UG PROGRAM (4 Years Honors)
CBCS - 2020-21

B.Sc
PHYSICS

Syllabus and Model Question Papers

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Note: BOS is to providefinal soft copy in PDF and word formats and four copies of hard copies in bounded form to the office of Dean Academic affairs.

1. Resolutions of the Board of Studies

Meeting held on: Dt.22.01.2021.....Time:10.00AM
At: ANUR, Convention Hall, Rjy

Agenda:

1. Adoption of vised-common program structure and revising/updating course-wise syllabi as per guidelines issued by APSHE.
2. Adoption of regulations on scheme of examination and marks/grading system of university UG programme.
3. Preparationof Model Courses in prescribed format.
4. List ofequipment/software requirement for each lab/ practical.
5. Eligiblity of student joining in the course.
6. Eligiblity of faculty for teaching the course.
7. Specific instructions to the teachers/ Course-setters / CS/ Course Evaluator.
8. List of Course-setters/ Course evaluators.

Members present:

1. Dr. K. Srinivas Rao Chairman, VSM College (A), Ramachandrapuram.Ao
2. Dr. S Rajya Laskhmi, Coordinator, ANUR, Rajahmundry.
3. Sri Ch Phani Kumar, Member, Aditya Degree College for Women, Rajamundry.

Resolutions:

1. Resolved to adopt the revised common program structure and verifying course wise syllabus as per guidelines issued by APSHE.
2. Resolved to continue the scheme of examination, pattern of examination external 75Marks and internal assessment 25Marks. However for all Practical LSC and SDC no internal assesment. All practical courses will be conducted for 50Marks and 3 Hrs duration. For evaluation of practical present system is followed.
3. Model Question Courses are prepared as per guidelines given by APSHE.
4. Also resolved to conduct piratical 2hrs per week and 4hrs theory per week. List of practical is revised.
5. Opinion of members taken into consideration for eligibility into course.
6. Resolved teaching staff eligibility as per guidelines.
7. By taking the recommendations of member guidelines are fomulated for question Courses setters and others.
8. List of Course setters is approved by BOS.
9. Panel of examiners is also approved by BOS.

UG Program (4 years Honors) Structure (CBCS)

2020-21 A. Y., onwards

BACHLOR OF SCIENCE

(3rd and 4th year detailed design will be followed as per APSCHE GUIDELINES)

Subjects/ Semesters		I		II		III		IV		V		VI			
		H/W	C	H/W	C	H/W	C	H/W	C	H/W	C	H/ W	C		
Languages												THIRD PHASE of APPRENTICESHIP Entire 5th / 6th Semester		FIRST and SECOND PHASES (2 spells) of APPRENTICESHIP between 1st and 2nd year and between 2nd and 3rd year (two summer vacations).	
English		4	3	4	3	4	3								
Language (H/T/S)		4	3	4	3	4	3								
Life Skill Courses		2	2	2	2	2+2	2+2								
Skill Development Courses		2	2	2+2	2+2	2	2								
Core Papers															
M-1	C1 to C5	4+2	4+1	4+2	4+1	4+2	4+1	4+2 4+2	4+1 4+1						
M-2	C1 to C5	4+2	4+1	4+2	4+1	4+2	4+1	4+2 4+2	4+1 4+1						
M-3	C1 to C5	4+2	4+1	4+2	4+1	4+2	4+1	4+2 4+2	4+1 4+1						
M-1	SEC (C6,C7)									4+2 4+2	4+1 4+1				
M-2	SEC (C6,C7)									4+2 4+2	4+1 4+1				
M-3	SEC (C6,C7)									4+2 4+2	4+1 4+1				
Hrs/ W (Academic Credits)		30	25	32	27	32	27	36	30	36	30	0	12	4	4
Project Work															
Extension Activities (Non Academic Credits)															
NCC/NSS/Sports/Extra Curricular									2						
Yoga							1		1						
Extra Credits															
Hrs/W (Total Credits)		30	25	32	27	32	28	36	33	36	30	0	12	4	4

M= Major; C= Core; SEC: Skill Enhancement Courses

Marks & Credits distribution: UG-Sciences

Sl. No	Course type	No. of courses	Each course teaching Hrs/wk	Credit for each course	Total credits	Each course evaluation			Total marks
						Conti-Assess	Univ-exam	Total	
1	English	3	4	3	9	25	75	100	300
2	S.Lang	3	4	3	9	25	75	100	300
3	LS	4	2	2	8	0	50	50	200
4	SD	4	2	2	8	0	50	50	200
5	Core/SE -I	5+2	4+2	4+1	35	25	75+50	150	1050
	Core/SE -II	5+2	4+2	4+1	35	25	75+50	150	1050
	Core/SE -III	5+2	4+2	4+1	35	25	75+50	150	1050
6	Summer-Intern	2		4	8		100	200	200
7	Internship/ Apprentice/ on the job training	1		12	12		200	200	200
		38			**159**				**4550**
8	**Extension Activities (Non Academic Credits)**								
	NCC/NSS/Sports/ Extra Curricular			2	2				
	Yoga	2		1	2				
	Extra Credits								
	Total	**40**			**142**				

DETAILS OF COURSE TITLES & CREDITS

Sem	Course no.	Course Name	Course type (T/L/P)	Hrs./Week (Science: 4+2)	Credits (Science: 4+1)	Max. Marks Cont/ Internal/Mid Assessment	Max. Marks Sem-end Exam
I	1	Mechanics, Waves & Oscillations	T	4	4	25M	75M
	2	Practila course -1	L	2	1	0	50M
II	3	Wave Optics	T	4	4	25M	75M
	4	Practial Course - 2	L	2	1	0	50M
III	5	Heat & Thermodynamic	T	4	4	25M	50M
	6	Practial Course - 3	L	2	1	0	50M
IV	7	Electricity,Magnetism &Electronics	T	4	4	25M	50M
	8	Practical Course - 4	L	2	1	0	50M
	9	Modern Physics	T	4	4	25M	50M
	10	Practical Course -5	L	2	1	0	25M
V	6A	Optical Instruments andOptometry	T	4	4	25M	50M
		Optical Instruments and Optometry Lab	L	2	1	0	25M
	7A	Optical Imaging and Photography	T	4	4	25M	50M
		Optical Imaging and Photography Lab	L	2	1	0	25M
	OR						
	6B	Low Temperature Physics & Refrigeration	T	4	4	25M	50M
		Low Temperature Physics & Refrigeration Lab	L	2	1	0	25M
	7B	Solar Energy and Applications	T	4	4	25M	50M
		Solar Energy and Applications Lab	L	2	1	0	25M
	OR						
	6C	Applications of Electricity & Electronics	T	4	4	25M	50M
		Applications of Electricity & Electronics Lab	L	2	1	0	25M
	7C	Electronic Instrumentation	T	4	4	25M	50M
		Electronic Instrumentation Lab	L	2	1	0	25M

Note: *Course type code: T: Theory, L: Lab, P: Problem solving

Note 1: For Semester–V, for the domain subject **PHYSICS**, any one of the three pairs of SECs shall be chosen as courses 6 and 7, i.e., 6A & 7A or 6B & 7B or 6C & 7C. The pair shall not be broken (ABC allotment is random, not on any priority basis).

Note 2: One of the main objectives of Skill Enhancement Courses (SEC) is to inculcate field skills related to the domain subject in students. The syllabus of SEC will be partially skill oriented. Hence, teachers shall also impart practical training to students on the field skills embedded in the syllabus citing related real field situations.

Note 3: To insert assessment methodology for Internship/ on the Job Training/Apprenticeship under the revised CBCS as per APSCHE Guidelines.

- **First internship (After 1st Year Examinations):** Community Service Project. To inculcate social responsibility and compassionate commitment among the students, the summer vacation in the intervening 1st and 2nd years of study shall be for Community Service Project (the detailed guidelines are enclosed).
- **Credit For Course: 04**

- **Second Internship (After 2nd Year Examinations):** Apprenticeship / Internship / on the job training / In-house Project / Off-site Project. To make the students employable, this shall be undertaken by the students in the intervening summer vacation between the 2nd and 3rd years (the detailed guidelines are enclosed).
- **Credit For Course: 04**

- **Third internship/Project work (6th Semester Period):**
  During the entire 6th Semester, the student shall undergo Apprenticeship / Internship / On the Job Training. This is to ensure that the students develop hands on technical skills which will be of great help in facing the world of work (the detailed guidelines are enclosed).
- **Credit For Course:12**

a. Proposed combination subjects:

   Physics is one of the subject at Graduation in B.Sc (Mathematics, Physics and Chemistry,B Sc (Mathematics, Physics and Computer Science), B. Sc. (Mathematics, Physics and Electronics, B. Sc. (Mathematics, Physics and
   Geology), B. Sc. (Geology, Physics and Chemistry).

b. Student eligibility for joining in the course:
   PHYSICS is the one of the subject in Intermediate Physics.

c. Faculty eligibility for teaching the course
   PG in Physics as per UGC norms.

d. List of Proposed Skill enhancement courses with syllabus, if any --- NO ----

e. Any newly proposed Skill development/Life skill courses with draft syllabus and required resources
   ..... NO .....

f. Required instruments/software/ computers for the course (Lab/Practical course-wise required i.e., for a batch of 15 students)

Sem. No.	Lab/Practical Name	Names of Instruments/Software/ computers required with specifications	Brand Name	Qty Required
1	P. Course 1:	Travelling MicroScope, Fly Wheel, Aspirator bottle, Compound pendulum, Stop Watches, Sono meter, Melde's apparatus, Screw gauge, Tuning forks set	Micron[1], PISCO	Each 5
2	P. Course - 2	Spectrometer, Transmission Grating, Prisim, Polarimeter, Telescope, plane glass plates, sodium vapor lamp, Mercury lamp, Convex lenses and Mercury	Micron, PISCO	Each 5
3.	P.Course - 3	Joules calorimeter, Lees apparatus, Electrical Kettle, Thermocouple, Stefans constant appratus, CarryFosters bridge	Micron, PISCO	Each 5
4.	P. Course - 4	LCR kit, Power supply, Ammeter, Voltmeter, Digital Multi Meter, Stewart & Gee's apparatus, Transister charactersitics kit, Half adder & Full adder kit and barmagnets	Micron, PISCO	Each 5
5.	P. Course - 5	e/m kit, photo cell kit, energy band gap kit, thermister kit, GM Counter with source	Micron, PISCO	

g. List of Suitable levels of positions eligible in the Govt /Pvt organizations

Suitable levels of positions for these graduates either in industry/govt organization like., technical assistants/ scientists/ school teachers., clearly define them, with reliable justification

S.No	Position	Company/ Govt organization	Remarks	Additional skills required, if any
1.	Clerk	IBPS		Skill in functional English, and aptitude.
2.	SSC	Central Govt.		Skill in functional English, and aptitude with GK.

3.	Assit Programmer	MNC (Soft ware Companies)		Skill in functional English, and aptitude and expected domain skills
4.	Technical assistant	Pharma copanies,	Chemistry background student	Along with aptitude and English, domain skills.

h. List of Govt. organizations / Pvt companies for employment opportunities or internships or projects

S.No	Company/ Govt organization	Position type	Level of Position			
1	A V V V Prasad	Managing Director		Solar Systems Kakinada	944o573389	

i. Any specific instructions to the teacher /Course setters/Exam-Chief Superintendent
1. Follow the syllabus prescribed by BoS and see that no deviation.
2. Questions in Course should clear and there should no ambiguity.
3. In Translation into telugu care should be taken, some case question is entirely different in telugu and english.
4. Minimum importance should be given to numerical problemls,
5. Log tables and Calculators may be allowed

3. Program objectives, outcomes, co-curricular and assessment methods

B Sc	PHYSICS

1. Aim and objectives of UG program in Subject:
   To align with emerging and employment areas.
2. Learning outcomes of Subject
   Semester - 1: Mechanics, Waves & Oscillations:

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

- Understand Newton's laws of motion and motion of variable mass system and its application to rocket motion and the concepts of impact parameter, scattering cross section.
- Apply the rotational kinematic relations, the principle and working of gyroscope and itapplications and the processional motion of a 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.
- Understand postulates of Special theory of relativity and its consequences such as length contraction, time dilation, relativistic mass and mass-energy equivalence.
- Examine phenomena of simple harmonic motionand the distinction between undamped, damped and forced oscillations and the concepts of resonance and quality factor with reference to damped harmonic oscillator.
- Appreciate the formulation of the problem of coupled oscillations and solve them to obtain normal modes of oscillation and their frequencies in simple mechanical systems.
- Figure outthe formation of harmonics and overtones in a stretched string and acquire the knowledge on Ultrasonic waves, their production and detection and their applications in different fields.

Semester - 2: Wave Optics:

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

- Understand the phenomenon of interference of light and its formation in (i) Lloyd's single mirror due to division of wave front and (ii) Thin films, Newton's rings and Michelson interferometer due to division of amplitude.
- Distinguish between Fresnel's diffraction and Fraunhoffer diffraction and observe the diffraction patterns in the case of single slit and the diffraction grating.
- Describe the construction and working of zone plate and make the comparison of zone plate with convex lens.
- Explain the various methods of production of plane, circularly and polarized light and their detection and the concept of optical activity..
- Comprehend the basic principle of laser, the working of He-Ne laser and Ruby lasers and their applications in different fields.3
- Explain about the different aberrations in lenses and discuss the methods of minimizing them.
- Understand the basic principles of fibreoptic communication andexplore the **field of**

Holography and Nonlinear optics and their applications.

