SRI KALISWARI COLLEGE, SIVAKASI

(An Autonomous Institution, Affliated to Madurai Kamaraj University,

Reaccredited with 'A' Grade by NAAC with CGPA 3.30)

DEPARTMENT OF PHYSICS

Programme Scheme of Examinations and Syllabi

(with effect from June 2015)

UG Programmme – B.Sc., (Physics)

Programme Outcome

Knowledge

PO 1: Well grounded knowledge in chosen subjects.

PO 2: Updated knowledge related to the subjects.

Skills

PO 1: Acquisition of cognitive skills

PO 2: Acquisition of Life Skills for Employment.

Attitude

PO 1: Holistic Personality Development through Self-directed and lifelong learning.

PO 2: Eco Sensitivity, inclusive culture, moral uprightless and social commitment.

Programme Specific outcome

- Thorough knowledge of the core concepts in Physics
- Ability to design and conduct experiments, as well as to analyze and interpret data
- Trained to apply their Physics experience and knowledge to analyze new situations and problems in Physics
- Ability to apply core principles of Physics in post graduate Physics and modern areas of Physics research
- Be able to successfully pursue career objectives in a scientific career in government or private industry, in a teaching career, or in a related career

2015-2018

Part	Course Code	Course Name	Hours	Credits
Semester I				
I	15UTAL11	Tamil/Hindi/French – I	6	3
II	15UENL11	English – I	6	3
III	15UPHC11	**Core – I :** Foundation Course Basic Physics	3	3
	15UPHC12	**Core – II :** Properties of Matter	3	3
		Major Physics Practical-I	2	-
	15UPHA11	**Allied – I :** Allied Mathematics – I	6	5
IV	15UPHN11	**Non Major Elective Course- I :** Physics in every day life – I	2	1
	15UPHE11	**Enrichment Course – I :** Introduction to PC Software	2	1
		TOTAL	**30**	**19**
Semester II				
I	15UTAL21	Tamil/Hindi/French – II	6	3
II	15UENL21	English – II	6	3
III	15UPHC21	**Core – III** : Mechanics and Sound	3	3
	15UPHC22	**Core – IV** : Gravitation and Relativity	3	3
	15UPHC2P	**Core – V** : Major Physics Practical – I	2	3
	15UPHA21	**Allied– II :** Allied Mathematics – II	6	5

IV	15UPHN21	**Non Major Elective Course – II** : Physics in every day life - II	2	1
	15UPHE21	**Enrichment Course – II :** Photography	2	1
		TOTAL	**30**	**22**

Semester III				
I	15UTAL31	Tamil/Hindi/French – III	6	3
II	15UENL31	English – III	6	3
III	15UPHC31	**Core – VI :** Optics	3	3
	15UPHC32	**Core – VII :** Electricity	3	3
		Major Physics Practical – II	2	-
	15UPHA31	**Allied – III :** Allied Chemistry – I Allied Chemistry Practical	4 2	3
IV	15UPHS31	**Skill Based Course – I :** Thermal Physics	2	2
	15UPHV31	**Value Based Course – I :** Physics of Household Appliances – I	2	1
		TOTAL	**30**	**18**
Semester IV				
I	15UTAL41	Tamil/Hindi/French – IV	6	3
II	15UENL41	English – IV	6	3
III	15UPHC41	**Core – VIII :** Electromagnetism	3	3
	15UPHC42	**Core - IX :** Spectroscopy and laser Physics	3	3
	15UPHC4P	**Core - X :** Major Practical – II	2	4

	15UPHA41 15UPHA4P	**Allied – IV :** Allied Chemistry - II Allied Chemistry Practical	4 2	3 4
	15UPHO41 15UPHO42	**Optional / Elective Course – I :** 1. Programming in C 2. Statistical Mechanics 3. Mathematical Physics	4	3
		Extension	-	1
		TOTAL	**30**	**27**

Semester V				
III	15UPHC51	**Core – XI :** Atomic Physics and Quantum Mechanics	5	5
	15UPHC52	**Core – XII :** Analog Electronics	5	5
	15UPHC53	**Core – XIII :** Classical Mechanics	5	5
		Major Physics Practical - III	3	-
		Major Physics Practical – IV	3	-
	15UPHO51 15UPHO52	**Optional / Elective Course – II :** 1. Programming in C++ 2. Astro Physics 3. Opto electronics	4	3
IV	15UPHS51	**Skill Based Course – II :** Medical Physics	2	2
	15UPHS52	**Skill Based Course - III :** Energy Physics-I	2	2
	15UVED51	Value Education	1	1
		TOTAL	**30**	**23**
Semester IV				
III	15UPHC61	**Core – XIV :** Condensed matter Physics	5	5

	15UPHC62	**Core – XV :** Nuclear Physics	5	5
	15UPHC63	**Core – XVI :** Digital Electronics	4	4
	15UPHC6P	**Core - XVII :**Major Physics Practical – III	3	5
	15UPHC6Q	**Core - XVIII :** Major Physics Practical – IV	3	5
	15UPHO61 15UPHO62 15UPHO63	**Optional / Elective Course – III :** 1. Electronic communication 2. Microprocessor Fundamentals 3. Nanotechnology and Instrumentation	4	3
IV	15UPHV61	**Value Based Course – II :** Physics of household appliances – II	2	1
	15UPHS61	**Skill Based Course - IV :** Energy Physics – II	2	2
	15UPHR61	Environmental Studies	2	1
		TOTAL	**30**	**31**

Semester	**I**	**II**	**III**	**IV**	**V**	**VI**
Credit	**19**	**22**	**18**	**27**	**23**	**31**

Sri Kaliswari College (Autonomous)- Sivakasi
Choice based credit system- Curriculum Pattern
U.G. Programme – (B.Sc. Physics) - 2015-2018
Semester – I

Core I: Foundation Course - Basic Physics - 15UPHC11 **Duration: 45 Hrs**
Credits: 3

Aim and objectives:

- To understand the basic concept of vector and its applications
- To understand the basic concepts of wave motion

- To recollect the concepts in heat and thermodynamics
- To be familiar with electric field, flux and potential
- To understand electric current and electric circuits

Course Outcome:

- Thorough knowledge in the basic concepts of Basic Physics
- Familiarity with vectors and various vector operations
- Thorough knowledge in Newton's laws of motion and wave motion
- Be able to understand the basic concepts of thermal physics and electrostatics.
- Knowledge acquired on electric current and solving simple circuits

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UNIT I **(9 Hrs)**

Vector concepts and their uses : Introduction – Vectors and Scalars – Adding vectors geometrically – Components of vectors – UNIT vectors – Adding vectors by components – Vectors and the laws of physics – Multiplying vectors – Moving in two or three dimensions - Position and displacement – Average velocity and instantaneous velocity – Average acceleration and instantaneous acceleration – Newton's I law – Force – Mass – Newton's II law – Newton's III law

UNIT II **(9 Hrs)**

Wave motion : Waves – Types of waves – Transverse and longitudinal waves – Wavelength and frequency – The speed of the traveling waves – Wave speed on a stretched string – Energy and Power of a traveling string wave – The principles of superposition of waves – Interference of waves – Standing waves - Standing waves and resonance

UNIT III **(9 Hrs)**

Heat and thermodynamics: Introduction – Zeroth law of thermodynamics – Measuring temperature - Centigrade and Fahrenheit scales – Thermal Expansion – Temperature and heat – Absorption of heat by solids and liquids – Closer look at heat and work – First law of thermodynamics – Some special cases of first law of thermodynamics – Heat transfer mechanism.

UNIT IV **(9 Hrs)**

Electrostatic field and potential: Introduction – Electric charge – conductors and insulators – Coulomb's law – Charge is quantized – Charge is conserved – Electric field – Electric field lines – Electric field due to a point charge – Flux – Flux of an electric field – Electric potential energy

– Electric potential – Equipotential surfaces – calculating the potential from the field – Potential due to a point charge.

UNIT V **(9 Hrs)**

Electric current and circuits: Moving charges and electric currents –Electric current – Current density – resistance and resistivity – Ohm's law – Power in electric circuits – Work, energy and emf - calculating the current in a single loop circuit – Other single loop circuits – Potential differences – the ammeter and voltmeter (measurement only)

Text Books:

1. Principles of Physics by Halliday, Resnick and Jearl Walker 9 th edition, Wiley India Pvt. Ltd.
   UNIT I: 3.2 – 3.8, 4.2 – 4.4, 5.2 – 5.6 and 5.8
   UNIT II: 16.2 – 16.7, 16.9, 16.10, 16.12 and 16.13
   UNIT III: 18.2 – 18.12
   UNIT IV: 21.2 – 21.6, 22.2 – 22.4, 23.2 – 23.3 and 24 – 24.6.
   UNIT V: 26.2 – 26.5, 26.7, 27.3 – 27.6 and 27.8

Reference Books

1. University Physics by Zears and Zeamansky's, Pearson Education, Inc, Eleventh Edition, 2006
2. Physics by Cutnell Johnson, John Wiley & Sons, Inc, Fifth Edition, 2004

Sri Kaliswari College (Autonomous)-Sivakasi
Choice based credit system
U.G. Programme – (B.Sc. Physics) -2015-2018
Semester – I

Core -II: Properties of Matter - 15UPHC12 **Duration: 45 Hours**
Credits : 3

Aim and objectives:

- To be familiar with different moduli of elasticity and their measurements.

- To understand the basic concepts of liquid flow of non viscous liquids.
- To understand the phenomenon of surface tension.
- To give an exposure on diffusion and osmosis.
- To be aware of laws of flotation and their applications.

