES a) Classification of Transducers, Resistive, Capacitive & Inductive transducers, Piezoelectric transducer, Photo transducer, Digital transducer. b)DC bridge – Wheatstone's bridge, AC Bridges - Measurement of Inductance and Capacitance – Maxwell's bridge, Hays bridge 	9
IV	 UNIT-IV ADC AND DAC &DISPLAY INSTRUMENTS a)A/D & D/A converters - Binary ladder, A/D converters - continuous type, integrating type, successive approximation type. b)Introduction to Display devices, LED Displays, Seven Segment Displays, Construction and operation (Display of numbers). 	9
V	 UNIT-V AMPLIFIERS, OSCILLATORS & BIOMEDICAL INSTRUMENTS (9hrs) a) Amplifiers – Classification of amplifiers, Coupling amplifiers – RC Coupled amplifier – frequency response characteristics (no derivation), Feedback in Electronic circuits – Positive and Negative feedback, Barkhausen criteria, RC phase shift oscillator b) Basic operating principles and uses of (i) Clinical thermometer (ii) Stethoscope (iii) ECG machine (iv) Radiography (v) Ultrasound scanning 	9

Reference Books:

- 1. Electronic Instrumentation by H.S.Kalsi ,TMH Publishers
- 2. Electronic Instrument Hand Book by Clyde F. Coombs ,McGraw Hill
- 3. Introduction to Biomedical Instrumentation by Mandeep Singh, PHI Learning.
- 4. Electronic Instrumentation WD Cooper
- 5. Electrical and Electronic Instrumentation AK Sawhany
- 6. A text book in electrical technology by B.L.Thereja (S.Chand&Co)
- 7. Biomedical Instrumentation and Measurements by Leslie Cromwell, Prentice Hall India.
- 8. Electronic Measurements and Instrumentation by Kishor, K Lal, Pearson, New Delhi
- 9. Electrical and Electronic Measurements by Sahan, A.K., Dhanpat Rai, New Delhi
- 10. Electronic Instruments and Measurement Techniques by Cooper, W.D. Halfrick,

A.B., PHI Learning, New Delhi

11. Web sources suggested by the teacher concerned and the college librarian including reading material.

Course : Electronic Instrumentation- PRACTICAL SYLLABUS

Practical (Laboratory) Syllabus:(Max Marks:50)

Minimum SIX experiments are to be done and recorded

- 1. Familiarization of digital multimeter and its usage in the measurements of (i) resistance (ii) current, (iii) AC & DC voltages
- 2. Measure the AC and DC voltages, frequency using a CRO and compare the values measured with other instruments like Digital multimeter.
- 3. Formation of Sine, Square wave signals on the CRO using Function Generator and measure their frequencies. Compare the measured values with actual values.
- 4. Display the numbers from 0 to 9 on a single Seven Segment Display module by applying voltages.
- 5. Displacement transducer LVDT
- 6. A.C Impedance and Power Factor.
- 7. Maxwell's Bridge Determination of Inductance.
- 8. Measurement of body temperature using a digital thermometer and list out the error and corrections.
- 9. Measurement of Blood Pressure of a person using a B.P. meter and record your values and analyze them.
- 10. Display the letters **a** to **h** on a single Seven Segment Display module by applying voltages.
- 11. Get acquainted with an available ECG machine and study the ECG pattern to understand the meaning of various peaks
- 12. Observe and understand the operation of a Digital Pulseoxymeter and measure the pulse rate of different people and understand the working of the meter.

VI. Lab References:

1.Electronic Measurement and Instrumentation by J.P. Navani. ,S Chand & Co Ltd 2.Principles of Electronic Instrumentation by A De Sa, Elsevier Science Publ.

3. Electronic Measurements and Instrumentation by S.P.Bihari, YogitaKumari, Dr. Vinay

Kakka, Vayu Education of India .

4.Laboratory Manual For Introductory Electronics Experiments by Maheshwari, New Age

International (P) Ltd., Publishers.

5.Electricity-Electronics Fundamentals: A Text-lab Manual by Paul B. Zbar ,Joseph Sloop, & Joseph G. Sloop , McGraw-Hill Education.

6.Web sources suggested by the teacher concerned.

The Guidelines to be followed by the question paper setters in PHYSICS for the V/VI- Semester - end exams

SEMESTER – V/VI	PAPER CODE : SECPHY502C	
PAPER TITLE : ELECTRONIC INSTRUMENTATION		
ACADEMIC YEAR-2022-2023		

Weightage for the question paper :

syllabus	Section-A (Short answer questions)	Section-B (essay questions)
Unit-1 (30 Marks)	2	2
Unit-2 (25Marks)	1	2
Unit-3 (30Marks)	2	2
Unit-4 (15Marks)	1	1
Unit-5 (20 Marks)	2	1

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III B.Sc ,PHYSICS , SEMESTER – V/VI PAPER CODE : SECPHY502C

PAPER TITLE : ELECTRONIC INSTRUMENTATION

ACADEMIC YEAR-2022-2023

Time: 3Hours

Maximum marks: 70

Minimum marks: 28

(4X5=20M)

MODEL PAPER

Section - A

Answer any Four of the following

- 1. Mention the difference between accuracy and precession of a measurement.(CO1, L1)
- 2. Write the uses of function generator. (CO1, L2)
- 3. Write a short note on digital transducer. (CO2, L1)
- 4. What are the various applications of CRO?(CO2, L2)
- 5. Explain about DC bridge ?
- 6. Explain LED display systems. (CO4, L1)
- 7. What is Barkhausen criteria? (CO5, L1)
- 8. Explain the importance of ultrasound scanning. (CO5, L1)

Section -B

Answer any FIVE of the following :

(5X10 = 50 M)

9. Define error. Mention different types of Errors. Explain any three types of errors associated with measurements. (CO1, L2)

10. What is a multimeter? What are the advantages of analog multimeter? How do we measure voltage using analog multimeter? (CO1, L2)

11.Describe the principle and working of CRO.(CO2, L1)

- 12. Write a brief note on different types of oscilloscopes and their uses.(CO2, L1)
- 13. Explain in brief Piezoelectric transducer and Photo transducer.(CO3, L1)
- 14. Discuss about Wheatstone's bridge.(CO3, L1)
- 15. Explain A/D and D/A converters.(CO4, L1)
- 16. What is an amplifier? Explain RC coupled amplifier.(CO5, L2)