Semester - 3 : Heat and Thermodynamics:

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

- Understand the basic aspects of kinetic theory of gases, Maxwell-Boltzman distribution law, equipartition of energies, mean free path of molecular collisions and the transport phenomenon in ideal gases
- Gain knowledge on the basic concepts of thermodynamics, the first and the second lawof thermodynamics, the basic principles of refrigeration,the concept of entropy,the thermodynamic potentials and their physical interpretations.
- Understand the working of Carnot's ideal heat engine, Carnot cycle and its efficiency
- Develop critical understanding of concept of Thermodynamic potentials, the formulation of Maxwell's equations and its applications.
- Differentiate between principles and methods to produce low temperature and liquefyair and also understand the practical applications of substances at low temperatures.
- Examine the nature of black body radiations and the basic theories.

Semester - 4 : Electricity, Magnetism and Electronics:

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

- ❖ Understand the Gauss law and its application to obtain electric field in different cases and formulate the relationship between electric displacement vector, electric polarization, Susceptibility, Permittivity and Dielectric constant.
- ❖ Distinguish between the magnetic effect of electric current and electromagnetic induction and apply the related laws in appropriate circumstances.
- ❖ Understand Biot and Savart's law and Ampere's circuital law to describe and explain the generation of magnetic fields by electrical currents.
- ❖ Develop an understanding on the unification of electric and magnetic fields and Maxwell's equations governing electromagnetic waves.
- ❖ Phenomenon of resonance in LCR AC-circuits, sharpness of resonance,Q- factor,Power factor and the comparative study of series and parallel resonant circuits.
- ❖ Describe the operation of p-n junction diodes, zener diodes, light emitting diodes and transistors
- ❖ Understand the operation of basic logic gates and universal gates and their truth tables.

Semester - 4: Modern Physics :

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

- ❖ Develop an understanding on the concepts of Atomic and Modern Physics, basic elementary quantum mechanics and nuclear physics.
- ❖ Develop critical understanding of concept of Matter waves and Uncertainty principle.

- ❖ Get familiarized with the principles of quantum mechanics and the formulation of Schrodinger wave equation and its applications.
- ❖ Examine the basic properties of nuclei, characteristics of Nuclear forces, salient features of Nuclear models and different nuclear radiation detectors.
- ❖ Classify Elementary particles based on their mass, charge, spin, half life andinteraction.
- ❖ Get familiarized with the nano materials, their unique properties and applications.
- ❖ Increase the awareness and appreciation of superconductors and their practical applications.

3. Recommended Skill enhancement courses: (Titles of the courses given below and details of the syllabus for 4 credits (i.e., 2 units for theory and Lab/Practical) for 5 hrs class-cum-lab work

..... NO .....

4. Recommended Co-curricular activities:(Co-curricular Activities should not promote copying from text book or from others' work and shall encourage self/independent and group learning)

A. Measurable:

1. Assignments on:

2. Student seminars (Individual presentation of Courses) on topics relating to:
   Quiz Programmes on: RIndividual Field Studies/projects: Motion of Rocket,SHM applications
3. Group discussion on:
4. Group/Team Projects on:

B General

1. Collection of news reports and maintaining a record of Course-cuttings relating to topics covered in syllabus
2. Group Discussions on:
3. Watching TV discussions and preparing summary points recording personal observations etc., under guidance from the Lecturers
4. Any similar activities with imaginative thinking.

5. Recommended Continuous Assessment methods:

Details of course-wise Syllabus

B. Sc	Semester I	Credits: 4
Course: 1	Mechanics, Waves and Oscillations	Hrs/Wk: 4

Learning outcomes:

- To understand basic theories related with properties of matter and its applications to determine values of various physical quantities associated with matter.
- Be able to apply knowledge of the properties of matter to explain natural physical processes and related technological advances.
- To learn about fundamentals of verbal and mathematical concepts of waves and oscillations
- We should make the students to know their skills required to get the information from the syllabus and use them in a proper way

UNIT I:

Mechanics of Particles: Review of Newton's Laws of Motion, Motion of variable mass system, Motion of a rocket, Multistage rocket, Concept of impact parameter, scattering cross-section, Rutherford scattering-Derivation.

Mechanics of Rigid bodies: 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

UNIT II:

Motion in a Central Force Field: Central forces, definition and examples, characteristics of central forces, conservative nature of central forces, Equation of motion under a central force, Kepler's laws of planetary motion- Proofs, Motion of satellites, Basic idea of Global Positioning System (GPS), weightlessness, Physiological effects of astronauts

UNIT III:

Relativistic Mechanics: Introduction to relativity, Frames of reference, Galilean transformations, absolute frames, Michelson-Morley experiment, negative result, Postulates of Special theory of relativity,Lorentz transformation, time dilation, length contraction, variation of mass with velocity, Einstein's mass-energy relation.

UNIT IV:

Undamped, Damped and Forced oscillations: Simple harmonic oscillator and solution of the differential equation, Damped harmonicoscillator, Forced harmonic oscillator – Their differential equations and solutions, Resonance,Logarithmic decrement, Relaxation time and Quality factor.

Coupled oscillations: Coupled oscillators - introduction , Two coupled oscillators, Normal coordinates and Normal Modes.

UNIT V:

Vibrating Strings: Transverse wave propagation along a stretched string, General solution of wave equation and its significance, Modes of vibration of stretched string clamped at ends, Overtones andHarmonics.

Ultrasonic's: Ultrasonics, General Properties of ultrasonic waves, Production of ultrasonics by piezoelectric and magnetostriction methods, Detection of ultrasonics, Applications of ultrasonic waves, SONAR

REFERENCE BOOKS:

1. Sc. Physics, Vol.1, Telugu Academy, Hyderabad
2. Fundamentals of Physics Vol. I - Resnick, Halliday, Krane ,Wiley India 2007
3. College Physics-I. T. Bhimasankaram and G. Prasad. Himalaya Publishing House.
4. University Physics-FW Sears, MW Zemansky& HD Young,Narosa Publications,Delhi
5. Mechanics, S.G.Venkatachalapathy, Margham Publication, 2003.
6. Waves and Oscillations. N. Subramanyam and Brijlal, VikasPulications.
7. Unified Physics - Waves and Oscillations, Jai PrakashNath&Co.Ltd.
8. Waves & Oscillations. S.Badami, V. Balasubramanian and K.R. Reddy, OrientLongman.
9. The Physics of Waves and Oscillations, N.K.Bajaj, Tata McGraw Hill
10. Science and Technology of Ultrasonics- Baldevraj, Narosa, New Delhi,2004

B Sc	Semester I	Credits: 1
Course: 1	Mechanics, Waves and Oscillations Lab	Hrs/Wk: 2

Details of Lab/Practical/Experiments/Tutorials syllabus:

Minimum of 6 experiments to be done and recorded:

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. Viscosity of liquid by the flow method (Poiseuille's method)
5. Bifilar suspension –Moment of inertia of a regular rectangular body.
6. Fly-wheel -Determination of moment of inertia
7. Rigidity modulus of material of a wire-Dynamic method (Torsional pendulum)
8. Volume resonator experiment
9. Determination of 'g' by compound/bar pendulum
10. Simple pendulum- normal distribution of errors-estimation of time period and the error of the mean by statistical analysis
11. Determination of the force constant of a spring by static and dynamic method.

11. Recommended Co-curricular activities:(Co-curricular Activities should not promote copying from text book or from others' work and shall encourage self/independent and group learning)

A. Measurable:

1. Assignments on: Motion of a rocket, Multistage rocket, Rutherford scattering-Derivation. Precession of a spinning top, Gyroscope, Precession of the equinoxes, Kepler's laws of planetary motion-Proofs, Motion of satellites, Michelson-Morley experiment, negative result, Postulates of Special theory of relativity, Lorentz transformation, Simple harmonic oscillator and solution of the differential equation, Damped harmonic oscillator, Forced harmonic oscillator – Their differential equations and solutions, Transverse wave propagation along a stretched string, Production of ultrasonics by piezoelectric and magnetostriction methods, Detection of ultrasonics, Coupled Oscillators

2. Student seminars (Individual presentation of Courses) on topics relating to: Motion of variable mass system, Motion of a rocket, Multistage rocket, Rutherford scattering-Derivation. Rigid body, rotational kinematic relations, Equation of motion for a rotating body. Central Forces- Kepler's laws, Special theory of relativity, Michelson Morley experiment, Lorentz transformation, Simple Harmonic Motion, Coupled Oscillators, Ultrasonics,

Quiz Programmes on: Rutherford Scattering, Mechanics of rigid bodies,Keplers laws, Special theory of relativity,SHM,Ultrasonics

3. Individual Field Studies/projects:
4. Group discussion on: Newtons Laws of Motion, Motion of satellites, Basic idea of Global Positioning System (GPS),Special theory of relativity, SHM
5. Group/Team Projects on: Motion of a rocket, Multistage rocket, Concept of impact parameter, Central forces, Kepler's laws of planetary motion-Proofs, Motion of satellites, Basic idea of Global Positioning System (GPS), weightlessness. Ultrasonics, General Properties of ultrasonic waves, Production of ultrasonics by piezoelectricand magnetostriction methods, Detection of ultrasonics

B. General

1. Collection of news reports and maintaining a record of Course-cuttings relating to topics covered in syllabus
2. Group Discussions on:
3. Watching TV discussions and preparing summary points recording personal observations etc., under guidance from the Lecturers
4. Any similar activities with imaginative thinking.

12. Recommended Continuous Assessment methods:

B Sc	Semester II	Credits: 4
Course: 2	Wave Optics	Hrs/Wk: 4

Student able to Learning:

- Understand the nature of light and principles of Laser and holography.
- Analyse the intensity variation of light due to interference, diffraction and polarization.
- Solve problems in Optics by selecting the appropriate equations and performing numerical or analytical calculations.
- Student can able to operation of optical devices including polarizers, interferometers,and Lasers.

UNIT I: Interference of light: (12hrs)

Introduction, Conditions for interference of light, Interference of light by division of wave front and amplitude,Phase change on reflection- Stokes' treatment, Lloyd's single mirror, Interference in thin films: Plane parallel and wedge- shaped films, colours in thin films, Newton's rings in reflected light-Theory and experiment, Determination of wavelength of monochromatic light, Michelson interferometer anddetermination of wavelength.

UNIT II: Diffraction of light:(12hrs)

Introduction, Types of diffraction: Fresnel and Fraunhoffer diffractions, Distinction between Fresnel and Fraunhoffer diffraction,Fraunhoffer diffraction at a single slit, Plane diffraction grating,Determination of wavelength of light using diffraction grating, Resolving power of grating, Fresnel's half period zones, Explanation of rectilinear propagation of light, Zone plate, comparison of zone plate with convex lens.

UNIT III: Polarisation of light:(12hrs)

Polarized light: Methods of production of plane polarized light, Double refraction, Brewster's law, Malus law, Nicol prism, Nicol prism as polarizer and analyzer, Quarter wave plate, Half wave plate, Plane, Circularly and Elliptically polarized light-Production and detection, Optical activity, Laurent's half shade polarimeter: determination of specific rotation.

UNIT IV: Aberrations and Fibre Optics: (12hrs)

Monochromatic aberrations, Spherical aberration, Methods of minimizing spherical aberration, Coma, Astigmatism and Curvature of field, Distortion; Chromatic aberration-the achromatic doublet; Achromatism for two lenses (i) in contact and (ii) separated by a distance. **Fibre optics:** Introduction to Fibers, different types of fibers, rays and modes in an optical fiber, Principles of fiber communication (qualitative treatment only), Advantages of fiber optic communication.

UNIT V: Lasers and Holography:(12hrs)

Lasers: Introduction, Spontaneous emission, stimulated emission, Population Inversion, Laser principle, Einstein coefficients, Types of lasers-He-Ne laser, Ruby laser, Applications of lasers; Holography: Basic principle of holography, Applications of holography

REFERENCE BOOKS:

1. BSc Physics, Vol.2, Telugu Akademy, Hyderabad
2. A Text Book of Optics-N Subramanyam, L Brijlal, S.Chand& Co.
3. Optics-Murugeshan, S.Chand& Co.
4. Unified Physics Vol.IIOptics, Jai PrakashNath&Co.Ltd., Meerut
5. Optics,F.A. Jenkins and H.G.White, McGraw-Hill
6. Optics, AjoyGhatak,TataMcGraw-Hill.
7. Introduction of Lasers – Avadhanulu, S.Chand& Co.
8. Principles of Optics- BK Mathur, Gopala Printing Press, 1995

B Sc	Semester II	Credits: 1
Course: 2	Wave Optics Lab	Hrs/Wk: 2

Details of Lab/Practical/Experiments/Tutorials syllabus:

Minimum of 6 experiments to be done and recorded

1. Determination of radius of curvature of a given convex lens-Newton's rings.
2. Resolving power of grating.
3. Study of optical rotation –polarimeter.
4. Dispersive power of a prism.
5. Determination of wavelength of light using diffraction grating-minimum deviationmethod.
6. Determination of wavelength of light using diffraction grating-normal incidencemethod.
7. Resolving power of a telescope.
8. Refractive index of a liquid-hallow prism
9. Determination of thickness of a thin wire by wedge method
10. Determination of refractive index of liquid-Boy's method.
11. Determination of cauchy's constants (Using prisim A and B).