Course Outcome:

- Ability to distinguish between the different forces that hold atoms together
- Capable understanding the elastic properties of solids
- Understanding the basic concept of capillarity and its applications
- Acquired knowledge in Bernoulli's theorem will helps to understand the working of flying object like aeroplanes etc
- Ability to solve problems in properties of matter.

UNIT I **(9 Hrs)**

Elasticity – Definitions – Poisson's ratio – Work done in deforming a body – Bulk modulus – Modulus of rigidity – Relation between elastic constants – Twisting of a cylinder – Torsion pendulum – Young's Modulus - Bending of beams – Cantilever – I section girders – Determination of Y by uniform bending.

UNIT II **(9 Hrs)**

Introduction – Stream line motion and rate of flow – Equation of continuity – Energy of a liquid in motion – Bernoulli's theorem – Applications (Pitot's tube and Venturi meter) – Torricelli's theorem – Viscosity – Stoke's law – Poiseuille's method for coefficient of viscosity – correction to Poiseuille's equation – Ostwald's viscometer.

UNIT III **(9 Hrs)**

Introduction – surface tension – Explanation – Surface energy and surface tension – Pressure across a spherical surface – Excess of pressure inside a spherical liquid drop and liquid bubble – Angle of contact – Explanation and determination – Capillary rise – Examples – Experiment to determine the surface tension of water by Jaeger's method.

UNIT IV **(9 Hrs)**

Diffusion – Fick's law - Relation between time of diffusion and length of column – Experimental measurement of diffusivity – Graham's law for diffusion of gases – Effusion – Transpiration and Transfusion – Osmosis and Osmotic pressure – laws of Osmotic pressure – Osmosis and vapor pressure of a solution – Osmosis and boiling point of a solution.

UNIT V **(9 Hrs)**

Fluids – Liquids and gases – Hydrostatic pressure – Hydrostatic pressure due to a liquid column – Pascal's law – Thurst on an immersed plane – Centre of pressure – Principle of Archimedes - Equilibrium of floating bodies – Stability of equilibrium – Rolling and pitching of a ship – Determination of metacentric height.

Text Books

1. Properties of Matter by Brijlal and N.Subramanyam, first edition, 2013, Eurasia Publishing House (Pvt) Ltd, New Delhi.

UNIT I
Sections : 6.1 to 6.11, 6.14, 6.16, 6.18 to 6.21,6.24 and 6.25

UNIT II
Sections: 7.1 to 7.13

UNIT III
Sections: 8.1 to 8.8 and 8.10 to 8.17

2. Elements of properties of matter by D.S. Mathur, Eleventh edition, S.Chand and Company Ltd, New Delhi.

UNIT IV
Sections: 13.1 to 13.11

UNIT V
Sections: 9.1 to 9.7 and 9.10 to 9.14

Reference Book

1. Elements of properties of matter by D.S. Mathur, First edition, reprint 2006, S.Chand and Company Ltd, New Delhi.
2. Mechanics and general Properties of matter by P.K.Chakrabarti, Books and Allied (PVT) Limited, Calcutta, Third Edition, 2009.

Sri Kaliswari College (Autonomous)-Sivakasi
Choice based credit system
U.G. Programme – (B.Sc. Physics) -2015-2018
Semester – I

Non Major Elective Course -I: Physics in everyday life I - 15UPHN11 Duration: 30 Hours
Credit : 1

Aim and objectives:

- To enable the students to understand the basic concepts of heat and applications
- To learn about different light sources and energy saving methods.
- To understand the basic concepts in Electricity.
- To understand the working of some electrical appliances
- To get an exposure on solar energy and its uses

Course Outcome:

- Ability to understand and solve the simple problems in thermal physics
- Capable of understanding the working of filament and CFL lamps
- Able to solve simple problem based on ohm's law
- Awareness created on need for renewable energy resources.

UNIT I **(6 Hrs)**

Heat and Temperature – Measurement of temperature – Fuels – Burner – Electric heater – Induction stove –Microwave Oven.

UNIT II **(6 Hrs)**

Light – Sources – Spectrum – Atom – Molecules – Solids – Filament Lamp – Tube light – CFL –Energy savings methods

UNIT III **(6 Hrs)**

Electricity – Current – Voltage – Power – Energy – Conductor – Insulator – Resistor – Ohm's law – Capacitors – Inductors.

UNIT IV **(6 Hrs)**

Primary cells – Secondary cells –DC to AC converter – Transformer – DC motor – Universal motor – Uses of motor

UNIT V **(6 Hrs)**

Need for renewable energy resources and their importance –Introduction to solar energy – Measurement of Solar radiation data– Flat plate collector – Solar cell –Solar cooker – Solar water heater.

Text Book

1. Study materials prepared by Department of Physics, Sri Kaliswari College, Sivakasi.

Reference Books

1. Basic Electrical Electronics & Computer Engineering by N. Premkumar, II Edition,

Anuradha Agencies Publishers, Kumbakonam, 1995.
2. Non –Convention energy resources by B.K.Khan ,Tata Mc graw hill, 2006

Sri Kaliswari College (Autonomous)-Sivakasi
Choice based credit system
U.G. Programme – (B.Sc. Physics) -2015-2018
Semester – I

Enrichment course I **Duration: 30 hours**
Introduction to PC Software: 15UPHE11 **Credit : 1**

Aim and objectives:

- To enable the students to make use of computer to create and store text files in windows environment.
- To guide the students to make use of various options in MS Word.
- To make the students to understand the mail merge.
- To enable the students to make use of Excel functions for scientific applications.
- To enable the students to prepare charts using Excel worksheet.

Course Outcome:

- Ability to use the various option in MS Word
- Ability to create the mail merge document
- Be able to apply the Excel function for scientific application
- Capable of preparing charts using excel worksheet

UNIT I **(6 Hrs)**

Introduction – Starting word – Creating, Saving and Printing a Document – Resaving and Closing a New Document- Exiting Word- Opening a Document – Cursor Movements – Editing a Document – Selecting, Deleting and Replacing Text – Undoing and Redoing Changes – Saving a Document with a New Name – Moving Text – Copy, Cut and Paste options – Quickly Opening recently used files – Getting Help.

UNIT II **(6Hrs)**

Formating Text – Using of Font Dialog Box – Paragraph Formating – Using Bullets and Numbering in Paragraphs – Creating Hanging Paragraph – Controlling Paragraph Indents through Ruler Bar – Moving to a Specific Page – Finding and replacing text – Checking Spelling and Grammer – Changing Dictionary – Controlling Spelling and Grammer Options – Autocorrect and Autotext Options – Auto Complete – Inseting Date and Time – Using the Thesaurus.

UNIT III **(6 Hrs)**

Creating Tables – Formating a Tables – Table AutoFormat option – Calculations in a Table – Using Multiple Columns – Sorting Text – Inserting Text from Another File – Using Format Painting to Copy Formating – Using AutoFormat – Introduction to Mail
Merge – A Practical Example of Mail Merge – Viewing and Printing Merged Letters – Using Mail Merge to print Envelopes - Creating Mailing Lables.

UNIT IV (**6 Hrs)**

Introduction to Worksheet and Excel – Starting Excel – the Excel Screen – Organisation of the Worksheet Area – Entering Infromations and Numbers – Entering a Formula – Advantages of Using a Formula – Entering more data – Saving a Workbook – Aligning and Editing Data in cells – Excel Functions - Range – Range with SUM – Specifing a Range – Chaning Column Width – Resaving and Closing a Workbook File – Exiting Excel.

UNIT V (**6 Hrs**)

Opening an Existing Workbook File – Moving Data – Copying Data to Another Area – Filling up a Cell – Copying a Single Cell to Several Cells – Using the Mouse to Copy Data – Undoing and Redoing Actions – Inserting Row and Column – Erasing Part of a Worksheet – Deleting Rows and Columns – Not Saving Changes – Using Chart Wizard to Create a Chart – Resizing and Moving the Chart – Cahning the Chart Type – Controlling the Apperance of the Chart – Updating, Modifing and Deleting a Chart – Creating a chart on a Chart Sheet – Previewing and Printing Charts.

Text book

PC Software for Windows 98 Made Simple by R.K.Taxali, Tata Mc- Graw Hill Publishers, New Delhi, 2011 Edition.

UNIT I - Chapter 9,10 and 11.

UNIT II- Chapter 12 and 13.

UNIT III - Chapter 16 and 18.

UNIT IV- Chapter 20,21 and 22.

UNIT IV- Chapter 23 and 26.

Reference book:

1.Exploring Microsoft XP – Raghav Bahl (edition 2001) cyber tech publication New Delhi.

2. Comdex computer course kit (XP edition) - Vikas gupta (2007) Dream tech publishers.

Sri Kaliswari College (Autonomous)- Sivakasi
Choice based credit system
U.G. Programme – B.Sc. (Physics) -2015-2018
Semester – II

Core: III Mechanics and Sound - 15UPHC21 **Duration: 45 Hours**
Credits: 3

Aim and objectives:

- To understand the concepts of conservation laws.
- To acquire the knowledge of moment of inertia of solid objects.
- To understand the concepts of collision.
- To evaluate the velocity of sound in different media.
- To be disseminate with reflection of sound and ultrasonic waves

Course Outcome:

- Thorough knowledge in the basic concepts of mechanics and sound
- Familiarity with conservation of energy under conservative and non- conservative forces
- Be able to calculate moment of inertia for different objects
- Knowledge acquired on different types of collision and loss energy in different types of collision
- Thorough knowledge in concepts related velocity of sound in different media and Doppler effect
- Ability to understand the theory of reflection of sound and various application of Ultrasonic waves

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UNIT I **(9 Hrs)**

Conservation laws: Concept of work, power and energy – Conservative force – Work energy principle – Conservative force as negative gradient of potential energy $curl\ \vec{F} = 0$ – Law of conservation of mechanical energy – Non-conservative force – General law of conservation of energy - Conservation of momentum for a system of particles

UNIT II **(9 Hrs)**

Moment of Inertia: Rigid body – Rotational and translational motion - Moment of inertia – Radius of gyration – Parallel axes theorem and perpendicular axes theorem of moment of inertia (for plane laminar body only) – Moment of inertia of uniform rod – Moment of inertia of a rectangular lamina – Moment of inertia of a circular lamina or disc – Moment of inertia of a solid cylinder – Moment of inertia of solid sphere.

UNIT III **(9Hrs)**

Collision : Impulse of a force - Collision – Elastic and In-elastic collision – Oblique impact of a smooth sphere on a fixed smooth plane – Elastic one dimensional collision - Direct impact of two smooth spheres – Loss of kinetic energy due to direct impact of two smooth spheres – Oblique impact of two smooth spheres - Loss of kinetic energy due to oblique impact of two smooth spheres

UNIT IV **(9 Hrs)**

Velocity of sound in media and Doppler Effect: Sound – Velocity of longitudinal waves in gases – Newton's formula for velocity of sound and Laplace correction (Theory only no derivation)- Factors affecting velocity of sound – Velocity of sound in water – Velocity sound in air – Velocity sound in isotropic solid – Doppler effect in sound

UNIT V **(9 Hrs)**

Reflection of sound and Ultrasonic waves: Reflection of plane wave at a plane surface - Experimental demonstration of reflection of sound - Echo - Application of reflection of sound- Phase change due to reflection- Transmission of sound from air to water - Acoustics- Reverberation- Factors affecting Acoustics of building - Requisites of good Acoustics - Ultrasonic – Production and detection of ultrasonic waves – Applications of ultrasonic waves

TextBook:

1. Mechanics by D.S. Mathur revised by Dr.P.S.Hemne, S.Chand & Company Ltd., revised edition 2012

   UNIT – I Chapter: 5.2 – 5.6 and 5.10,

   UNIT – II Chapter: 11.1, 11.4, 11.5, 11.7, 11.9.1,11.9.2, 11.9.4, 11.9.6 and 11.9.10
2. Mechanics and relativity – Properties of matter – Practical physics by R.Murugesan , Vivekananda press, Madurai, First edition 2006.

   UNIT – III UNIT 4.1 – 4.7
3. Text book of sound by N. Subramanyam and Brij lal, Vikas Publishing House Pvt,, Ltd., Second revised 1995 Edition (reprint 2002)

   UNIT IV Chapter 5.1 – 5.12 and 8.1 – 8.4

   UNIT V Chapter 9.1 – 9.8, 10.14,10.15, 10.20 – 10.25 and 10.27

Reference Books:

1. Mechanics by P.Duraipandian, Laxmi Duraipandian, Muthamizh Jayapragasam, S.Chand & Company Ltd., Sixth revised edition, Reprinted on 2014
2. Oscillations, Waves and Acoustics by M. Ghosh and D. Bhattacharya, S.Chand & Company Ltd., Third edition 2006

Sri Kaliswari College (Autonomous)-Sivakasi
Choice based credit system
U.G. Programme –(B.Sc. Physics) -2015-2018
Semester – II

Core: IV: Gravitation and Relativity - 15UPHC22 **Duration: 45 Hours**
Credits : 3

Aim and objective

- To study the basic concepts of Newton's law of gravitation.
- To give an exposure on variation of g.
- To be familiar with the satellites and rocket motion.
- To give an introduction of special theory of relativity.
- To have an exposure on the mass – energy equivalence.

Course Outcome:

- Capable of solving problems in gravitation and relativity
- Familiarity in planetary motion and law governing the planetary motion
- Thorough knowledge in the basic concepts of rocket and satellites motion
- Understanding the basic difference Newton Relativity & Einstein's relativity

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UNIT I **(9 Hrs)**

Basic forces in nature- Newton's law of gravitation –Experimental determination of the Gravitational constant – Cavendish's method - Boy's method – Density of the earth – Mass of the earth and the sun – Gravitational field-intensity of the field – Gravitational potential and the gravitational potential energy – Gravitational potential and field due to a spherical shell.

UNIT II **(9 Hrs)**

Motion of falling bodies – Kepler's laws of motion and derivation of law of gravitation – Compound pendulum – Bar pendulum – Points of suspension and oscillation are interchangeable – Minimum time period – Value of g at the poles and at the equator - Variation of 'g' with altitude, depth and rotation – Difference between mass and weight – Inertial mass and gravitational mass.

UNIT III **(9 Hrs)**

Satellites – Orbital velocity – Stationary satellite – Escape velocity – Jet planes - Principle and Theory of Rocket – Velocity of Rocket at any instant – Rocket Propulsion system – Specific impulse - The multistage rocket - Shape of the rocket –time period and arbitrary speed of the satellite- Use of the Artificial satellite.

UNIT IV **(9 Hrs)**

Frame of reference - Newton's laws of motion and their limitations - Inertial frame of reference- Non-nertial frame of reference – Newtonian relativity - Gailiean transformation –

Galilean invariance – Michelson and Morley experiment and Significance of Negative results- Einstein's concept of relativity – Postulates of Special theory of relativity

UNIT V **(9 Hrs)**

Lorentz transformation – Length contraction - Time dilation - Velocity addition – simultaneity - Relativistic Mass – Relativistic Momentum - Equivalence of mass and energy – Transformation of relativistic momentum and energy – Relation between relativistic momentum and energy – Relation between the total energy , rest mass energy and momentum.

Books for Study:

1. Mechanics by D.S. Mathur, S Chand & company, First Edition, 2003.

UNIT –I

Chapter 11 - Sections: 11.1, 11.2, 11.3 (1, 2), 11.4, 11.5, 11.7, 11.8 and 11.13

UNIT –IV

Chapter 2 - Sections: 2.3, 2.4, 2.5, 2.11, 2.6 and 2.8

Chapter 3 - Sections: 3.3, 3.4 and 3.5

UNIT- V

Chapter 3 - Sections: 3.6, 3.7(i, ii, iii, v), 3.9, 3.10, 3.12 and 3.13

2. Properties of Matter, Brijlal and N.Subramanyam, First edition 2003 Eurasia Publishing House (Pvt) Ltd, New Delhi

UNIT – II

Chapter 5 - Sections: 5.1 – 5.3, 5.11 – 5.14 and 5.16 – 5.21

3. Mechanics and relativity – Properties of matter – Practical physics by R.Murugesan, Vivekananda press, Madurai, First edition 2006.

UNIT –III

Chapter 3 - Sections: 3.4 - 3.11

Books for Reference:

1. Elements of Properties of matter, D.S. Mathur, S Chand & company, Ist Edition, 2006.
2. Physics by Cutnell Johnson, John Wiley & Sons, Inc, Fifth Edition, 2004

Sri Kaliswari College (Autonomous)- Sivakasi
Choice based credit system
U.G. Programme – (B.Sc. Physics) -2015-2018
Semester – I and II

Core V: Major Physics Practical -I- 15UPHC2P **Duration: 60 Hours**
Credits : 3

1. Young's Modulus – Uniform bending – Pin & Microscope method.

2. Young's Modulus – Non Uniform bending - Optic lever method

3. Young's Modulus - Cantilever – Depression by pin and microscope.

4 .Torsion pendulum – Determination of G and I.

5. Sonometer – Verification of laws.

6. Compound Pendulum - Determination of g.

7. Spectrometer – Refractive index of the prism (sodium vapor lamp).

8. Comparison of viscosities – Ostwald's Viscometer.

9. Potentiometer – Low range voltmeter Calibration.

10. Potentiometer – Ammeter Calibration.

11. Potentiometer – High range voltmeter Calibration.

12. Potentiometer – Resistivity & comparison of resistances.

13. Carey Foster's Bridge - Resistivity of the material of the wire.

14. Carey Foster's Bridge - Temperature coefficient of resistances.

15. Surface tension – Drop weight method.

16. Sonometer- Determination of A.C. Frequency.

Sri Kaliswari College (Autonomous)- Sivakasi
Choice based credit system
U.G. Programme –2015-2018
Semester – II

Non Major Elective Course II: Physics in everyday life II - 15UPHN21

Duration: 30 Hours
Credit : 1

Aim and objective:

- To impart knowledge of physics to students other than physics major.
- To get clear idea about memory storage devices.
- To understand the basic communication systems.
- To get an exposure on optical fibers and their uses.
- To enhance the knowledge on technical details of color TV.

Course Outcome:

- Thorough knowledge in the basic concepts of physics
- Ability to understand the concept of memory storage devices
- Be able to understand the internet and intranets communication system
- Knowledge acquired on design and operation of fiber optical communication

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UNIT I **(6Hrs)**

LED – LCD – LDR – Photodiode – Transducers – Piezoelectric Transducers – Photoelectric Transducers.

UNIT II **(6 Hrs)**

Memory system in computers – Magnetic core as memory device – Magnetic core construction – Magnetic disc memories – Floppy disk

UNIT III **(6 Hrs)**

IT – Modem – Picture phone – Internet – Intranets – Communication channels – Wired windows

UNIT IV **(6 Hrs)**

Fiber optics – Structure of optical fibers – Classification of optical fibers – Propagation of light – Optical fiber cable – Fiber optic communications – Advantages of optic fibers – Disadvantages.