Recommended Co-curricular activities:(Co-curricular Activities should not promote copying from text book or from others' work and shall encourage self/independent and group learning)

C. Measurable:

5. Assignments on: Lloyd's single mirror, Interference in thin films: Plane parallel and wedge-shaped films, colours in thin films, Newton's rings in reflected light-Theory and experiment, Determination of wavelength of monochromatic light, Michelson interferometer and determination of wavelength. Distinction between Fresnel and Fraunhoffer diffraction,Fraunhoffer diffraction at a single slit, Plane diffraction grating,Determination of wavelength of light using diffraction grating, Zone plate, comparison of zone plate with convex lens. Brewster's law, Malus law, Nicol prism, Nicol prism as polarizer and analyzer, Quarter wave plate, Half wave plate, spherical aberration, Coma, Astigmatism and Curvature of field, Distortion; Chromatic aberration-the achromatic doublet; Achromatism for two lenses (i) in contact and (ii) separated by a distance. Laser principle, Einstein coefficients, Types of lasers-He-Ne laser, Ruby laser, Applications of lasers; Holography:

6. Student seminars (Individual presentation of Courses) on topics relating to:Intereference, Abberations, Opticalfiber communicaton, Holography, Diffraction,Polarization, Lasers.
7. Quiz Programmes on: Interference, Diffraction,Polarization, Optical fibers, Lasers, Abberations
8. Individual Field Studies/projects:
9. Group discussion on:Interefernce, Diffraction, Polarization
10. Group/Team Projects on: Lasers, Optical fibers

D. General

1. Collection of news reports and maintaining a record of Course-cuttings relating to topics covered in syllabus
2. Group Discussions on:
3. Watching TV discussions and preparing summary points recording personal observations etc., under guidance from the Lecturers
4. Any similar activities with imaginative thinking.

Recommended Continuous Assessment methods:

B Sc	Semester III	Credits: 4
Course: 3	Heat and thermodynamics	Hrs/Wk: 4

Student able to Learning:

- Students will be able to Perform experiments and interpret the results of observation, including making an assessment of experimental uncertainties.
- They develop the ability to apply the knowledge acquired in the classroom and laboratories to specific problems in theoretical and experimental Physics.
- To apply the theories learnt and the skills acquired to solve real time problems
- To understand the concepts and significance of the various physical phenomena

UNIT I: Kinetic Theory of gases: (12 hrs)

Kinetic Theory of gases-Introduction, Maxwell's law of distribution of molecular velocities (qualitative treatment only) and its experimental verification,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.

UNIT II: Thermodynamics: (12hrs)

Introduction- Isothermal and Adiabatic processes, Reversible and irreversible processes, Carnot's engine and its efficiency, Carnot's theorem, Thermodynamic scale of temperature and its identity with perfect gas scale, Second law of thermodynamics: Kelvin's and Clausius statements, Principle of refrigeration, Entropy, 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.

UNIT III: Thermodynamic Potentials and Maxwell's equations: (12hrs)

Thermodynamic potentials-Internal Energy, Enthalpy, Helmholtz Free Energy, Gibb's Free Energy and their significance, Derivation of Maxwell's thermodynamic relations from thermodynamic potentials, Applications to (i) Clausius-Clayperon's equation (ii) Value of C_P-C_V (iii) Value of C_P/C_V (iv) Joule-Kelvin coefficient for ideal gases.

UNIT IV: Low temperature Physics:(12hrs) 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, Liquefaction of air by Linde's method, Production of low temperatures by adiabatic demagnetization (qualitative), Practical applications of substancesat low temperatures.

UNIT V: Quantum theory of radiation: (12 hrs) Blackbody and its spectral energy distribution of black body radiation, Kirchoff's law, Wein'sdisplacement law, Stefan-Boltzmann's law and Rayleigh-Jean's law (Noderivations), Planck's law of black body radiation-Derivation, Deduction of Wein's law and Rayleigh-Jean's law from Planck's law, Solar constant and its determination using Angstrompyroheliometer, Estimation of surface temperature of Sun.

REFERENCE BOOKS:

1. BSc Physics, Vol.2, Telugu Akademy, Hyderabad
2. Thermodynamics, R.C.Srivastava, S.K.Saha&AbhayK.Jain, Eastern Economy Edition.
3. Unified Physics Vol.2, Optics & Thermodynamics, Jai PrakashNath&Co.Ltd., Meerut
4. Fundamentals of Physics. Halliday/Resnick/Walker.C. Wiley India Edition 2007
5. Heat and Thermodynamics -N BrijLal, P Subrahmanyam, S.Chand& Co.,2012
6. Heat and Thermodynamics- MS Yadav, Anmol Publications Pvt. Ltd, 2000
7. University Physics, HD Young, MW Zemansky,FW Sears, Narosa Publishers, New Delhi

B Sc	Semester III	Credits: 1
Course: 3	Heat and thermodynamics Lab	Hrs/Wk: 2

Details of Lab/Practical/Experiments/Tutorials syllabus:

Minimum of 6 experiments to be done and recorded

1. Specific heat of a liquid –Joule's calorimeter –Barton's radiation correction
2. Thermal conductivity of bad conductor-Lee's method
3. Thermal conductivity of rubber.
4. Measurement of Stefan's constant.
5. Specific heat of a liquid by applying Newton's law of cooling correction.
6. Heating efficiency of electrical kettle with varying voltages.
7. Thermoemf- thermo couple - Potentiometer
8. Thermal behavior of an electric bulb (filament/torch light bulb)
9. Measurement of Stefan's constant- emissive method
10. Study of variation of resistance with temperature - Thermistor.
11. Calculation of temperature coefficient of given material using Carry Fosters bridge.

9. Recommended Co-curricular activities:(Co-curricular Activities should not promote copying from text book or from others' work and shall encourage self/independent and group learning)

E. Measurable:

Assignments on: Maxwell's law of distribution of molecular velocities, Transport phenomenon in ideal gases: viscosity, Thermal conductivity and diffusion of gases. Introduction- Isothermal and Adiabatic processes, Reversible and irreversible processes, Carnot's engine and its efficiency, Carnot's theorem, Thermodynamic scale of temperature, Thermodynamic potentials-Internal Energy, Enthalpy, Helmholtz Free Energy, Gibb's Free Energy and their significance, Derivation of Maxwell's thermodynamic relations fromthermodynamic potentials, Joule Kelvin effect, Porous plug experiment ,Joule expansion, Distinction between adiabatic and Joule Thomson expansion, Expression forJoule Thomson cooling, Liquefaction of air by Linde's method, Production of lowtemperatures by adiabatic demagnetization

10. Student seminars (Individual presentation of Courses) on topics relating to: Kinetic Theory of Gases, Carnots Engine and its efficiency, Carnot Theorem, Entropy, Maxwell Thermodynamic Equations, Joule Kelvin effect, Production of low temperatures, Plank Radiation law, Weins law,Pyrometers,
11. Quiz Programmes on: Kinetic theory of gases, Heat and Temperature entropy, Isothermal and Adiabatic process,Thermodynamic Potentials, Low temperature Physics , Thermal Radiation.
12. Individual Field Studies/projects: Carnots Engine, Pyrometers, Adaibatic demagnetization, Porus plug experiment. Liquification of gases.
13. Group discussion on:Kinetic theory of gases, Quantum theory of Radiation, Low temperature physics and thermodynamic potentials,
14. Group/Team Projects on: Carnots Engine, Pyrometers, Adaibatic demagnetization, Porus plug experiment. Liquification of gases.

F. General

5. Collection of news reports and maintaining a record of Course-cuttings relating to topics covered in syllabus
6. Group Discussions on:
7. Watching TV discussions and preparing summary points recording personal observations etc., under guidance from the Lecturers
8. Any similar activities with imaginative thinking.

Recommended Continuous Assessment methods:

B Sc	Semester IV	Credits: 4
Course: 4	Electricity, Magnetism & Electronics	Hrs/Wk: 4

Student Able learn:

- To learn about Gauss law and solve the electric field and magnetic field for various geometric objects and to learn basic electronic concepts in analog and digital theory.
- To be Explain all the topics of Experiments, Concepts and Derivations to the student
- Apply the principles of electronics in day to day life.
- Encourage all the students to study higher educational courses in reputed institutes and to enrich the students with creative, logical and analytical skills and to motivate the students towards research side

UNIT I:

Electrostatics: (6hrs) : Gauss's law-Statement and its proof, Electric field intensity due to (i) uniformly charged solid sphere and (ii) an infinite conducting sheet of charge, Deduction of Coulomb's law from Gauss law, Electrical potential–Equipotential surfaces, Potential due to a uniformly charged sphere.

Dielectrics: (6 hrs): Dielectrics-Polar and Non-polar dielectrics- Effect of electric field on dielectrics,Dielectric strength, Capacitance of a parallel plate condenser with dielectric slab between the plates, Electric displacement D, electric polarization P,Relation between D, E and P, Dielectric constant and electric susceptibility.

UNIT II:

Magnetostatics: (6 hrs): Biot-Savart's law and its applications: (i) circular loop and (ii) solenoid, Ampere's Circuital Law and its application to Solenoid, Hall effect, determination of Hall coefficient and applications.

Electromagnetic Induction: (6 hrs): Faraday's laws of electromagnetic induction, Lenz's law, Self induction and Mutual induction,Self inductance of a long solenoid, Mutual inductance of two coils, Energy stored in magnetic field, Eddy currents.

UNIT III:

Alternating currents: (6 hrs): Alternating current - Relation between current and voltage in L,C, R, LR and CR circuits, Phasor and Vector diagrams, LCR series and parallel resonant circuit, Q – factor, Power factor.

Electromagnetic waves-Maxwell's equations:(6 hrs) : Idea of displacement current,Maxwell's equations-Derivation, Maxwell's wave equation (with derivation), Transverse nature of electromagnetic waves, Poynting theorem (Statement andproof). Velocity of wave equation using maxwells relations in vaccume.

UNIT IV:

Basic Electronic devices: (12 hrs): PN junction diode, Zenerdiode andLight Emitting Diode (LED) and their I-V characteristics, Zener diode as a regulator- Transistors and its operation, CB, CE and CC configurations, Input and output characteristicsofa transistor in CE mode, Relation between alpha, beta and gamma; Transistor as an amplifier.

UNIT-V:

Digital Electronics: (12 hrs): Number systems, Conversion of binary to decimal system and vice versa, Binary addition & Binary subtraction (1's and 2's complement methods), Laws of Boolean algebra, DeMorgan's laws-Statements and Proofs, Basic logic gates, NAND and NOR as universal gates, Exclusive-OR gate, Half adder and Full adder circuits.

REFERENCE BOOKS

1. BSc Physics, Vol.3, Telugu Akademy, Hyderabad.
2. Electricity and Magnetism, D.N. Vasudeva. S. Chand & Co.
3. Electricity and Magnetism, B.D.Duggal and C.L.Chhabra. Shobanlal& Co.
4. Electricity, Magnetism with Electronics, K.K.Tewari, R.Chand& Co.,
5. Electricity and Magnetism, R.Murugeshan, S. Chand & Co.
6. Principles of Electronics, V.K. Mehta, S.Chand& Co.,
7. Digital Principles and Applications, A.P. Malvino and D.P.Leach, McGrawHill Edition.

B Sc	Semester IV	Credits: 1
Course: 4	Electricity, Magnetism & Electronics Lab	Hrs/Wk: 2

Details of Lab/Practical/Experiments/Tutorials syllabus:

Minimum of 6 experiments to be done and recorded

1. Figure of merit of a moving coil galvanometer.
2. LCR circuit series/parallel resonance, Q factor.
3. Determination of ac-frequency –Sonometer.
4. Verification of Kirchoff's laws and Maximum Power Transfer theorem.
5. Field along the axis of a circular coil carrying current-Stewart & Gee's apparatus.
6. PN Junction Diode Characteristics
7. Zener Diode –V-I Characteristics
8. Zener Diode as a voltage regulator
9. Transistor CE Characteristics- Determination of hybrid parameters
10. Logic Gates- OR,AND,NOT and NAND gates. Verification of Truth Tables.
11. Verification of De Morgan's Theorems.
12. Construction of Half adder and Full adders-Verification of truth tables
13. Universal gates construction and verification of truth tables.

Recommended Reference books:

14. Recommended Co-curricular activities:(Co-curricular Activities should not promote copying from text book or from others' work and shall encourage self/independent and group learning)

G. Measurable:

1. **Assignments on**: Gauss's law-Statement and its proof, Electric field intensity due to uniformly charged solidsphere and Potential due to a uniformly charged sphere.
2. **Student seminars (Individual presentation of Courses) on topics relating to**:
3. Biot-Savart's law and its applications: (i) circular loop and (ii) solenoid, Ampere's Circuital Law and its application to Solenoid, Hall effect, determination of Hall coefficient and applications
4. **Quiz Programmes on**: PN junction diode, Zenerdiode andLight Emitting Diode (LED) and their I-V characteristics, Zener diode as a regulator- Transistors and its operation, CB, CE and CC configurations
5. **Individual Field Studies/projects**: Maxwell's equations-Derivation, Maxwell's wave equation (with derivation), Transverse nature of electromagnetic waves, Poynting theorem (Statement andproof)
6. **Group discussion on:** Number systems, Conversion of binary to decimal system and vice versa, Binary addition & Binary subtraction (1's and 2's complement methods), Laws of Boolean algebra
7. **Group/Team Projects on**: Alternating current - Relation between current and voltage in L,C, R, LR and CR circuits, Phasor and Vector diagrams, LCR series and parallel resonant circuit, Q –factor, Power factor.

H. General

8. Collection of news reports and maintaining a record of Course-cuttings relating to topics covered in syllabus
9. Group Discussions on:
10. Watching TV discussions and preparing summary points recording personal observations etc., under guidance from the Lecturers
11. Any similar activities with imaginative thinking.

Recommended Continuous Assessment methods:

B Sc	Semester IV	Credits: 4
Course: 5	Modern Physics	Hrs/Wk: 4

Student able learn:

- To Create awareness on the topics of Atomic & Molecular Physics, Quantum mechanics, Nuclear Physics, and Solid state physics.
- To be Explain all the topics of Experiments, Concepts and Derivations to the student.
- Explain the basic principles of quantum mechanics and apply to Atomic, Molecular structure of energy levels etc..
- Motivate all the students to pursue PG courses in reputed institutes and to endow the students with creative and analytical skills; this will equip them to become entrepreneurs.

UNIT I :

Atomic and Molecular Physics:(12 hrs): Vector atom model and Stern-Gerlach experiment, Quantum numbers associated with it,Angular momentum of the atom, Coupling schemes, Spectral terms and spectral notations, Selection rules, Intensity rules, Fine structure of Sodium D-lines, Zeeman effect, Experimentalarrangement to study Zeeman effect; Raman effect, Characteristics of Raman effect. Experimental arrangement to study Raman effect, Quantum theory of Raman effect, Applications of Raman effect.

UNIT II:

Matter waves &Uncertainty Principle:(12 hrs): Matter waves, de Broglie's hypothesis, Wave length of matter waves, Properties of matter waves, Davisson and Germer's experiment, Phase and group velocities, Heisenberg's uncertainty principle for position and momentum& energy and time, Illustration of uncertainty principle using diffraction of beam of electrons and photons (Gamma ray microscope),Bohr's principle of complementarity.

UNIT III:

Quantum (Wave) Mechanics:(12 hrs): Basic postulates of quantum mechanics, Schrodinger time independent and time dependent wave equations-Derivations, Physical interpretation of wave function, Eigen functions, Eigen values, Application of Schrodinger wave equation to (i) one dimensional potential box of infinite height(InfinitePotential Well) and (ii) three dimensional box - tunneling effect.

UNIT IV:

Nuclear Physics:(12 hrs): *Nuclear Structure*: General Properties of Nuclei, Mass defect, Binding energy; *Nuclear forces*:Characteristics of nuclear forces- Yukawa's meson theory; *Nuclear Models*: Liquid drop model, The Shell model, Magic numbers; *Nuclear Radiation detectors*: G.M. Counter, Cloud chamber, Solid State detector; *Elementary Particles*: Elementary Particles and their classification.

UNIT-V:

Nano materials:(7hrs): Nanomaterials – Introduction, Electron confinement, Size effect, Surface to volume ratio, Classification of nano materials– (0D, 1D, 2D); Quantum dots, Nano wires, Fullerene, CNT, Graphene(Mention of structures and properties),Distinct properties of nano materials (Mention-*mechanical,optical, electrical, and magnetic properties*); Mention of applications of nano materials: (*Fuel cells,Phosphors for HD TV).*

Superconductivity: (5 hrs): Introduction to Superconductivity, Experimental results-critical temperature, critical magnetic field, Meissner effect , Isotope effect,Type I and Type II superconductors, BCS theory (elementary ideas only),Applications of superconductors

REFERENCE BOOKS

1. BSc Physics, Vol.4, Telugu Akademy, Hyderabad
2. Atomic Physics by J.B. Rajam; S.Chand& Co.,
3. Modern Physics by R. Murugeshan and Kiruthiga Siva Prasath. S. Chand & Co.
4. Concepts of Modern Physics by Arthur Beiser. Tata McGraw-Hill Edition.
5. Nuclear Physics, D.C.Tayal, Himalaya Publishing House.
6. S.K. Kulkarni, Nanotechnology: Principles & Practices (Capital Publ.Co.)
7. K.K.Chattopadhyay&A.N.Banerjee, Introd.to Nanoscience and Technology(PHI LearningPriv.Limited).
8. Nano materials, A K Bandopadhyay. New Age International Pvt Ltd (2007)
9. Textbook of Nanoscience and Nanotechnology, BS Murthy, P Shankar, BaldevRaj,BB Rath and J Murday-Universities Press-IIM

B Sc	Semester IV	Credits: 1
Course: 5	Modern Physics Lab	Hrs/Wk: 2

Details of Lab/Practical/Experiments/Tutorials syllabus:

Minimum of 6 experiments to be done and recorded

1. e/m of an electron by Thomson method.
2. Determination of Planck's Constant (photocell).
3. Verification of inverse square law of light using photovoltaic cell.
4. Determination of the Planck's constant using LEDs of at least 4 different colours.
5. Determination of work function of material of filament of directly heated vacuumdiode.
6. Study of absorption of α-rays.
7. Study of absorption of β-rays.
8. Determination of Range of β-particles.
9. Determination of M & H.
10. Analysis of powder X-ray diffraction pattern to determine properties of crystals.
11. Energy gap of a semiconductor using junction diode.
12. Energy gap of a semiconductor using thermistor
13. GM counter characteristics
14. Study of photo cell characteristics.

Recommended Reference books:

9. Recommended Co-curricular activities:(Co-curricular Activities should not promote copying from text book or from others' work and shall encourage self/independent and group learning)

I. Measurable:

Assignments on: Stern-Gerlach experiment, Quantum numbers associated with it, Angular momentum of the atom, Coupling schemes, Experimental arrangement to study Zeeman effect; Raman effect, Characteristics of Raman effect. Experimental arrangement to study Raman effect, Applications of Raman effect, Wave length of matter waves,; *Nuclear Radiation detectors*: G.M. Counter, Cloud chamber, Solid State detector, Classification of nano materials– (0D, 1D, 2D); Quantum dots, Nano wires, Fullerene, CNT, Graphene(Mention of structures and properties),

Student seminars (Individual presentation of Courses) on topics relating to: Stern-Gerlach experiment, Zeeman effect, Raman effect. Davisson and Germer's experiment, , Heisenberg's uncertainty principle Schrodinger time independent and time dependent wave equations-Derivations, , The Shell model, Magic numbers;,

8. **Quiz Programmes on**: Zeeman effect, Matter waves, de Broglie's hypothesis, Heisenberg's uncertainty principle for position and momentum& energy and time, Schrodinger time independent and time dependent wave equations-Derivations.
9. **Individual Field Studies/projects**: *Nuclear Radiation detectors*: G.M. Counter, Cloud chamber, Solid State detector, Liquid drop model, Distinct properties of nano materials
10. **.Group discussion on:** Properties of matter waves, Davisson and Germer's experiment, Eigen functions, Eigen values, Application of Schrodinger wave equation to (i) one dimensional potential box of infinite height(InfinitePotential Well), Liquid drop model, The Shell model, Magic numbers
11. **Group/Team Projects on**: Basic postulates of quantum mechanics, Schrodinger time independent and time dependent wave equations-Derivations, Physical interpretation of wave function

J. General

12. Collection of news reports and maintaining a record of Course-cuttings relating to topics covered in syllabus
13. Group Discussions on:
14. Watching TV discussions and preparing summary points recording personal observations etc., under guidance from the Lecturers
15. Any similar activities with imaginative thinking.

Recommended Continuous Assessment methods:

B Sc	Semester V (Skill Enhancement Course -Elective)	Credits: 4
Course: 6A	Optical Instruments and Optometry	Hrs/Wk: 4

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 usedin daily life.
2. Acquire a critical knowledge on the various defects of eye and their correcting methodswith 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.

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

UNIT I: OPTICAL MICROSCOPES (10hrs)

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, workingand uses

UNIT II: TELESCOPES (10hrs)

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 (10hrs)

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 (10hrs)

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 (10hrs)

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 BOOKS:

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.

B Sc	Semester V (Skill Enhancement Course -Elective)	Credits: 1
Course: 6A	Optical Instruments and Optometry Lab	Hrs/Wk: 2

PRACTICAL SYLLABUS *(30 Hrs. Max Marks: 50)*

Learning Outcomes: On successful completion of this practical course, student shall beable 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.

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.

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%20Manual.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_PROCED_Spring_2018.pdf

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 hand-written 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) <u>Suggested Co-Curricular Activities</u>

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 theirpower.
10. Visit to any eye research laboratories, if available
11. Invited lectures and presentations on related topics by field/industrial experts

B Sc	**Semester V (**Skill Enhancement Course -Elective)	**Credits: 4**
Course: 7A	**OPTICAL IMAGING AND PHOTOGRAPHY**	**Hrs/Wk: 4**

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.

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

UNIT I: INTRODUCTION TO PHOTOGRAPHY: **(10 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: **(10 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: **(10 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: **(10 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 : **(10 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]

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.

B Sc	Semester V (Skill Enhancement Course -Elective)	Credits: 1
Course: 7A	Optical Imaging and Photography Lab	Hrs/Wk: 2

PRACTICAL SYLLABUS *(30 Hrs, Max Marks: 50)*

Learning Outcomes: On successful completion of this practical course, student shall beable 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 availablein the lab or in a local studio.

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 in to other (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)

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.

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.

B Sc	Semester V (Skill Enhancement Course -Elective)	Credits: 4
Course: 6B	Low Temperature Physics & Refrigeration	Hrs/Wk: 4

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

1. Identify various methods and techniques used to produce low temperatures in the Laboratory.
2. Acquire a critical knowledge on refrigeration and air conditioning.
3. Demonstrate skills of Refrigerators through hands on experience and learns about refrigeration 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.

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

UNIT I: PRODUCTION OF LOW TEMPERATURE (10 hrs)

Production of low temperatures-Introduction, Freezing mixtures, Joule-Thomson effect, Regenerative cooling, 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 (10 hrs)

Gas thermometer and its correction and calibration, Secondary thermometers, resistance thermometers, thermocouples, Vapour pressure thermometers, Magnetic thermometers, Advantages and drawbacks of each type of thermometer.

UNIT III: PRINCIPLES OF REFRIGERATION (10 hrs)

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.
Refrigerants-Introduction, Ideal refrigerant, Properties of refrigerant, Classification of refrigerants, commonly used refrigerants, Eco-friendly refrigerants

UNIT IV: COMPONENTS OF REFIGERATOR (10 hrs)

Refrigerator and its working, Block diagram, Coefficient of Performance (COP), Tons of refrigeration (TR) and Energy Efficiency Ratio (EER), 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 (10 hrs.)

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.
Applications of refrigeration: Domestic refrigerators, Water coolers, Cold storages, Ice plants, Food preservation methods, Chemical and Process industries, Cold treatment of metals, Construction field, Desalination of water, Data centers.

REFERENCE BOOKS:

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/Review/2017-Low_Temperature_Applications_and_Challenges.pdf
10. https://nptel.ac.in/content/storage2/courses/112105129/pdf/RAC%20Lecture%203.pdf
11. Other Web sources suggested by the teacher concerned and the reading material. https://nptel.ac.in

B Sc	**Semester V (**Skill Enhancement Course -Elective)	**Credits: 1**

Course: 6B	Low Temperature Physics & Refrigeration Lab	Hrs/Wk: 2

PRACTICAL SYLLABUS *(30 Hrs. Max Marks: 50)*

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 their applications in agriculture, medicine and day to day life.
4. Acquire skills in observing and measuring various methodologies of very low temperatures
5. Perform some techniques related to Refrigeration and Freezing in daily life.

Practical (Laboratory) Syllabus: *(30 hrs. 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 chlorofluorocarbons-hydrochlorofluoro- 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

Lab References:

1. Experimental techniques in low temperature physics by Guy White, PhilipMeeson.
2. Experimental low-temperature physics by A. Kent, Macmillan physical science series
3. Physics and Chemistry at Low Temperatures by Leonid Khriachtchev. https://www.routledge.com/Physics-and-Chemistry-at-Low-Temperatures /Khriachtchev/p/book/9789814267519
4. Practical Cryogenics .http://research .physics illinois.edu /bezryadin /links/practical %20 Cryogenics.pdf
5. Freeze-Drying, 3rd Edition by Peter Haseley, Georg-Wilhelm Oetjen, Wiley (e-Book)
6. Web sources suggested by the teacher concerned.