UNIT V **(6 Hrs)**

TV – TV broadcasting system – Color TV – Compatibility – Properties of colors – Production of color TV signals – Color TV camera

Text Book

1. Study materials prepared by Department of Physics, Sri Kaliswari College, Sivakasi.

Reference Books

1. Basic Electronics solid state by B. L. Theraja, S. Chand & company Ltd., New Delhi, 2003.
2.Semiconductor Physics and Optoelectronics by Dr.M.Arumugam, Anuradha publications, 2005 Edition

Sri Kaliswari College (Autonomous) - Sivakasi
Choice based credit system
U.G. Programme – B.Sc. Physics 2015-2018
Semester – II

Enrichment Course II: Photography -15UPHE21 **Duration : 30 hours**
Credits : 1

Aim and Objective:

- To create interest among the students to know different photographic lenses.

- To enhance the knowledge on technical details of digital camera and video camera
- To give on exposure on different types of zooming and storage methods
- To enrich the knowledge of computer aided photography.
- To allow the learners to modify the images using software filters

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Course Outcome:

- Find and develop creative ways to solve the variety of photography strategies.
- Apply a high level of understanding to the issues surrounding the creation of digital artwork.
- Know how to use various features of the camera to have creative control of photographs.
- Understand how to use photo editing software to improve the overall appearance of images.

UNIT I **(6 hrs)**

Photographic camera – Parts –Camera types – TLR – SLR – Automatic camera — Lens type – close up – wide angle – Tele photo & Zoom lenses – Depth of focus – 'f' number – Shutter speed -- Flash Photography.

UNIT II **(6 hrs)**

Digital camera – Pixels – Sensors (CCD & CMOS) – Viedo camera- Metering – matrix, center weighted, spot (Elementary ideas)

UNIT III **(6 hrs)**

Storage card –Compact flash, smart media source, Secured Digital (SD) card, Multimedia card (elementary ideas) - Digital zooming - Image transformation from storage card to personal computer.

UNIT IV **(6 hrs)**

Introduction to photoshop CS4 program window – Exploring the new interface (application bar, menu bar, options bar, status bar) – Toolbox- working with commonly used photoshop tools – palettes – working with palettes – working with selection tools.

UNIT V **(6 hrs)**

Creating new document – Saving files – Reverting files–Comparing bitmap and vector image–Editing images – Rotating – Cropping – Brightness & color adjustment- File Format (PSD, TIFF, JPEG, PDF) - Filter for special effects.

Text book:

1.UNIT: I , II and III - Notes prepared by the Physics Department, Sri Kaliswari College (Autonomous),Sivakasi

2. UNIT IV - Page no 166- 179 & 205 – 218

3. UNIT V - Page no180-183 & 190 – 205 Comdex 9-in-1 DTP Course Kit by Vikas Gupta, Dream tech Press, New Delhi, Edition 2010.

4. UNIT V - Page no 337-360 Photoshop CS –By Shruti Lal- Firewall media Laxmi publications Pvt, Ltd,New Delhi, First edition 2011

Reference book

1. Practical Photography – S.Thiyagarajan, Ennes Publications, 3rd edition, Madurai, 2006
2. Photoshop CS (V8) by Robert shufflebotham, published by Dream tech Press,Edition 2008.

Sri Kaliswari College (Autonomous) - Sivakasi
Choice based credit system
U.G. Programme – B.Sc. Physics -2015-2018
Semester – III

Core – VI: Optics - 15UPHC31 **Duration: 45 Hours**
Credits : 3

Aim and Objectives:

- This course helps to enhance the knowledge in optical lenses.

- To study the applications of interference effect.
- To be familiar with the phenomena of diffraction and polarization.

Course Outcome:

- Apply the fundamental principles of optics to solve problem in future careers.
- Learn to handle microscope and form thin film and measure the radius of curvature of Plano convex lens.
- Understand the dispersion of light and determine the dispersive power of the prism.
- Application of interference, diffraction and polarization experiment.

UNIT I **(9 Hrs)**

Lens equation (thin lenses) - Deviation by a thin lenses – Power of a thin lens- Equivalent focal length of two thin lenses separated by a finite distance – Cardinal point of an optical system – Principal points and planes – Focal points and Focal planes – Nodal points and Nodal plane – Newton's formula and graphical construction of image using cardinal points- Applications of lens combinations: Telephoto lens – Telescope lens.

UNIT II **(9 Hrs)**

Dispersion by a prism – Refraction through prism- Dispersive power – Angular and chromatic dispersion –Achromatic combination of prism – Deviation without dispersion – Dispersion without deviation – Direct vision spectroscopy – Aberration – Spherical aberration in lenses and it removal - Chromatic aberration in lenses–Achromatic lenses – Oil immersion objective of high power microscope.

UNIT III **(9Hrs)**

Interference: Superposition of waves - Interference – Young's double slit experiment– Condition for interference -Fresnel biprism – Lloyd's single mirror – Interferometry –Plane parallel film – Newton's ring – Michelson's interferometer – Fabry Perot interferometer – Antireflection coatings- Dielectric mirror -Interference filter.

UNIT IV **(9 Hrs)**

Rectilinear Propagation of light – Zone plate – Action of Zone plate for an incident spherical wave front– Difference between a zone plate and Convex lens – Difference between diffraction and interference- Fresnel and Fraunhofer types of diffraction – Diffraction pattern due at a circular aperture – Diffraction at an opaque circular disc – Diffraction pattern due to a straight edge – Cornu's spiral – Plane diffraction grating.

UNIT V **(9 Hrs)**

Types of Polarization – Polarization by refraction – pile of plates – Polarizer and analyser – Anisotropic Crystals - Huygen's construction of wave fronts – Quarter wave plate and half wave plate - Production and Analysis of linear, elliptically and circularly polarized light – Optical activity – Optical rotation –Specific rotation - Fresnel's explanation of optical rotation- Experimental verification of Fresnel's theory- Magneto- optic effects

Text Book

Text Book: A Text Book of optics by N. Brijlal Subramanyam, S. Chand & company 25 th Edition, 2012.

Unit I - Chapters: 4.8, 4.9, 4.15 to 4.17, 5.2 to 5.4 and 6.8

Unit II - Chapters: 8.1 to 8.8, 9.2, 9.5, 9.10, 9.11, 9.13 and 9.14

Unit III - Chapters: 14.3 to 14.5, 14.7, 14.9, 14.10, 14.16, 15.2, 15.6, 15.7 , 15.12 and 15.15 to 15.17

Unit IV - Chapters: 17.4, 17.5 to 17.10, 17.14, 18.7 and 18.7.1.

Unit V - Chapters: 20.5, 20.6.2, 20.8, 20.10, 20.14, 20.19 to 20.22, 20.27 to 20.31 and 20.37

Reference Books

1. A Text Book of optics by S.L. Kakani, and A.K Bhandari, S. Chand & Son, 10th Edition, 2005.
2. Fundamentals of Optics by Francis A.Jenkins, Harley E.White, McGraw Hill International, 4th Edition

Sri Kaliswari College (Autonomous) - Sivakasi
Choice based credit system
U.G. Programme – B.Sc. [Physics] -2015-2018
Semester – III

Core VII: Electricity-15UPHC32 **Duration: 45 Hours**
Credits: 3

Aim and Objectives:

- To enable the students to understand the basic concepts in Electric field and Potential.
- To know the principle of capacitor and properties of dielectrics.
- To enrich their knowledge in electric circuits and electrical measurements.
- To learn the magnetic effect of electric current.
- To appreciate the thermo electric effect and its uses.

Course Outcome:

- Able to solve electric fields for various charge distributions.
- Able to understand the concepts and properties of lines of force.
  Understand the behavior of Magnetic and electric fields in the presence of dielectric and magnetic material.
- Ability to analyze the combination of resistances in series and parallel.
- Ability to handle the galvanometers like Moving coil and D' Arsonval galvanometer.
- Skill in developed to solve queries in the mechanism of heating effect.

Unit I **(9 Hrs)**

Electric charge and charge distribution-Coulomb's law – Electric field strength – General method for calculating the electric field — Usefulness of lines of force – Concept of the solid angle - The electric flux of a vector field - Gauss's theorem – Differential form of Gauss's law – Electric field due to point charge – Field around an infinite cylindrical charge – Field of an infinite plane sheet of charge – Field of a spherically symmetric charge distribution – Electric potential – Potential difference – Zero potential – Potential of a charged spherical conductor i) at a point outside ii) at a point inside and iii) at a point on the surface of the sphere.

Unit II **(9 Hrs)**

Electric dipole and dipole moment- Force and torque on a dipole in an electric field - Electric field and potential due to a dipole – Dipole-Dipole interaction – Capacitance of an isolated conductor - Capacitance and its units – The two - body system – General procedure for calculating capacitance – Expressions for the capacitance of Spherical, Cylindrical and Parallel plate capacitors – Guard ring capacitor – Series and parallel combinations of capacitors – Electrostatic potential energy of a system of charges- Energy of a charged capacitor - Polar and Non-polar molecules – Dielectric polarization – Effect of a dielectric on the capacity of a capacitor - Real dielectrics.

Unit III **(9 Hrs)**

Current – Direction of current – Current Density – Equation of continuity - Ohm's law – Ohm's experiments - Physics of Ohm's law – Electrical resistivity – Effect of temperature on resistance - Combination of resistances Serial and Parallel arrangements –Ladder network of resistances – Delta and star connections - Grouping of cells Series and Parallel and mixed

grouping of cells – Examples: 11,19, 22,23 - Kirchoff's laws – Wheatstone's bridge - Measurement of emf and current using Potentiometer.

Unit IV **(9 Hrs)**

Biot-Savart's law – magnetic field due to a straight wire – Magnetic field on the axis of a circular coil – Lorentz force – The Hall effect – Ampere's circuital theorem – Applications of Ampere's Theorem – Torque on a rectangular coil in a uniform magnetic field - The moving coil galvanometer – The D'Arsonvol Galvanometer.

Unit V **(9 Hrs)**

Joule's law of heating effect of currents – mechanism of heating effect – Electric power – Electrical heating in wires – Seebeck effect – Origin of Seebeck emf – Variation of thermo emf with temperature - Peltier effect - Demonstration of Peltier effect – Difference between Joule effect and Peltier effect – Application of thermodynamics to the thermo electric effect – Thomson effect – Demonstration of Thomson effect – Laws of thermoelectric circuits – Applications of thermoelectric effect.

Text Book

1. Electricity and Magnetism by Sehgal, Chopra and Sehgal, Sultan Chand & Sons, New Delhi, Sixth Edition, (Reprint) 2013

Unit I: Section 3.6, 3.9, 3.10, 4.2, 4.3, 4.16, 4.17, 4.19 to 4.26, 5.2 to 5.6 and 5.15
Unit II : Section 4.9, 4.12, 4.13, 5.18, 5.19, 6.7 to 6.12, 7.2, 7.5, 9.1 to 9.3, 9.9 and 9.22
Unit III : Section 12.1 to 12.4, 12.6 to 12.15, 12.17 and 15.11
Unit IV : Section 13.1to13.5,13.8,13.9, 13.20,13.23, 13.29,13.31 and 14.6 to 14.9
Unit V: Section 16.1 to 16.5, 16.9, 17.1 to 17.13, 17.15 and 17.20

Reference Books

1. Fundamentals of Magnetism and Electricity, D. N. Vasudeva, S. Chand & Company Ltd, New Delhi, 12th Edition, 2002

2. Electricity and magnetism by D.C. Tayal, Himalaya Publishing house, New Delhi, Edition, 2002

Sri Kaliswari College (Autonomous), Sivakasi
Choice based credit system
U.G. Programme – B.Sc. [Physics] -2015-2018
Semester – III

Skill based Course I: Thermal Physics-15UPHS31 **Duration: 30 Hours**
Credits: 2

Aim & Objectives:

- To be familiarize with the expansion of materials due to heat
- To learn the kinetic theory of gases and its applications
- To be familiar with the laws of thermodynamics and its applications.
- To acquire knowledge of methods of liquefaction of gases
- To understand experimental methods to verification of laws and to measure specific quantities
-

Course Outcome:

- Thorough knowledge in fundamental principles of thermodynamics.
- Ability to understand the difference between different types of engines.
- Knowledge acquired in liquefaction of different gases.
- Understand the basic concepts of cryogenics.
- Able to understand the basic concepts of Statistical Mechanics.

UNIT I **(6 hrs)**

Thermodynamics: First law of thermodynamics – Isothermal process – Adiabatic process- Second law of thermodynamics – Entropy – Change in entropy in a reversible process - Change in entropy in a irreversible process – Process of increase in entropy

UNIT II **(6 hrs)**

Heat engines : Carnot' cycle – Efficiency of Carnot's cycle – Carnot engine and refrigerator – Coefficient of performance - Carnot's theorem- internal combustion engine (Petrol engine) – Diesel engine – Multiples engines.

UNIT III **(6 hrs)**

Liquefaction of gases: Introduction – Different methods of liquefaction of gases- Cooling by adiabatic expansion – Joule- Thomson expansion (principle and results only) - Liquefaction of Oxygen by cascade process – Liquefaction of hydrogen – Liquefaction of Helium – Adiabatic demagnetization

UNIT –IV **(6 hrs)**

Radiation: Thermal radiation - Prevost's theory of heat exchange – Black body – Kirchoff's law and its applications – Stefan – Boltzmann law – Distribution of energy in a black body

spectrum – Wien's displacement law – Rayleigh Jeans law – Planck's radiation law (no derivation) - Experimental verification of Stefan' law.

UNIT –V **(6 hrs)**

Statistical Mechanics: Definition of Phase space – Macroscopic description – Ensembles – Probability – thermodynamic probability – Boltzmann's theorem of entropy and probability - Fundamental postulates if statistical mechanics – Statistical equilibrium – quantum statistics

Text book

Heat and thermodynamics by Brijlal N. Subramanyam S. Chand & company LTD, New Delhi 6^{th} Edition – 2007.

UNIT-I Chapter: 2.2, 2.3, 2.4, 4.0, 2.14, 2.16, 2.24, 2.25

UNIT-II Chapter: 5.11, 5.10, 5.13, 5.25, 5.26, 5.27, 5.28, 5.43, 5.44

UNIT – III Chapter: 6.1, 6.2, 6.8, 6.11, 6.12, 6.25, 6.26, 6.28, 6.44, 6.45, 6.46

UNIT – IV Chapter: 7.1, 7.2, 7.4, 7.7, 7.8, 7.10, 7.13

UNIT – V Chapter: 8.2, 8.8, 8.13, 8.30, 8.32, 8.35, 8.37, 8.38

Reference book

1. Thermodynamics Statistical Physics and Kinetics by Satya prakash and Dr. J.P Agarwal, 7^{th} Edition, Kedarnath, Ramnath & co.
2. Heat and Thermodynamics by D.S.Matthur, Sultan Chand and Sons, Fifth Edition 2004

Sri Kaliswari College (Autonomous), Sivakasi
Choice based credit system
U.G. Programme – B.Sc. Physics -2015-2018
Semester – III

Value Based Course I: Physics of House Hold Appliances I - 15UPHV31

Duration : 30 Hours

Credit : 1

Aim & Objectives:

- To understand the use of Physics in House hold appliances.
- To give an exposure on House hold wiring and electrical devices.
- To know the principle of refrigeration and air conditioning.

Course Outcome:

- Ability to understand the wire connection like single phase, three phase and fuse circuit
- Be able to understand the practical knowledge on various home lighting system
- Thorough knowledge in the electrical heating systems like water heater, electric stove, induction cooker
- Knowledge acquired on different types of motor, and practical applications
- Familiarity with principle and working of water cooler, air conditioner.

UNIT I **(6 Hrs)**

House wiring – Simple circuits – Switch connection – Power rating – Wattmeter – Line tester – Fuses – Types of fuse – Circuit breaker – Electric shock – Types of earthing – Safety Precaution.

UNIT II **(6 Hrs)**

Filament lamp – Power rating- Disadvantages – Fluorescent lamp – Working principle- Advantages – Working of CFL – LED – Working principle – Different materials used – Advantages.

UNIT III **(6 Hrs)**

Water Heater – Power rating – Basic circuit – Precaution - Electric Stove –Induction Cooker – Timer - Temperature controller- Toaster – Electric Iron.

UNIT IV **(6 Hrs)**

Single Phase – Three Phase-Delta and Star winding- Basic Principle of electric motor – Induction motor – Fan – Mixie - Sewing machine – Hair Drier

UNIT V **(6 Hrs)**

Water cooler- Refrigerator – Law of refrigeration – UNIT of refrigeration - Vapor compression refrigeration cycle - Precaution in refrigeration system - Air Conditioner – Room Air Conditioner

Text Book

Study materials prepared by Department of Physics, Sri Kaliswari College.

Reference Book:

1. A Text book of Hotel Maintenance by Dr.N.C. Goyal, Dr.K.C. Arora, Standard Publisher Distributors, First Edition.
2. A Primer on Engineering Practices Laboratory by K.Jeyachandran, S.Natarajan, R.Balasubramanian Anuradha Agencies, Kumbakonam, Second Edition

Sri Kaliswari College (Autonomous), Sivakasi
Choice based credit system
U.G. Programme – B.Sc.[Physics] -2015-2018
Semester – IV

Core VIII: Electromagnetism - 15UPHC41 **Duration: 45 hours**
Credits: 3

Aim & Objectives:

- To understand the laws of electromagnetic induction and the measurement of self induction and mutual inductance.
- To make use of the concept of growth and decay of steady current in electric circuits.
- To introduce ac circuits and their uses in bridge circuits.
- To make the students to learn about magnetic properties and measurement of magnetic quantities.
- To give an exposure on Maxwell's equations.

Course Outcome:

- Thorough knowledge in the basic concepts of electromagnetic induction.
- Able to derive expression for growth and decay of current in different AC circuits.
- Skill developed in constructing different AC bridges.
- Understand the basic properties of magnetic materials.
- Ability to understand the significance of Maxwell's equations.

UNIT I **(9 hrs)**

Faraday's law of induction – Lenz's law – Self inductance of a long solenoid,and Toroidal coil of rectangular cross section – Energy stored in an Inductor – Determination of self induction by Rayleigh's method with theory- Mutual Inductance – Mutual inductance between two arbitrary circuits – Relation between Mutual inductance and Self inductance – Inductances in series and in parallel – Determination of mutual inductance and coefficient of coupling.

UNIT II **(9 hrs)**

Growth and decay of current in LR circuit – Growth and decay of charges in CR circuit – determination of high resistance by method of leakage — Comparison of capacitance by De Sauty's method — Ideal LC circuit — growth and decay of charges in a circuit with inductance, capacitance and resistance in series.