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 in the in the laboratory/field for a total of not less than 15 hours on the techniques/skills of Low Temperature Production, methods used and applications of Low temperatures and refrigeration in day to day life and other applications in medicine and industry.
2. **For Student**: Student shall (individually) visit (i) a small ice plant or a cold storage plant (ii) Air Conditioner (AC) repair shop or (iii) Refrigerator repair shop to understand the construction, working principle and the trouble shooting of these devices after interacting with the technicians. **Or** Student shall observe the various thermodynamic processes taking place while working with the refrigerator and observe the leak detection in refrigeration system by different methods, air removal and charging of a refrigeration unit and testing of a refrigeration system to find out the Refrigerating capacity/Ton of refrigeration (TR) and the Power input. **Or** Student shall identify the refrigerant cylinder by color coding and standing pressure. **Or** Student shall visit the freezer aisle of a supermarket and observes the bags of different frozen fruits. Student shall write the observations and submit a hand-written Fieldwork/Projectwork 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. Unit tests (IE).

(b) <u>Suggested Co-Curricular Activities</u>

1. Training of students by related Factory, industrial experts.
2. Assignments (including technical assignments like identifying tools in Refrigerators, Freezers and their handling, operational techniques with safety and security)
3. Seminars, Group discussions, Quiz, Debates etc. (on related topics).
4. Preparation of videos on tools and techniques in Low Temperatures and applications.
5. Collection of material/figures/photos related to substances used in Freezing Mixtures, their Properties and availability etc., writing and organizing them in a systematic way in a file.
6. Visits to Ice plants and labs in universities, research organizations, private firms, etc.
7. Making your own mini refrigerator at home
8. Build your own water cooler with the materials available at home.
9. Making hand launched liquid nitrogen rockets
10. Experiments with Liquid nitrogen and strawberry/ banana/ lemon/ onion/ mushroom/ egg etc. (*To be tried under professional supervision only*).
11. Invited lectures and presentations on related topics by field/industrial experts
12. Identification of different Ozone-depleting substances (ODS) that damage the ozone layer in the upper atmosphere.
13. Demonstration to illustrate the greenhouse effect and the role of carbon dioxide as a greenhouse gas using plastic water bottles, flood light lamp, beakers and temperature sensors and observe the temperature changes.
    https://edu.rsc.org/experiments/modelling-the-greenhouse-effect/1543.article
    https://sealevel.jpl.nasa.gov/files/archive/activities/ts1hiac1.pdf

B Sc	**Semester V (**Skill Enhancement Course -Elective)	**Credits: 4**
Course: 7B	**Solar Energy and Applications**	**Hrs/Wk: 4**

Learning 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 photovoltaic collectors.
3. Demonstrate skills related to callus culture through hands on experience
4. Understand testing procedures and fault analysis of thermal collectors and PV modules.
5. Comprehend applications of thermal collectors and PV modules.

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

UNIT I: BASIC CONCEPTS OF SOLAR ENERGY (10HRS)

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. Pyrheliometer - working principle, direct radiation measurement, Pyrometer-working Principle, diffuse radiation measurement, Distinction between the two meters.

UNIT II: SOLAR THERMAL COLLECTORS (10hrs)

Solar Thermal Collectors-Introduction, Types of Thermal collectors, Flat plate collector – liquid heating type, Energy balance equation and efficiency, Evacuated tube collector, collector overall heat loss coefficient, 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 desalinators.

UNIT III: FUNDAMENTALS OF SOLAR CELLS (10Hrs)

Semiconductor interface, Types, homo junction, hetero junction and Schottky barrier, advantages and drawbacks, Photovoltaic cell, equivalent circuit, output parameters, conversion efficiency, quantum efficiency, Measurement of I-V characteristics, series and shunt resistance, their effect on efficiency, Effect of light intensity, inclination and temperature on efficiency

UNIT IV: TYPES OF SOLARCELLS AND MODULES (10 hrs)

Types of solar cells, Crystalline silicon solar cells, I-V characteristics, poly-Si cells, Amorphous silicon cells, Thin film solar cells-CdTe/CdS and CuInGaSe2/CdS cell configurations, structures, advantages and limitations, 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)

Energy storage in PV systems, Energy storage modes, electrochemical storage, Batteries, Primary and secondary, Solid-state battery, Molten solvent battery, lead acid battery and dry batteries, Mechanical storage – Flywheel, Electrical storage – Super capacitor

REFERENCES BOOKS:

1. Solar Energy Utilization by G. D. Rai, Khanna Publishers
2. Solar Energy- Fundamentals, design, modelling and applications by G.N. Tiwari, NarosaPublications, 2005.
3. Solar Energy-Principles of thermal energy collection & storage by S.P. Sukhatme, Tata Mc-Graw Hill Publishers, 1999.
4. Science and Technology of Photovoltaics, P. Jayarama Reddy, CRC Press (Taylor & Francis Group), Leiden &BS Publications, Hyderabad, 2009.
5. Solar Photovoltaics- Fundamentals, technologies and applications, Chetan Singh Solanki, PHI Learning Pvt. Ltd.,
6. Web sources suggested by the teacher concerned and the college librarian including reading material.
   (a) 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,%20William%2 0A.%20Beckman(auth.)-Solar%20Engineering%20of%20Thermal%20Processes,%20Fourth%20Edition%20(2013).pdf

B Sc	Semester V (Skill Enhancement Course -Elective)	Credits: 1
Course: 7B	Solar Energy and Applications Lab	Hrs/Wk: 2

Practical (lab) work *(30 hrs, Max Marks:50)*

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

1. List out and identify various components of solar thermal collectors and systems, solarphotovoltaic modules and systems.
2. Learn the procedures for measurement of direct, global and diffuse solar radiation, I -V characteristics and efficiency analysis of solar cells and modules.
3. Demonstrate skills acquired in evaluating the performance of solar cell / module inconnecting them appropriately to get required power output.
4. Acquire skills in identification and elimination of the damaged panels without affectingthe output power in a module / array.
5. Perform procedures and techniques related to general maintenance of solar thermal andphotovoltaic modules.

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

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.

LAB REFERENCES:

1. Solar Photo voltaic- Alab training manual, C.S. Solanki et al., Foundation Books Publishers,2012.
2. Laboratory Manual on Solar thermal experiments, HP Garg, TC Kandpal, Narosa Publishing House 2000.
3. Web sources suggested by the teacher concerned.
   https://renewablelab.niu.edu/experiments/solarPanel Development of simple solar hot water collector: https://www.youtube.com/watch?v=WP8H5IOTwYU
   https://www.instructables.com/Solar-Water-Heater-From-Scratch/

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 in the in the laboratory/field for not less than 15 hours on the field techniques/skills related to measurement of direct, diffused and global solar radiation; demonstration of procedures used in the performance evaluation of solar flat plate collectors, solar photovoltaic cells and modules measurement of different parameters in the calculation of efficiency.

2. **For Student**: Students shall visit to solar thermal and photovoltaic laboratories in universities/research organizations/ nearby industries to observe and understand the techniques and procedures used for evaluation of solar collector, solar cell and module efficiencies. They shall write their observations and submit to the teacher hand-written Fieldwork/Project work not exceeding 10 pages in the given format.
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. Unit tests (IE).

(b) Suggested Co-Curricular Activities

1. Training of students by related industrial/ technical experts using guest lectures/ invited talks.
2. Assignments (including technical assignments like identifying components of a solar hot water and solar photovoltaic systems and their handling, operational techniques and maintenance procedures with safety and security)
3. Seminars, Group discussions, Quiz, Debates etc. on related topics.
4. Preparation of videos on thermal and photovoltaic systems and technical procedures.
5. Collection of brochures/figures/photos related to products and applications of solar energy and organizing them in a systematic way in a file.
6. Making a (i) solar panel (ii) solar light (iii) solar cooker (iv) solar oven (v) solar inverter atHome.
7. Visits to nearby solar thermal system as well as solar photovoltaic power stations, firms,research organizations etc.

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B Sc	**Semester V (**Skill Enhancement Course -Elective)	**Credits: 4**
Course: 6C	**Applications of Electricity & Electronics**	**Hrs/Wk: 4**

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

1. Identify various components present in Electricity& Electronics Laboratory.
2. Acquire a critical knowledge of each component and its utility (like resistors, capacitors, inductors, power sources etc.).
3. Demonstrate skills of constructing simple electronic circuits consisting of basic circuit elements.
4. Understand the need & Functionality of various DC & AC Power sources.
5. Comprehend the design, applications and practices of various electrical & Electronic devices and also their trouble shooting.

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

UNIT I: INTRODUCTION TO PASSIVE ELEMENTS (10 hrs.)

Passive and Active elements-Examples, **Resistor**-Types of Resistors, Color coding - Applications of a Resistor as a heating element in heaters and as a fuse element. **Capacito**r-Types of Capacitors, Color coding, Energy stored in a capacitor, Applications of Capacitor in power supplies, motors(Fans) etc.**, Inductor**-Types of Inductors, EMF induced in an Inductor, Applications of Inductor, Application of choke in a fan and in a radio tuning circuit, Series resonance circuit as a Radio tuning circuit.

UNIT II: Power Sources (Batteries) (10 hrs.)

Types of power sources-DC & AC sources, Different types of batteries, Rechargeable batteries –Lead acid batteries, Ni-MH batteries, Li-ion batteries- Li-PO batteries, Series, Parallel& Series-Parallel configuration of batteries, Constant Voltage source-Constant Current Source-Applications of Current sources & Voltage sources, SMPS used in computers.

UNIT III: Alternating Currents (10 hrs)

A.C Power source-Generator, Construction and its working principle, Transformers-Construction and its working principle, Types of Transformers-Step-down and Step-up Transformers, Relation between primary turns and secondary turns of the transformer with emf., Use of a Transformer in a regulated Power supplies, Single phase motor –working principle, Applications of motors(like water pump, fan etc.).

UNIT IV: Power Supplies (Skill Based) (10 hrs.)

Working of a DC regulated power supply, Construction of a 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, Checking the output voltage of a battery eliminator using a MultiMate.(Trouble shooting), Design of a simple 5 volts DC charger, Power supply for computers(SMPS)

UNIT V: Applications of Electromagnetic Induction (10 hrs.)

DC motor –Construction and operating principle, Calculation of power, voltage and current in a DC motor, Design of a simple Motor (for example Fan) with suitable turns of coil-DC generator-Construction, operating principle and EMF equation, Construction of a simple DC generator, Difference between DC and AC generators

REFERENCES BOOKS:

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.

B Sc	Semester V (Skill Enhancement Course -Elective)	Credits: 1
Course: 6C	Applications of Electricity & Electronics Lab	Hrs/Wk: 2

PRACTICAL SYLLABUS *(30 hrs, Max Marks:50)*

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

1. List out, identify and handle various equipment in Electrical & Electronics laboratory.
2. Learn the procedures of designing simple electrical circuits.
3. Demonstrate skills on the utility of different electrical components and devices.
4. Acquire the skills regarding the operation, maintenance and troubleshooting of variousDevices in the lab.
5. Understand the different applications of Electromagnetic induction.

Practical (Laboratory) Syllabus: *(30 hrs, Max marks:50*)

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.
4. Connect two or three resistors or capacitors or inductors and measure the Series, Parallel Combination values using a Multimeter and compare the values with theCalculated values.
5. Use the Digital Multimeter and Analog Multimeter to measure the output voltage of an AC &DC power supply and also the voltage and frequency of a AC signal using CRO.
6. Use the Multimeter to check the functionality of a Diode and Transistor. Also test whether the given transistor is PNP or NPN.
7. 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.
8. 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.
9. Test whether a circuit is a Open circuit or Short Circuit by measuring continuity with a Multimeter and record your readings.

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 Paul B. Zbar,Joseph Sloop, & Joseph G. Sloop , McGraw-Hill Education
3. Laboratory Manual Basic Electrical Engineering by Umesh Agarwal, Notion Press
4. Basic Electrical and Electronics Engineering by S.K. Bhattacharya , Pearson Publishers.
5. Web sources suggested by the teacher concerned.

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 understanding of various electronic &electrical components and devices. And also understand the functional knowledge of these components and devices so that the student can safely handle these electronic components.

2. **For Student**: Students shall (individually) visita local Radio, TV or Mobile repair shop to understand the testing and soldering techniques and different electronic components in the devices that we use daily life. And also to understand the troubleshooting and working of domestic appliances such as cell phone chargers, fan, electric iron, heater, inverter, micro oven, washing machine etc.(Or)Students shall also visit the Physics/Electronics or Instrumentation Labs of nearby local institutions and can get additional knowledge by interacting with the technical people working there. (Or)Students shall also visit the local motor winding shop to understand the motor winding and working of different types of motors. After the observations, a hand- written Fieldwork/Project work not exceeding 10 pages in the given format to be submitted 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. Unit tests (IE).

(b) Suggested Co-Curricular Activities

1. Training of students by related industrial experts.
2. Assignments (including technical assignments like identifying various electrical and electronic components &devices and their handling, operational techniques with safety and security)
3. Seminars, Group discussions, Quiz, Debates etc. (on related topics).
4. Preparation of videos on tools and techniques in Electrical & Electronic Appliances indaily life.
5. Collection of material/figures/photos related to Electrical products like Heaters, Motors, Fans etc. and writing and organizing them in a systematic way in a file.
6. Visits to nearby electrical or electronic industries or laboratories in universities, research organizations, private firms, etc.
7. Invited lectures and presentations on related topics by field/industrial experts

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B Sc	**Semester V (**Skill Enhancement Course -Elective)	**Credits: 4**
Course: 7C	**Electronic Instrumentation**	**Hrs/Wk: 4**

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

1. Identify various facilities required to set up a basic Instrumentation Laboratory.
2. Acquire a critical knowledge of various Electrical Instruments used in the Laboratory.
3. Demonstrate skills of using instruments like CRO, Function Generator, Multimeter etc. through hands on experience.
4. Understand the Principle and operation of different display devices used in the display systems and different transducers
5. Comprehend the applications of various biomedical instruments in daily life like B.P. meter, ECG, Pulse oxymeter etc. and know the handling procedures with safety and security.