UNIT III **(9 hrs)**

Alternating currents - RMS value of alternating current / voltage – Alternating current applied to LR, CR and LCR circuits – Wattless current – Power factor - A.C bridges : Maxwell's bridge – Owens's bridge and Anderson's bridge – Wien's bridge –

UNIT IV **(9 hrs)**

Definition of B, H, M and magnetic susceptibility – Classification of magnetic materials - Ferromagnetic material and its property – Hysterisis – Area of hysterisis loop – Demagnetisation – Uses of Hysterisis curve –Demagnetisation – Uses of hysteresis curve – Determination of susceptibility – Guoy's method .

UNIT V **(9 hrs)**

Introduction – Types of currents – Vacuum displacement currents – Significance of displacement currents – Maxwell's equation in free space - electromagnetic waves in free space – electromagnetic waves in isotropic non conducting media (dielectrics) – Energy density of electromagnetic wave and Poynting theorem.

Text Book : Electricity and Magnetism K.K.Tewari S.Chand& Company Ltd,

Delhi,1998

Unit I : Chapter : 11 Section 11.1 - 11.3, 11.12 – 11.17, 11.19,11.22, 11.23

Unit II : Chapter : 11 Section 11.24 - 11.30

Unit III : Chapter : 16 Section 16.1 - 16.11, 16.17, and 17.5 - 17.7

Unit IV : Chapter : 14 Section 14.9 - 14.11, 14.14, 14.17, 14.19, 14.20 & 14.28

Unit V : Chapter: 15 Section 15.1-15.9, 15.11

Reference Book :

1. Electricity and Magnetism by Sehgal , Chopra & N.K Chopra Siltan chand &sons 6th Edition 2004.
2. Introduction to Electro dynamics by David J. Griffiths, Third edition, 1999.

Sri Kaliswari College (Autonomous) - Sivakasi
Choice based credit system
U.G. Programme – B.Sc. Physics -2015-2018
Semester – IV

Core IX: Spectroscopy and Laser Physics - 15UPHC42 **Duration: 45 Hrs**
Credits: 3

Aim and Objectives:

- To impart the basic knowledge on Spectroscopy.
- To understand basic theory of IR and Microwave spectroscopy.
- To give an exposure on Raman spectroscopy.
- To be familiar with fundamentals of laser sources.
- To explain the importance of different types of laser and their applications.

Course Outcome:

- Understand about electromagnetic waves and their interaction with matter.
- Knowledge about molecular structure using molecular methods (IR ,Raman)
- Use the acquired knowledge to determine the important functions of laser system
- Practical applications of laser spectroscopic methods in science and technology.

UNIT I **(9 Hrs)**

Interaction of radiation with matter: Characterization of electromagnetic radiation - Quantization of energy - Regions of the spectrum - Representation of the spectra –Basic elements of practical spectroscopy - Signal to noise: Resolving power- Width of spectral lines and intensity of spectral transitions

UNIT II **(9 Hrs)**

Microwave and infra-red spectroscopy : The rotation of molecules – Rotational Spectra - Diatomic molecule as rigid rotator – Techniques and instrumentation – The microwave oven - Vibration spectra – Vibrating diatomic molecule - The simple harmonic oscillator – Anharmonic oscillator.

UNIT III **(9 Hrs)**

Raman Effect : Introduction - Quantum theory of Raman Effect - Classical theory of Raman effect: Molecular Polarizability - Polarization of light and the Raman Effect – Vibration of Spherical top molecules - Structured determination from Raman and Infrared spectroscopy

UNIT IV **(9 Hrs)**

Lasers: Introduction – Thermal equilibrium – Absorption of light – Spontaneous emission of light - Stimulated emission – Einstein's coefficient and their relation – Light amplification- Population inversion Meta stable state – Components of laser – Lasing action – Three and four level pumping scheme.

UNIT V **(9 Hrs)**

Laser applications: The Ruby laser- ND-YAG laser - Carbon dioxide laser- Laser beam characteristics – Applications of laser Holography– Construction of hologram - Reconstruction of image – Important properties of hologram - Applications of Holography (basic idea only)

Text Book:

1. Fundamentals of Molecular Spectroscopy by Colin N. Banwell C.N. & Elaine M. McCagh, Tata McGraw Hill Publishing Co. Ltd., New Delhi, 4th edition, 2003

UNIT I: Chapter 1.1 – 1.7
UNIT II: Chapter 2.1 – 2.3.1, 2.5, 2.7 and 3.1 to 3.1.3.
UNIT III: Chapter 4.1, 4.4.1 to 4.4.2, and 4.5 .

2. A Text of Optics by Dr.N. Subrahmanyam Brijlal, Dr.M.N. Avadhanulu, S.Chand Company Ltd., 2012 (Reprint)
UNIT IV: 22.1 to 22.10
UNIT V: 22.14.1 – 22.14.4, 22.16, 22.17, 23.1, 23.2, 23.7, 23.9

Reference Book:

1. Molecular Spectroscopy by K.V. Raman, R.Gopalan, P.S.Raghavan, Vijay Nicole Imprint, Chennai, 2004.
2. Laser Systems and applications by Richa Sharma and Vibhu Sharma, ALTBS Publishers, India, 2010 Edition.

Sri Kaliswari College (Autonomous), Sivakasi
Choice based credit system
U.G. Programme – B.Sc. Physics -2012-2015
Semester – III and IV

Core X: Major Physics Practical- II- 15UPHC4P **Duration: 60 Hours**
Credits: 4

1. Potentiometer - Temperature coefficient
2. Potentiometer – Comparison of EMF.
3. Table galvanometer – figure of merit.
4. Desauty's bridge- C_1/C_2
5. Spot galvanometer – comparison of emf.
6. Air wedge- Thickness of the wire.
7. Newton's Ring – radius of curvature
8. Determination of B_H - axial coil
9. Determination of M- axial coil
10. Detemination of M and B_H- Tan C method
11. Spectrometer - Dispersive power of the material of the prism.
12. Spectrometer- Normal Incidence –Grating- To find N and λ
13. Spectrometer - i-d curve to find μ
14. Spectrometer - Small Angled prism – Refractive index
15. To write Program in C to find the resonance frequency of LCR circuit for different values of C
16. To write Program in C to find the most probable velocity of system of particles

Sri Kaliswari College (Autonomous), Sivakasi
Choice based credit system
U.G. Programme – B.Sc. Physics -2015-2018
Semester – IV

Optional Course I: Programming in C - 15UPHO41 **Duration: 60 Hours**
Credits: 3

Aims and Objectives:

- To provide basic knowledge in C programming
- To give an exposure on use of array variables in C
- To understand and make use of functions in C
- To know structure in C and its use in programming
- To understand and use FILE handling facilities

Course Outcome:

- Basic Knowledge acquired in C programming.
- Able to write simple C- programs
- Capable of solving simple Physics problems using C – Language
- Motivation acquired to study various computer languages

UNIT: I **(12 Hrs)**

Introduction to C – Character set, identifiers and keywords – Data types –variables and constants – Operators – Expressions – if and if – else statements – switch statements – while and do –while statements – for loop – break and continue statements – exit functions . Program Exercise: a) Find the distance travelled by a particle at the given time and b) Find the resonance frequency of LCR Circuit for different values of C.

UNIT: II **(12 Hrs)**

Defining an array – Processing an array – One dimensional array – Two dimensional arrays – Multidimensional array – Simple programs using array – Strings and character arrays. Program Exercise: a) Find standard deviation b) Find the most probable velocity of system of particles.

UNIT: III **(12 Hrs)**

Defining a function – Accessing a function – Passing arguments to function – Recursion – Library function- Program Exercise: a) Find the frequency of a RC Circuit for different values of capacitance using Functions b) Find the factorial of a given number.

UNIT: IV **(12 Hrs)**

Defining a structure – Processing a structure – Unions – Bit fields –Pointer declaration – Pointers and Simple variables - Program Exercise: a) Comparison of structure variables (Comparison of physical properties of material) b) Using pointer to compute the sum of all elements (life time of atoms) stored in an array.

UNIT: V **(12 Hrs)**

Standard input and output- putchar(), getchar() – File input and output- fscanf(), fprintf() - getc, putc – getw(), put() – fseek() - Program Exercise: a) Copy the contents of one file to another file b) To get data with fseek().

Text book:

"Programming in ANSI C by E.Balagurusamy, Tata McGraw hill publishing company, 5th edition, 2011.

UNIT I - Section: 2.1 to 2.13 & 3.1 to 3.16 & 5.1 to 5.9 & 6.1 to 6.5.

UNIT II - Section: 7.1 to 7.7 & 8.1 to 8.8

UNIT III - Section: 9.5 to 9.16

UNIT IV - Section: 10.2 to10.14 & 11.1 to 11.7

UNIT V - Section: 12.1 to 12.7

Reference book:

1. The Complete Reference – C, Herbert Schidt, Tata McGraw Hill, NewDelhi, fourth edition.
2. Programming in C by K.Venu Gopal, Sundeep R. Prasad, Tata McGraw Hill, New Delhi, 2002.
3. Programming in C by Dr.S.Ramaswamy and P.Radhaganesan, Scitech Publications (INDIA) Pvt.Ltd. Chennai, 2008.
4. Let us C – by Yashavant P.Kanatkar, 6th edition BPB Publications, NewDelhi, 2005.

Sri Kaliswari College (Autonomous), Sivakasi
Choice based credit system
U.G. Programme – B.Sc. Physics -2015-2018
Semester – IV

Optional Course I: Statistical Mechanics - 15UPHO42

Duration : 60 Hours
Credits: 3

Aim & Objectives:

- To enable the learners to understand the basic concepts in statistical mechanics.
- To impart knowledge on Maxwell-Boltzmann statistics.
- To enable the learners to apply the statistical mechanics in thermodynamics.

Course Outcome:

- Understand the basic rules of probability theory.
- Ability to understand the different types of ensembles.
- Understand the basic difference between the distribution laws like Maxwell-Boltmann,Fermi-Dirac,Bose- Einstein Statistics.
- Basic knowledge acquired in quantum Statistics.
- Be able to solve simple problem in Statistical Mechanics.

Unit I **(12 Hrs)**

Statistical basis – Probability – Probability & Frequency – Some basic rules of probability theory – Permutations & Combinations – Macrostate and Microstate – Thermodynamic probability – Fluctuations & their dependence on 'n' – Constraints on a system – Static & Dynamic systems – Most probable state – Life time of a microstate and macrostate – Concept of a cell in a compartment – Ensemble and average properties.

Unit II **(12 Hrs)**

Degrees of freedom – Position space – Momentum space – Phase space – mu space and gamma space – Division of phase space into cells – Applications: one dimensional harmonic oscillator – Free particle – Fundamental postulates of statistical mechanics – Density of quantum states of energy of a particle – Statistical ensembles – Kinds of ensembles – comparison of ensembles – Equilibrium between two systems in thermal contact – Bridge with macroscopic physics.

Unit III **(12 Hrs)**

Theories based on statistical mechanics – Entropy and probability – Boltzmann entropy relation – Boltzmann canonical distribution law – Application of Boltzmann canonical distribution law – Equipartition of energy – Statistical interpretation of second law of thermodynamics – Partition function and its relation with thermodynamic quantities – Entropy of an ideal gas: Gibbs paradox.

Unit IV **(12 Hrs)**

Three kinds of particles – Maxwell Boltzmann statistics applicable to ideal gas - Maxwell Boltzmann energy distribution law – M.B Energy distribution function for an ideal gas –

Condition for application of M.B Statistics – Applications of M.B distribution law – Mean, RMS & Most probable speeds of gas molecules – Maxwell's distribution law of velocities – Doppler broadening of spectral lines – Limitations of M.B method.

Unit V **(12 Hrs)**

Need for Quantum statistics – Development of quantum statistics – 'h' as a natural constant – Indistinguishability of particle & its consequences – Bose Einstein distribution law – Photon gas – Planck's radiation law – Fermi-Dirac distribution law – Free electrons in metal: Electron gas – Fermi level and Fermi energy – Fermi energy at 0 K for electron in a metal – Comparison of the three statistics.

Text book

1. Heat, Thermodynamics and Statistical Mechanics by Brij Lal, N. Subrahmanyam, P.S. Hemne (2007) S. Chand & company Ltd, New Delhi.

Unit I	:	Section 9.1 – 9.15
Unit II	:	Section 10.1 – 10.13
Unit III	:	Section 10.14 – 10.21
Unit IV	:	Section 11.1 – 11.8
Unit V	:	Section 12.1 – 12.10, 12.15

Books for Reference

1. Statistical Mechanics by B. K. Agarwal, Melvin Eisner, (II Edition) New Age International Publishers, NewDelhi, (1998).

2. Fundamentals of Statistical Mechanics, B.B.Laud, New Age International Publishers, NewDelhi , 2000.

Sri Kaliswari College (Autonomous), Sivakasi
Choice based credit system
U.G. Programme – B.Sc. Physics -2015-2018
Semester – IV

Optional Course I:Mathematical Physics - 15UPHO43 **Duration: 60 Hours**
Credits: 3

Aims and Objectives:

- To enable the students to familiarize with vector concepts.
- To encourage the students to understand matrices and make use of them.
- To be aware of Fourier and Laplace transforms to solve Physics problems
- To enable students to get an exposure on basic of Group theory.
- To give enough knowledge in numerical methods to solve problems

Course Outcome

- Familiarity with vector concepts.
- Ability to understand matrices and make use of them.
- Ability to apply Fourier and Laplace transforms to solve Physics problems
- Thorough knowledge in numerical methods to solve problems

Unit I **(12 hrs)**

Addition and subtraction of Vectors – Orthogonal resolution of vectors –Some physical application of the product of two vectors – Gradient of a scalar function – Line, Surface and Volume integral –Divergence of a vector function– Curl of a vector function and its physical significance – Gauss divergence theorem – Stokes theorem – Green's theorem – Classification of vector field.

Unit II **(12 hrs)**

Matrix – Special types of matrix – Sub matrices –Transpose of matrix– The conjugate of matrix– The conjugate of Transpose –Adjoint matrix– Orthogonal matrix– Unitry matrix– Trace of matrix– Elementary operation –Rank of matrix–Eigen values – Eigen vectors– Characteristic equation of matrix –Caley-Hamilton theorem–Power of matrix.

Unit III **(12 hrs)**

Fourier transformation – Dirichelet's theorem and Dirichlet's condition– Use of Fourier series– Properties of Fourier series – Physical Example of Fourier series – Laplace transforms – Laplace transform of a derivative function – Laplace transform of a Integral – Laplace transform of a periodic function.

Unit IV **(12 hrs)**

Concept of group – Abelian group – The generator of a fine group – The cyclic group – The Group multiplication Table– Subgroup – Cosets – Conjucate element and classes – The product of classes – Permutation group – Cayley's theorem – The group of symmetry of equilateral triangle – The group of symmetry of square.

Unit V **(12 hrs)**

Introduction to numerical analysis – Finite differences– Interpolation and extrapolation – numerical difference and averaging operation– Euler method – Taylor series – The method of least square.

Text book

Mathematical Physics by Satya prakash, Sultan chand & sons, Fifth Edition, 2006.

Unit –I Chapter : 1.1(a, c, e), 1.2, 1.3, 1.4, 1.5, 1.7, 1.9, 1.11, 1.13

Unit –II Chapters : 2.1, 2.2, 2.3, 2.5, 2.6, 2.7, 2.8, 2.15, 2.17, 2.18, 2.19, 2.23, 2.31, 2.37

Unit –III Chapters: 8.1, 8.2, 8.8, 8.9, 10.9, 10.10, 10.11, 10.12, 10.13

Unit–IV Chapters: 13.1, 13.2, 13.3, 13.4, 13.5, 13.7, 13.8, 13.9, 13.14, 13.15, 13.16, 13.17

Unit-V Chapter: 14 .0, 14.1, 14.2, 14.3, 14.6

Reference Book

1. Mathematical Physics by A.K Ghatak, L.C.Goyal, S.L Chua, Macmillan India LTD, First Edition, 2002.
2. Mathematical Methods for Physicists By Arfken ans weber, Fifth Edition

Sri Kaliswari College (Autonomous) – Sivakasi
Choice based credit system
U.G. Programme – B.Sc. Physics -2015-2018
Semester – V

Core -XI: Atomic Physics and Quantum Mechanics - 15UPHC51 **Duration: 75 Hrs**
Credits: 5

Aim and Objectives:

- To understand the structure of atoms by various models.

- To give an exposure on X-ray spectra.
- To make students to understand the dual nature of radiation and matter.
- To give some basic idea about Quantum mechanics.
- To impart the basic skills to solve some problems in Quantum mechanics.

Course Outcome

- Ability to understand the depth concepts in atomic physics.
- The student can solve the numerical problems in atomic physics.
- Familiarity in working method of X-ray spectrometer.
- Capable of understanding the medical applications of laser.
- Ability to solve simple problems in quantum mechanics.

UNIT I **(15 Hrs)**

Bohr's atom model - The Hydrogen spectrum - Spectral lines – Bohr's correspondence principle – Sommerfeld atom model – Relativistic theory – Vector atom model – Spatial Quantization – Spinning of electron hypothesis – Quantum numbers – Coupling schemes – Pauli's exclusion principle – Electronic structure of atoms

UNIT II **(15 Hrs)**

Classical and Quantum theory of Zeeman effect – Anomalous Zeeman effect – Stark effect.Production, properties and nature of X-rays – Bragg's analysis of three dimensional grating – X-ray spectrometer – X-ray spectra continuous and characteristic X-rays spectra– Duane & Hunt law – Mosley's law & its importance – Theory and experimental verification Compton effect– Application of X-rays.

UNIT III **(15 Hrs)**

Dual nature of matter & radiation – de Broglie hypothesis of matter waves – de Broglie wavelength – Davission & Germer experiment – G. P Thomson experiment with relativistic correction – Group velocity and phase velocity and their relations – Heisenberg Uncertainty principle – Diffraction of electron through a single slit – Comments on uncertainty principle.

UNIT IV **(15 Hrs)**

Basic postulates of Wave mechanics – Wave function - Schrodinger wave equation in one dimension and three dimensions – Time dependent and time independent form of 1-D schrodinger equation – Hamiltonian operator – Probability amplitude and probability density – Normalization of wave function – Boundary condition – Eigen value and Eigen function – Basic postulates of Quantum mechanics – Probability current density – Orthogonal wave function – Ehrenfest's theorem – Expectation values of momentum and energy.

UNIT V **(15 Hrs)**

Schrodinger equation for a free particle in one dimension and three dimensions – Step barrier problem – Barrier potential – Tunneling effect – Problem of square well potential – Particle in 1-D box – Particle in 3-D box – Degeneracy – Quantum mechanical theory of Harmonic oscillator – Zero point energy.