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

UNIT I: INTRODUCTION TO INSTRUMENTS (10 hrs)

Types of electronic Instruments- Analog instruments & Digital Instruments, DC Voltmeter and AC Voltmeter, Construction and working of an Analog Multimeter and Digital Multimeter (Block diagram approach),Sensitivity, 3½display and 4½ display Digital multimeters, Basic ideas on Function generator

UNIT II: OSCILLOSCOPE (10 hrs)

Cathode Ray Oscilloscope-Introduction, Block diagram of basic CRO, Cathode ray tube, Electron gun assembly, Screen for CRT, Time base operation, Vertical deflection system, Horizontal deflection system, Use of CRO for the measurement of voltage (DC and DC), frequency, phase difference, Different types of oscilloscopes and their uses, Digital storage Oscilloscope

UNIT III: TRANSDUCERS (10 hrs)

Classification of transducers, Selection of transducers, Resistive, capacitive & inductive transducers, Resistive and capacitive touch screen transducer used in mobiles, Displacement transducer-LVDT, Piezoelectric transducer, Photo transducer, Digital transducer, Fibre optic sensors

UNIT IV: DISPLAY INSTRUMENTS (10 hrs)

Introduction to Display devices, LED Displays, Seven Segment Displays, Construction and operation (Display of numbers),Types of SSDs(Common Anode &Common Cathode type), Limitations of SSDs, Liquid Crystal Displays, Principle and working of 2x16 display and 4x16 LCD modules, Applications of LCD modules.

UNIT V: BIOMEDICAL INSTRUMENTS (10 hrs)

Basic operating principles and uses of (i) Clinical thermometer (ii) Stethescope (iii) Sphygmomanometer (iv) ECG machine (v) Radiography (vi) Ophthalmoscope (vii) Ultrasound scanning (viii) Ventilator (ix) Pulse oxymeter (x) Glucometer, Basic ideas of CT scan and MRI scan

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 byMandeep Singh, PHI Learning.
4. Biomedical Instrumentation and Measurements by Leslie Cromwell ,Prentice HallIndia.
5. Electronic Measurements and Instrumentation by Kishor, K Lal, Pearson, New Delhi
6. Electrical and Electronic Measurements by Sahan, A.K., Dhanpat Rai, New Delhi
7. Electronic Instruments and Measurement Techniques by Cooper, W.D. Halfrick, A.B., PHI Learning, New Delhi
8. Web sources suggested by the teacher concerned and the college librarian including reading material.

B Sc	**Semester V (**Skill Enhancement Course -Elective)	**Credits: 1**
Course: 7C	**Electronic Instrumentation Lab**	**Hrs/Wk: 2**

PRACTICAL SYLLABUS : *(30 Hrs. Max Marks: 50)*

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

1. List out, identify and handle various equipment in Instrumentation Laboratory or Electronic Laboratory.
2. Learn the construction, operational principles of various instruments.
3. Demonstrate skills on handling, Maintenance & trouble shooting of different instruments used in the Labs.
4. Acquire skills in observing and measuring various electrical and electronic quantities.
5. Perform some techniques related to Biomedical Instrumentation and measurement of Certain physiological parameters like body temperature, B.P. and sugar levels etc.

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

1. Familiarisation of digital multimeter and its usage in the measurements of (i) resistance (ii) current, (iii) AC & DC voltages and for (i) continuity test (ii) diode test and (iii) transistor test
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. Display the letters **a** to **h** on a single Seven Segment Display module by applying voltages.
6. Measurement of body temperature using a digital thermometer and list out the error and corrections.
7. Measurement of Blood Pressure of a person using a B.P. meter and record your values and analyze them.
8. Get acquainted with an available ECG machine and study the ECG pattern to understand the meaning of various peaks
9. Observe and understand the operation of a Digital Pulse oxymeter and measure the pulse rate of different people and understand the working of the meter.

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.

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 in the in the laboratory/field for not less than 15 hours on the field techniques/skills of understanding the operation, Maintenance and utility of various electrical and electronic instruments both in the Laboratory as well as in daily life.

   For Student: Students shall (individually)visit a local electrical and electronics shop or small firm to familiarize with the various electrical and electronic instruments available in the market and also to understand their functionality, principle of operation and applications as well as the troubleshooting of these instruments.(Or) Student shall visit a diagnostic centre and observe the ECG machine and the ECG pattern(Or) Student shall visit a diagnostic centre and observe the CT scan and MRI scan.(Or) Student shall visit a mobile smart phone repair shop and observe the different components on the PCB(Motherboard), different ICs (chips) used in the motherboard and trouble shooting of touch screen in smart phones.

   Observations shall be recorded in a hand-written Fieldwork/Project work not exceeding 10pages in the given format to be submitted 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 / technical experts.
2. Assignments (including technical assignments like identifying different measuring instruments and tools and their handling, operational techniques with safety and security.
3. Seminars, Group discussions, Quiz, Debates etc. (on related topics).
4. Making your own stethoscope at home.
5. Making seven segment display at home.
6. Preparation of videos on tools and techniques in various branches of instrumentation.
7. Collection of material/figures/photos related to products of Measuring Instruments,

Display Modules and Biomedical Instruments and arrange them in a systematic way in a file.

8. Visits to Instrumentation Laboratories of local Universities or Industries like Cement, Chemical or Sugar Plants etc. or any nearby research organizations, private firms, etc.
9. Invited lectures and presentations on related topics by Technical /industrial experts

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MODEL QUESTION PAPER (Sem - End)

B.Sc DEGREE EXAMINATION
Semester – I
Paper 1: MECHANICS,WAVES AND OSCILLATIONS

Time: 3 hrs **Maximum Marks : 75**

Section A

Answer Any Five Questions **5X5=25M**

1. Impact Parameters
2. అభిఘాతా పరామితి
3. Write a short note on Gyroscope
4. గైయిరోస్కోప్ ను వివరింపుము
5. Show the conservative nature of central forces
6. కేంద్రీయ బలాల యొక్క నిత్యత్వమును చూపుము
7. Give brief idea about GPS
8. GPS గురించి క్లుప్తంగా వ్రాయుము
9. If a Rod travels with a speed with V=0.6c along its length , calculate the percentage of contraction
10. 0.6 వేగముతో చాలించుచున్న కడ్డీ యొక్క సంకుచిత్వాత్వము యొక్క శాతమునును కనుగొనుము
11. What is the fundamental frequency of piezo-electric crystal if $y = 8*10^8$ pa , $p= 2.5 *10^3$ m k g $/m^3$ and vibrating length is $3 x10^3$.
12. స్పయిజో స్ఫటికము యొక్క పౌన:పుణ్యమును కనుగొనుము
13. Find the fundamental frequency of longitudinal wave in rod of 1m length fixed at the mid point with both the ends being free .given the velocity of the sound in the bar V=3000m/s and the density of the material of the bar p=8600kg/ m3.
14. మధ్యన బిగించబడిన మీటర్ కడ్డిలోని అనుదైర్ఘ్య తరంగ ప్రాథమిక పౌన: పుణ్యము కనుగొనుము కడ్డిలో ధ్వని వేగము V=3000m/s కడ్డీ లోహ సాంద్రత p=8600kg/ m3.
15. Write five applications of Ultrasonic
16. అతిధ్వనుల యొక్క అనువర్తనాలు ఐదు వ్రాయుము

Section B

Answer ALL The Questions. **5X10 = 50M**

17. a) Explain the principle of motion of a rocket and derive for its velocity at any instant when it is moving under constant gravitational field
18. రాకెట్ గమన నియమమును వివరించుము . స్థిర గురుత్వాకర్షణ కక్షలోతిరుగుతున్నప్పుడు ఏదైనా ఒక సమయంలో దాని వాగమును రాబట్టుము
19. (OR)
20. b) Derive Euler equations

21. యూలర్ సూత్రమును రాబట్టుము

22. a) Define Central forces and show that they are conservative in nature.

23. కేంద్రీయ బలాలను వివరించి వాటి నిత్యత్వంను నిరూపించుము

24. (OR)

25. b) State and prove Kepler's laws of planetary motion.

26. కెప్లర్ గృహక నియమాలను వ్రాసి నిరూపించుము

27. a) Describe Michelsons- morleys experiment. Explain negative result.

28. మాక్స్వెల్ - మార్లేప్రయోగమును వివరించి , రుణ ఫలితమును నిరూపించుము

29. (OR)

30. b) Explain Einsteins mass energy relation.

31. ఐనస్టీన్ యొక్క ద్రవ్యరాశి - శక్తి నియమాన్ని వివరింపుము

32. a) Solve the differential equation of damped Harmonic Oscillator and discuss the critical damping.

33. సందిగ్ద తీగలో విరుద్ధ డోలనాల అవకలన సమీకరణాలను సాధింపుము

34. (OR)

35. b) Discuss about two coupled oscillator and derive expression for normal modes.

36. ద్వంద యుగ్మత డోలనాల సమీరణాలను సాధింపుము

37. a) Derive an equation for the propagation of transvers waves along string. Discuss the case of string clamped at both ends.

38. సాగతీయబడిన తీగలో తిర్యక్ తరంగ సమీకరణమును రాబట్టుము ఇరువైపులా బిగించబడిన తీగలోని కంపాలానాను వివరింపుము

39. (OR)

40. b) Explain the production of Ultrsonics using Piezo electric method.

41. పైజో విద్యుత్ పద్దతి ద్వారా అతిధ్వనులు ఉత్పాదనము విరింపుము

MODEL QUESTION PAPER (Sem - End)
B.Sc DEGREE EXAMINATION
Semester – II
Paper 2: Wave Optics

Time: 3 hrs **Maximum Marks : 75**

Section A

Answer Any Five Questions **5X5=25M**

1. Explain the defects coma and astigmatism in a lens. How are they minimized?
   బిందు విస్తరణ మరియు కేంద్రక ఆవరణ వివరింపుము. వాటిని ఆడామగా తొలగించవచ్చును
2. Distinguish between Fresnel and Fraunhoffer diffractions
   ప్రేనల్ మరియు ప్రాన్ హెపర్ వివర్తనముల విత్యాసమును వివరిముంపుము
3. What are quarter and half wave plates?
   ఆర్డతరంగా మరియు క్వార్టాసు తరంగ పలక వివరింపుము
4. What is holography? Mention its uses.
   హెలోగ్రఫీ అనగానేమి దాని ఉపయోగాలు వ్రాయండి
5. A double convex lens has radii of 40 cm and 10 cm. If the refractive indices for violet and red colours are 1.52 and 1.51 respectively, what is the longitudinal chromatic aberration for an object at infinity?
   ద్వంద కుంభాకార కటకం యొక్క వాసర్ధాలు 40 cm & 10 cm ఎరుపు మరియు ఉదరంరంగు గల వక్రీభవన గుణకములు 1.52 మరియు 1.51 వస్తువు అనంతదూరంలో ఉన్నపుడు అనుదెయిర్గ్య వర్ణ విపాదనము కనుగొనుము
6. A lens of thickness of 2cm and refractive index 1.5 placed in air has radii of curvature 8 cm and 8 cm. Find the system matrix and focal length.
   2cm మందము 1.5 వక్రీభవన గుణకములు గల కటకం గాలిలో ఉన్నపుడు దాని వక్రతల వ్యాసార్ధము 8cm నాభ్యంతరము మరియు మాత్రికను కనుగొనుము
7. A 15 cm tube containing cane sugar solution shows optical rotation 7₀. Calculate the strength of the solution.
   2 చక్కెర ద్రావణము 15cm గొట్టంలో దృశ్య 7^0 చూపగా ఆ ద్రావణము యొక్క సామర్ధ్యమును లెక్కించుము
8. In Newton's rings arrangement the radius of curvature of the curved surfaces is 50 cm. The radii of the 9^{th} and 16th dark rings are 0.18 cm and 0.2235 cm. Calculate the wave length of the source of light.
   లెన్యూట్టాన్ వలయాల ప్రయోగంలో 9 మరియు 16వ చీకటి వలయాల వ్యాసార్ధం 0.18cm&0.2235cm వక్రతల వ్యాసార్ధం 50cm అయినచో కాంతి యొక్క తరంగ ధెయిర్గ్య ము లెక్కించుము

Section B

Answer ALL The Questions. **5X10 = 50M**

9. a) What is chromatic aberration? Obtain an expression for the chromatic aberration of a lens.
   వరణ విపదనము అనగానేమి ? ఒక కటకం యొక్క వర్ణవిపదమును యొక్క సామ్,అర్ధ్యము వివరింపుము

(OR)

b) Explain spherical aberration. Describe minimization techniques

గోళీయ విపదనము అనగానేమి . దానిని ఏట్లు నివారించవచ్చును

10. a) How are Newton's rings formed? Describe Newton's rings experiment to determine the wave length of a monochromatic light with necessary theory.
న్యూటన్ వలయాలు ఏల ఏర్పడతాయి. ఏకవర్ణకాంతి తరంగాధేయిర్ఘ్యాన్ని న్యూటన్ వలయాల ద్వారా ఏల కనుగొందురు

(OR)

b) Explain how to determine thickness of given thin wire by forming wedge shaped film.

వెడ్జ్ విధానము అనుసరించి ఇచ్చిన తీగ మందమును ఏలా కనుగొందువు

11. a) What is a zone plate? Describe its action. Explain how a zone plate acts like a convergent lens having multiple foci.
మండల పలకము అనగానేమి ? దాని క్రియను వివరించి మండల పలకము అనేక న్యాబ్యాంతరముల కల కుంభాకార కతకుము వలె పనిచేయును అని చూపుము

(OR)

b) Explain diffraction of light due to single slit.

ఏకరీతి చీలిక వల్ల ఏర్పడు వివర్తనమును వివరింపుము

12. a) Describe the construction and working of a Nicol prism. Give any method of producing plane polarized light.
నికాల్ పట్టక నిర్మాణమును మరియు పనిచేయు విధానమును విరింపుము ఏకరీతి ద్రావిత కాంతిని పొందు ఒక విధానమును వివరింపుము

(OR)

b) Define optical activity. Describe how the specific rotation of given optically active substance using laurant's half schade polarimeter.
ద్రావణా తలా భ్రమణము అనగానేమి లారెంట్ అర్ధచాయా ధ్రువణమాపకము ద్వారా బ్రహ్మకమును ఏల కనుగొందువు

13. a) Explain construction and working of He-Ne laser.

హీలియం -నియాన్ లేజర్ యొక్క నిర్మాణము మరియు పనిచేయు విధానము వివరింపుము

(OR)

b) A double convex lens has radii of 40 cm and 10 cm. If the refractive indices for violet and red colours are 1.52 and 1.51 respectively, what is the longitudinal chromatic aberration for an object at infinity?
ద్వంద కుంభాకార కటకం యొక్క వాసర్ధాలు 40 cm & 10 cm ఎరుపు మరియు ఉదరంరంగు గల వక్రీభవన గుణకములు 1.52 మరియు 1.51 వస్తువు అనంతదూరంలో ఉన్నపుడు అనుదెయిర్ఘ్య వర్ణ విపాదనము కనుగొనుము

MODEL QUESTION PAPER (Sem - End)

B.Sc DEGREE EXAMINATION
Semester – III
Paper 3: Heat &Thermodynamic

Time: 3 hrs **Maximum Marks : 75**

Section A

Answer Any Five Questions **5X5=25M**

1. Derive an expression for the coefficient of viscosity of a gas on the basis of kinetic theory of gases.
   వాయుస్నిగ్ధతాగుణకమును అణు చలన సిద్ధాంతము ద్వారా వివరింపుము
2. What are pyrometers? Describe disappearing filament optical pyrometer.
   మాయమైపోయే తీగ దృశా పిరోమీటర్ నిర్మాణమును వివరింపుము
3. What are pyrometers? Describe disappearing filament optical pyrometer
   కార్నడ్ సిద్ధాంతమును వ్రాసి వివరించుము
4. Obtain clausius- clapeyron equation from Maxwell's equations
   మాక్స్వెల్ సమీకరణం ద్వారా క్లాసియస్ -క్లాపిరాన్ సమీకరణాని ఉత్పాదించుము
5. Discuss the effects of Chloro and fluoro carbons on ozone layer
   ఓజోన్ పొరమీద క్లోరో - ఫ్లోరో కార్బన్ ల యొక్క చర్యను విరింపుము
6. What is Entropy. And explain how it changes in a reversible process
   ఎంట్రోపిని వివరింపుము. ఉత్క్రమినియా ప్రక్రియలో దాని మార్పునుము విరింపుము
7. The efficiency of a Cornot's engine is 60%. Calculate the increase in temperature of the source so that the efficiency becomes 70%.
   కార్నో ఇంజను యొక్క సామర్థ్యం60%. దాని సామర్థ్యం 0% అయితే దాని ఉత్పదక లోని ఉష్ణోగ్రత పెరుగుదల ఎంత
8. Calculate the surface temperature of the Sun, given the radius of the Sun = 7.04 x 10^5 Km, distance of the Sun from the earth = 14.72 x 10^7 Km, solar constant = 1400 W/m^2 and Stefan's constant = 5.7 x 10^{-8} $Wm^{-2}K^{-4}$.
   సూర్యుని ఉపరితల ఉష్ణోగ్రతను లెక్కించుము60%.. సూర్యుని వ్యాసార్ధం 7.04 x 10^5 Km భూమినుండి సూర్యునికి గల దూరం 14.72 x 10^7 Km సౌర సిద్ధాంతం 1400 W/m^2 మరియు స్టేపాన్ స్థిరాంకం

Section B

Answer ALL The Questions. **5X10 = 50M**

9. a) Derive Maxwell's distribution law of velocities.
   మాక్స్వెల్ వేగా వితరణ సూత్రాన్ని రాబట్టండీ

   (OR)

   b) Define coefficient of viscosity and thermal conductivity and derive the relation between them using Kinetic theory of gasses.
   స్నిగ్ధతాగుణము మరియు ఉష్ణ వాహకత్వముయు నిర్వహించి వాటి మధ్య సంబంధమును వ్రాయు అణు చలన సిద్ధాంతము ద్వారా రాబట్టుము

10. a) Derive Plank's law of radiation. Derive an expression for energy distribution?
ప్లాంక్ వికిరణ సూత్రాన్ని రాబట్టుము , శక్తి వితరణ సత్రాన్ని వివరింపుము
(OR)
b) Explain the construction and working of PyroHelio meter.
పైరోహేలియో మీటర్ యొక్క నిర్మాణము మరియు పనితనం వ్రాయుము
11. a) Describe the working of Cornot's engine and derive the expression for its efficiency
కార్నో ఇంజను పనితనం మరియు దాని సామర్థ్యమును ఉత్పాదించుము
(OR)
b) Explain T-S diagram and derive expression for effiency
T-S పఠమను వివరిచి దాని సామర్థ్యమును ఉత్పాదించుము
12. a) What are thermodynamic potentials? Derive Maxwell's thermodynamic relations.
ఉష్ణగతిక శక్మాలను నిర్వచించుము, తద్వారా మాక్స్వెల్ ఉష్ణగతిక సమీకరణాన్ని రాబట్టండి
(OR)
b) Define Joule Thomson effect and derive and expression for cooling
జౌల్ - థామ్సన్ ఫలితము వివరింపుము , జౌల్ - థామ్సన్ శీతలీకణానికి సమీకరణని వివరింపుము
13. **a)** Describe how low temperatures are produced by adiabatic demagnetization. Give the theory of the experiment.
స్థిరోష్ణ నిరయస్కాంతీకరణం ద్వారా అల్ప ఉష్ణోగ్రతలను ఏ విధంగా పొందవచునో వివరింపుము
(OR)
b) Explain the liquification of air by Linde's methode.
లిండే పద్దతి ద్వారా వ్రాయుద్రువీకరణము వివరింపుము

MODEL QUESTION PAPER (Sem - End)

B.Sc DEGREE EXAMINATION
Semester – IV
Paper 4: Electricity, Magnetism &Electronics

Time: 3 hrs **Maximum Marks : 75**

Section A

Answer Any Five Questions **5X5=25M**

1. Derive expression for the potential due to a point charge.
   బిందు ఆవేశము వలన కలిగే పొటెన్సీల్ ఉత్పేదించుము
2. What is Hall Effect? Write the applications of Hall Effect.
   హాల్ ఎఫెక్ట్ ఫలితము అనగానేమి దాని అనువర్తనాలను వ్రాయండి
3. Write the integral and differential forms of Maxwell's equations.
   మాక్స్వెల్ నియమాల ఇంటెగ్రల్ మరియు సంకలన రూపాలను వ్రాయుము
4. Derive the relation among D, E and P.
   D, E and P మధ్య గల సంబంధము వ్రాయుము
5. Calculate the resonance frequency of a LCR series circuit with a resistance 10&!, inductance 20mH and a capacitance of 0.02μF
   LCR వలయం యొక్క అనువాద పౌనపుణ్యంను కనుగొనుము నిరోధము వోమ్ 10 &! ఇండక్టన్స్ మరియు కెపాసిటన్స్ 20mH, 0.02μF.
6. For a transistor α =0.95 and its emitter current is 1mA. Find its base and collector currents.
   ట్రాన్సిస్టర్ యొక్క α =0.95 మరియు ఉద్గార విద్యుత్ 1mA అయితే ఆధార మరియు కలక్టర్ విద్యుత్ విలువ ఎంత.
7. Convert the following binary numbers into equivalent decimal number
   i. 101010101 ii. 1111001
   ఈ క్రింది ద్వి సంఖ్యా మానంలోని సంఖ్యలను దశాంశ సంఖ్యలుగా వ్రాయుము
   i. 101010101 ii. 1111001
8. Perform the following subtraction using 2's compliment method
   i. 101101 – 011110 ii. 11110111 – 00001100
   ఈ క్రింది వ్యత్యాసములను 2' కాంప్లీమెంట్ పద్ధతి ద్వారా కనుగొనుము
   i. 101101 – 011110 ii. 11110111 – 00001100

Section B

Answer ALL The Questions. **5X10 = 50M**

9. a) State and prove Gauss's law.
   గాస్ నియమమును వ్రాసి నిరూపించుము

(OR)

b) Derive expression for the capacitance of parallel plate capacitor with dielectric slab

సమాంతర పలకల మధ్య నిరోధమును ఉంచినప్పుడు కెపాసిటెన్స్ ని ఉత్పాదించుము

10. a) State and explain Biot - Savart's law. Derive an expression for the magic induction at a point on the axis of a current carrying solenoid.
బయోడ్ - స్టావర్ట్ నియమమును వివరించుము ? సొలినాయిడ్ లో విద్యుత్ ప్రవహిస్తునట్లుగా దాని అక్షం మీద ఉన్న బిందువు వద్ద అయస్కాంత తీవ్రతను వివరింపుము.

(OR)

b) Explain Faraday's laws of electromagnetic induction. Derive expression for coefficient of coupling.
ఫెరాడేస్ విద్యుత్ అయస్కాంత నియమమును వ్రాయుము ? కంపీలింగ్ విధానాన్ని ఉత్పాదించుము

11. a)Describe the behavior of series LCR circuit when an alternating voltage is applied to it. Explain the condition for resonance.
LCR విలయానికి ఏ. సి వోల్టేజి ఇచ్చినప్పుడు దాని ప్రవర్తన వ్రాయుము మరియు అనువాద నియమము వివరింపుము

(OR)

b) Derive the equation of electromagnetic wave and hence determine the velocity of propagation of electromagnetic wave in free space.
విద్యుత్ అయస్కాంత తరంగ సమీకరణమును ఉత్పాదించుము ? తరంగ ప్రవాహ వేగము రాబట్టుము

12. a) What is transistor? Explain the working of PNP and NPN Transistor.
PNP మరియు NPN ట్రాన్సిస్టర్ యొక్క పనితనం వివరింపుము.

(OR)

b) Deduce relation between alpha, beta and gamma.
ఆల్ఫా, బీటా మరియు గామా ల మధ్య గల సంబంధము వ్రాయుము

13. a) Explain the functioning of a Half Adder and a Full Adder along with respective truth tables.
అర్ధ సంకలన కారిణి (హాఫ్ యాడారు) మరియు ఫుల్ యాడర్ ల యొక్క నిజ పట్టీల ద్వారా వీటి యొక్క పనితనం వివరింపుము

(OR)

b) State and prove Demorgan's laws. Realize AND, OR and NOT gates from NAND logic.
డీ - మార్గన్ సిద్ధాంతము నిర్వచించుము ? నాండ్(NAND) ద్వారము ద్వారా అండ్ (AND) , ఆర్ (OR) మరియు నాట్ (NOT) ద్వారాలను రాబట్టుము.

MODEL QUESTION PAPER (Sem - End)

B.Sc DEGREE EXAMINATION
Semester – IV
Paper 5: MODERN PHYSICS

Time: 3 hrs **Maximum Marks : 75**

Section A

Answer Any Five Questions **5X5=25M**

1. Explain L-S and J-J coupling schemes.
   L -S మరియు J - J కప్లింగ్ పద్ధతులను వివరించండి .
2. State and explain Zeeman effect.
   జీమన్ ఫలితాన్ని వివరించండి.
3. How inter nuclear distance in a molecule can be determined
   న్యూక్లియర్ అంతర్గత దూరం ఎలా కనుగొనవచును.
4. Define Binding energy of nucleus. Calculate binding energy of nucleus
   కేంద్రక బంధన శక్తిని విరింపుము , దానిని ఏవిధంగా లెక్కగడతారో తెలుపుము.
5. What are properties of nuclear forces.
   కేంద్రక బలాల ధర్మాలను తెలుపుము.
6. Write about Geiger-Nuttal law.
   గైగర్ .. నట్టల్ నియమాన్ని వివరించండి .
7. Briefly explain the principle of solid state detector.
   సలాడ్ స్టేట్ డిటెక్టర్ పని చేయు విధానాన్ని వివరించండి.
8. The mass of $_{17}Cl^{35}$ is 34.98 a.m.u. Find the binding energy per nucleon. Mass of neutron is 1.008665 a.m.u and mass of proton is 1.007665 a.m.u.
   $_{17}Cl^{35}$ యొక్క ద్రవ్యరాసి 34.98 a.m.u. న్యుట్రాన్స్ ద్రవ్యరాసి 1.008665 a.m.u మరియు ప్రొటాన్స్ ద్రవ్యరాసి 1.007665 a.m.u. బంధన శక్తి ప్రతి న్యూక్తియాన్ ను కనుగొనుము.

Section B

Answer ALL The Questions. **5X10 = 50M**

9. a) Describe the Stern Gerlach experiment and indicate the importance of the results obtained.
   స్టెర్న్ గేర్లక్ ప్రయోగము వివరించి ప్రాధాన్యతను తెలపండి

   (OR)

   b) Explain Raman effect. Describe experimental arrangement to observe Raman effect.
   రామన్ ప్రయోగ ఫలితాన్ని ప్రయోగ పూర్వకంగా రాయండి

10. a) Describe Davision and Germer Experiment.
    డేవిసన్ మరియు జర్మన్ ప్రయోగ ఫలితాన్ని తెలుపండి

    (OR)

    b) Describe Heisenbergs Uncertanity relation. Derive Energy – time uncertainty.

ఇసన్ బర్గ్ అన్నిశ్చిత సూత్రాన్ని వివరించి శక్తి, కాలముల అన్నిశ్చిత సూత్రాన్ని నిరూపించండి

11. a) Derive an expression for energy levels of particle in box which is 3-D motion.
పెట్టెలో 3-D చలనం కలిగిన కణం యొక్క శక్తి సూత్రాన్ని ఉత్పాదన చేయండి.

(OR)

b) Derive Schodinger time dependent wave equation.
స్కాండిజర్ కాల సమీకరణాన్ని ఉత్పాదించండి

12. a) Explain Liquid drop model of nuclus.
ద్రవ బిందు నమూనా గురించి వివరించండి

(OR)

b) Explain the construction and working of GM counter.
కౌంటర్ నిర్మాణము పనిచేయు విధానాన్ని తెలపండి

13. a) Explain about type -1 and type -2 superconductors and write brief about BCS theory.
1 - వ రకం 2 - వ రకం అట్టి వాహక పద్దార్థాల గురించి వివరించి BCS సిద్దాంతమును వ్రాయండి
(OR)
b) Explain the distinct properties of nano materials.
నానో పదార్థాల యొక్క ధర్మాలను వివరించండి

MODEL QUESTION PAPER (Sem - End)

B.Sc DEGREE EXAMINATION
Semester – V (Skill Enhancement Course -Elective)
Paper-6A-Optical Instruments And Optometry

Time: 3 hrs **Maximum Marks : 75**

Section A

Answer Any Five Questions **5X5=25M**

1. Explain the operating principle of Phase Contrast Microscope
2. Explain the terms : Magnifying power and Normal Adjustment of a Simple Microscope
3. Explain the working principle and applications of Binoculars
4. Write a short note on various types of telescopes
5. Give various applications of Scanning Electron Microscope
6. Give any five applications of Radio Telescopes
7. Explain the optical defects : Myopia and Hypermetropia
8. Explain the applications of Phoropter

Section B

Answer ALL The Questions. **5 x 10 = 50M**

9. (a) Explain the Construction, Magnifying power and normal adjustment of a Compound microscope

(OR)

(b) Explain Construction, working and uses of a Travelling microscope

10. (a) Explain the Construction, working and Magnifying power of a Refracting Telescope

(OR)

(b) Explain the working principle and uses of an Astronomical telescope

11.(a) Explain about a Transmission Electron Microscope and give its applications

(OR)

(b) Explain about Infrared and Ultraviolet telescopes and give their applications

12.(a) Explain the Removal of defects in vision using ophthalmic lenses

(OR)

(b) Explain the working principle and Mention various types of Contact lenses

13.(a) Describe the working principles of an opthalmoscope and Keratometer

(OR)

(b) Explain the various principles of computer based eye testing

MODEL QUESTION PAPER (Sem - End)

B.Sc DEGREE EXAMINATION
Semester – V (Skill Enhancement Course -Elective)
Paper-7A– Optical Imaging And Photography

Time: 3 hrs **Maximum Marks : 75**

SECTION – A

Answer any FIVE Questions **5X5 = 25M**

1. Write a short note on Single lens Reflex camera (SLR).
2. Explain about various factors influencing Choice of Camera.
3. Write a brief note on Digital image formation.
4. Explain the terms : (a) Size of the image (b) Depth of focus and (c) Depth of field.
5. Write a short note on any two light sources in photography.
6. Explain about the usage of filters in photographic Shooting.
7. Explain about the factors influencing the quality of digital
8. Describe the various methods of storing and Processing images in photography

SECTION – B

Answer ALL the Questions **5X10M = 50M**

9.(a) Give a brief on Various types of Cameras and Explain about : (i) Twin Reflex (TLR) Camera and (ii) Digital Single-lens reflex Camera (DSLR)

(OR)

(b) Give a note on the Working principle of a Camera and Explain (i) Image formation in Simple Camera and (ii) Image formation in Human eye.

10. (a) Explain about Various Artificial light sources

(OR)

(b) Describe the need for the light in photography and Explain about Various light sources in photography.

11. (a) Explain the Working of a DSLR Camera. Also give a brief note on Wid angle and telephoto lenses.

(OR)

(b) Explain about the terms : (i) Exposure time (ii)Aperture (iii)Shutter speed (iv) Resolution

12. (a) Explain about (i) Techniques of Photomicrography and (ii) High speed photography with motor drivn Camera

(OR)

(b) Describe about the basic understanding of :i) Under Water photography(ii) Astronomical photography.

13. (a) Describe about the Various equipment and materials used in developing and priting photography

(OR)

(b) Explain about the terms : (i) Adjustment of Brightness in photoshop (ii) Adjustment of Contrast (iii) Tonal and Color values

MODEL QUESTION PAPER (Sem - End)

B.Sc DEGREE EXAMINATION
Semester – V (Skill Enhancement Course -Elective)
PAPER-6B – Low Temperature physics and Refrigeration

Time: 3 hrs **Maximum Marks : 75**

SECTION – A

Answer any FIVE Questions **5X5M = 25M**

1. Explain about various properties of materials at low temperatures
2. Give a short note on different methods of liquefaction of gases
3. Give a brief note on Vapour pressure thermometers
4. Explain the Concepts of Correction and Calibration in Gas thermometer
5. Explain the terms : Natural refrigeration and Artificial refrigeration
6. Explain various properties of refrigerant.
7. Give a short note on Refrigerant leakage and detection
8. Explain about the role of refrigeration in Desalination of Water.

SECTION - B

Answer ALL the Questions **5X10M = 50M**

9. (a) Describe the production mechanism involved in the production of
(i) Liquid Hydrogen and (ii) Liquid Nitrogen

(OR)

(b) What is Adiabatic Demagnetization ? Give it's theory and Working.

10. (a) Write a note on (i) 'Resistance Thermometers and
(ii) Magnetic Thermometers with their advantages and drawbacks.

(OR)

(b) Explain about the types of Refrigeration Systems
(i) Vapour compression and (ii) Vapour Absorption

11. (a) Explain Refrigeration Cycle along with its Block diagram

(OR)

(b)Explain about the Classification of refrigerants

12. (a) What is a Refrigeration ? Explain about it's working with the help of a Block diagram

(OR)

(b) Explain about Various types of : (i) Compressors (ii) Evaporators
(iii) Condensers in Refrigerators

13. (a) Explain about Cryogenic rocket propulsion system

(OR)

(b) Explain the applications of refrigeration in :
(i) Food preservation methods
(ii) Chemical and process Industries
(iii) Cold treatment of metals

MODEL QUESTION PAPER (Sem - End)

B.Sc DEGREE EXAMINATION
Semester – V (Skill Enhancement Course -Elective)
Paper-7B – Solar Energy And Applications

Time: 3 hrs **Maximum Marks : 75**

SECTION – A

Answer any FIVE Questions **5X5M = 25M**

Explain about the Spectral distribution of Solar radiation

1. Explain the terms : (a) direct (b) diffuse and (c) total
2. Give a short note on thermal collectors radiations
3. Write a short note on Solar desalinators
4. Explain about : (a) homo junction and (b) hetero junction Concepts in semiconductor interfaces.
5. Give a short note on various types of Solar cells
6. Explain about the advantages and limitations of Thin film solar cells.
7. Explain about energy storage modes in PV Systems
8. Explain about the semiconductor interfaces.

SECTION - B

Answer ALL the Questions **5X10= 50M**

9. (a) Explain the principle of Working and direct radiation measurement in Pyrheliometer

(OR)

(b) What is Pyrometer ? Explain the Working principle and direct radiation measurement involved in it.

10. (a) Explain about a Flat plate collector of liquid heating type and obtain Energy balance Equation and Efficiency

(OR)

(b) Explain the Solar Water heating system involving natural and forced circulation types

11. (a) What is a photovoltaic call ? Draw it's equivalent circuit and Explain about : (i) output parameters (ii) Conversion Efficiency and (iii) Quantum Efficiency

(OR)

(b) Explain the following Effects of (i) Series and shunt resistance (ii) light intensity (iii) inclination and (iv) temperature on the Efficiency of solar cells.

12. (a) Explain the configuration, structure, advantages and limitations of CdTe / Cds Thin film solar cell

(OR)

(b) Explain the concepts of (i) Solar module fabrication steps anD (ii) modules in series and Paralle

13. (a) Explain about Various primary storage Batteries

(OR)

(b) Explain about Various Secondary storage mechanisms (i) Fly wheel and (ii) Supercapacitor

MODEL QUESTION PAPER (Sem - End)

B.Sc DEGREE EXAMINATION

Semester – V (Skill Enhancement Course -Elective)

PAPER-6C – Applications of Electricity & Electronics

Time: 3 hrs **Maximum Marks : 75**

SECTION – A

Answer any FIVE Questions **5X5M = 25M**

1. Give a brief note on Energy Stored in a Capacitor
2. Explain about Various types of inductors
3. Write a short note on Lead acid batteries
4. Write Various applications of current and voltage sources
5. Write Various applications of motors
6. Write a short note on SMPS Power supply for computers
7. Write the differences between DC and AC generators
8. Give a brief note on types of transformers

SECTION – B

Answer ALL the Questions **5X10= 50M**

9. (a) What are Active and Passive circuit Elements ? Give examples and Explain Various types of Resistors with application as a fuse Element

(OR)

(b) Explain about various types of Capacitors and give a note on colour coding along with their applications in power supplies

10.(a) Explain about the Rechargeable Batteries :
(i) Ni-MH batteries (ii) Li-ion batteries and (iii) Li-Po Batteries

(OR)

(c) Explain about various configurations of batteries

11. (a) What is a Generator? Explain it's Construction and Working principle

(OR)

(b) What is a Single phase motor? Explain it's principle and Working

12. (a) Explain the Working of DC-regulated power supply and also give the steps involved in the Construction of a 5V regulated power supply

(OR)

(b) Explain the Designing of a FM Radio circuit using LCR series resonance Circuit

13.(a) What is a DC Motor? Explain the Construction and operating principle Involved in it.

(OR)

(b) What is a DC Generator? Explain the Construction and operating principle Involved Also obtain the EMF equation

MODEL QUESTION PAPER (Sem - End)

B.Sc DEGREE EXAMINATION
Semester – V (Skill Enhancement Course -Elective)
PAPER-7C– Electronic Instrumention

Time: 3 hrs **Maximum Marks : 75**

SECTION – A

Answer any FIVE Questions **5X5M = 25M**

1. Distinguish between DC Voltmeter and AC Voltmeter
2. Write a short note on Function Generator
3. Write various uses of Oscilloscopes
4. Give a brief note on vertical and horizontal deflection systems
5. What is a Transducer ? Give the Classification of transducers
6. Write a short note on Fibre optic sensor
7. Give the applications of LCD modules
8. Write the basic operating principle involved in ECG machine and give it's uses.

SECTION – B

Answer ALL the Questions **5X10M= 50M**

9. (a) Explain the Construction and Working of a Digital multi meter, with Block Diagram

(OR)

(b)Write about the Construction and Working of an Analog multi meter

10. (a)What is a CRO? Explain the operation of a Basic CRO with the help of a Block Diagram

(OR)

(b)Explain about Various types of Oscilloscopes and give a short note on Digital storage Oscilloscope

11.(a) Explain about : (a) Piezoelectric (b) Photo transducer

(OR)

(b)Explain about the Resistive and Capacitive touch screen transducers used in mobile phones.

12.(a) Describe the Construction and Working of a Seven Segment Display

(OR)

(b) Explain about various types of SSDs and also give their limitations.

13. (a) Describe the basic operating principles and uses of :
(i) Radiography and
(ii) Ultrasound Scanning

(OR)

(b) Write about a pulse oxy meter and give a brief idea of MRI Scan.