Text Book:

Modern Physics by Sehgal, Chopra, Sehgal, (IX edition) Sultan Chand & Sons, New Delhi, 2004.

UNIT I	:	Page No.: 4.18 – 4.33, 4.44 – 4.66, 5.3 – 5.57
UNIT II	:	Page No.: 6.35 – 6.60
UNIT III	:	Page No.: 7.3 – 7.26, 7.33 – 7.38, 7.40 – 7.43
UNIT IV	:	Page No.: 8.7 – 8.38
UNIT V	:	Page No.: 9.3 – 10.35

Reference Books

1. Quantum Mechanics by G. Aruldhas, Prentice Hall of India Private Limited, New Delhi. (2005)
2. Concepts of Modern Physics by Arthur Beiser, Sixth Edition, Tata McGraw Hill Edition, 2004.

Sri Kaliswari College (Autonomous) - Sivakasi
Choice based credit system
U.G. Programme – B.Sc. Physics -2015-2018
Semester – V

Core XII: Analog Electronics - 15UPHC52 **Duration: 75 Hours**
Credits: 5

Aims and Objectives:

- . To impart the knowledge on basic circuits using diodes

- To impart basic skills on different biasing of transistor
- To make them aware of constructing analog circuits
- To get an exposure on different types of oscillators
- To explain the importance of electronics in the field of communication

Course Outcome:

- Thorough knowledge in the basic concepts of Analog Electronics
- Skill developed to design circuits in Analog Electronics
- Capable of solving problems in condensed matter physics
- Familiarity with applications of junction diode and IC voltage regulators
- Thorough knowledge in CE mode single Stage transistor amplifier and related topics
- Be able to understand the construction and working of different types of oscillators.
- Knowledge acquired on fundamental concepts of communication system.

UNIT I **(15 Hrs)**

PN Junction diode rectifier – Ripple Factor - Capacitor filter, Choke input filter and π section filter – Half wave voltage doublers – Fixed positive and negative voltage regulators – Regulator Dual power supply - Adjustable voltage regulators – Diode clipping and clamping circuits – Diode as a switch

UNIT II **(15 Hrs)**

Common emitter mode transistor configuration - Load line and operating point – Transistor biasing – Stabilization –Base bias – Collector feedback bias – Voltage divider Bias – Emitter bias – Single Stage Amplifier – A.C and D.C equivalent circuits - Frequency response - Voltage gain of loaded amplifier – JFET characteristics and important terms – JFET parameters and relation between them.

UNIT III **(15 Hrs)**

Classification of Power amplifiers- Transformer coupled class A power amplifier and its efficiency - Push-pull class-B power amplifier and its maximum efficiency – Differential amplifier – Operation of differential amplifier – Common mode and differential mode signals - Operational amplifier characteristics and parameters - Inverting amplifier - Non-inverting amplifier - Unity follower - Summing amplifier - Difference amplifier - Differentiator, integrator using Op -Amp - Comparator

UNIT IV **(15 Hrs)**

Positive and negative Feedback in amplifier - Principle of negative voltage feedback in amplifier – Feedback circuit - Gain of negative voltage feedback amplifier - Advantage of negative voltage feed back in amplifier – Oscillator circuit – Positive feedback amplifier oscillator – Barkhausen criterion - Hartley, Colpitt's and phase shift oscillators – Transistor as a switch - Transistor Astable and monostable multivibrator.

UNIT V **(15 Hrs)**

Radio Broadcasting – Transmission and reception – Modulation – Types of Modulation – Amplitude modulation – Modulation factor – Analysis of Amplitude modulated wave – Sideband frequencies in AM wave – Transistor AM modulator – Power in AM wave – Limitations of amplitude modulation – Frequency Modulation - Theory of FM – Demodulation – Essential of modulation – A.M. diode detector – A.M. radio receivers – Types of A.M. radio receivers – Stages and advantages of superhetrodyne radio receivers – FM receiver – Difference between AM and FM receivers

TextBooks:

1. Principles of Electronics by V.K. Mehta, S.Chand & Co., 11th edition, 2008.

UNIT I: Chapter 5.14 - 5.19,6.8-6.11,6.18,6.20-6,21,6.23,17.15 – 17.18,18.18 & 18.20 – 18.23

UNIT II: Chapter 8.12, 8.17, 8.18, 9.2 - 9. 12, 10.4-10.7,10.9, 19.1-19.6 & 19.8- 19.14

UNIT III: Chapter 12.6, 12.9, 12.17, 12.18, 25.1-25.8, 25.15-25.18, 25.20, 25.22 – 25.24,25.26,25.27, 25.32 – 25.35 and 25.39

UNIT IV: Chapter 13.1-13.5, 14.3-14.7, 14.10-14.13, 18.10-18.13,

UNIT V: Chapter 16

Books for Reference:

1. Basic Electronics by Ubald Raj and Jose Robin, I edition (2004), Indira Publication, Marthandam.
2. Basic Electronic Solid State, B.L.Theraja, S.Chand and Com, NewDelhi,2003.

Sri Kaliswari College (Autonomous) - Sivakasi
Choice based credit system
U.G. Programme – B.Sc. Physics -2015-2018
Semester – V

Core XIII: Classical Mechanics - 15UPHC53 **Duration: 75 Hours**
Credits : 5

Aim and Objectives:

- To understand the concepts of Mechanics of a system of particles.
- To give an exposure on Lagrange's equations and their uses.

- To acquire knowledge on Hamilton's equations for simple systemsm
- To solve two body central force problems.
- To introduce the concept of virtual principles and Lagrange's ssundetermined multipliers.

Course Outcome:

- Understanding the basic difference between Newtonian Mechanics and Lagrangian Dynamics
- Ability to frame equation of motion for various system like simple pendulum using Lagrangian Dynamics
- Ability to frame equation of motion for various system like Compound pendulum using Hamilton Dynamics
- Familiarly with two body central force problem.
- Having a good knowledge of variation principle and its application
- The course will assist the students to understand the higher level concept in classical Mechanics While doing their post graduate

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UNIT I **(12 Hrs)**

Newtonian mechanics: Space and time – Newton's laws of motion – Inertial frames – Gravitational mass – Conservation of linear momentum – Conservation of angular momentum – Conservation of energy – Mechanics of a system of particles – External and internal forces – Centre of mass - Conservation of linear momentum – centre of mass-frame of reference – Conservation of angular momentum - Relation between angular momentum (J) and angular momentum about the centre of mass (J_{cm}) conservation of angular momentum – Conservation of energy – Atwood machine – conservative force and work done problem – Harmonic oscillator.

UNIT II **(12Hrs)**

Lagrangian dynamics: Basic concepts of configuration space – Holonomic and non-holonomic constraints – Generalized coordinates – Principle of virtual work – D'Alemberts principle – Lagrange's equations from D'Alemberts principle – Procedure for formation of Lagrange's equations – Newton's equation of motion from Lagrange's equations – Simple pendulum – Lagrange's equations for L-C circuit – Motion under central force – Hamilton's principle and Lagrange's equations.

UNIT III **(12 Hrs)**

Hamiltonian dynamics: Generalized momentum and cyclic coordinates – Hamiltonian Function H and conservation of energy: Jacobi's integral – Hamilton's equations - Hamilton's equations in different coordinate systems – Examples in Hamiltonian dynamics: Harmonic oscillator – Motion of a particle in a central force field – Compound pendulum – Two dimensional harmonic oscillator.

UNIT IV **(12 Hrs)**

Two body central force problem: Reduction of two body central force problem to the equivalent one body problem – Central force and motion in a plane – Equations of motion under central force and first integrals – Differential equation for an orbit – Inverse square law force – Artificial satellites.

UNIT V **(12 Hrs)**

Variational principles: Deduction of Hamilton's principle from D'Alemberts principle - Modified Hamilton's principle - Deduction of Hamilton's equations from Modified Hamilton's Principle(**variational principles**) - Deduction of Lagrange's equations from variational principle for non-conservative systems – Lagrange's equations of motions for non-holonomic systems – Physical significance of Lagrange's multipliers – Examples of Lagrange's method of undetermined multipliers: Rolling hoop on an inclined plane.

Text Book

Classical Mechanics by J.C. Upadhyaya, Himalaya Publishing House, First Edition 1999, Reprint 2014.

UNIT I
Sections: 1.1 – 1.7 Ex.2, Ex.3, and Ex.6.
UNIT II
Sections: 2.1 – 2.8, Problems Ex.1, Ex.2, Ex.7, Ex.8 and 2.11 .
UNIT III
Sections: 3.1, 3.2 and 3.4 – 3.6, Ex 3.7 (1,2,4,5).
UNIT IV
Sections: 4.1 – 4.5 and 4.8.
UNIT V
Sections: 5.1 and 5.3 – 5.8 and Ex 5.9 (1)

Reference Book

1. Classical Mechanics by Herbert Goldstein, Second Edition, Narosa Publishing House.
2. Classical Mechanics by Goldstein, Poole, Saftko, Pearson Education, Third Edition.

Sri Kaliswari College (Autonomous) - Sivakasi
Choice based credit system
U.G. Programme – B.Sc. Physics -2015-2018
Semester – V

Optional Course II: Programming in C++ - 15UPHO51 **Duration: 60 Hrs**
Credits : 3

Aim and Objectives:

- To expose the students in object oriented programming.
- To enrich the activities of physics through programming

- To gain the knowledge in recent technology.
- To have an exposure on the principles of heritance.
- To effectively use the pointers.

Course Outcome:

- Understanding the basic concepts of C++ language.
- Ability of solve problems in physics using C++ language.
- Knowledge acquired in principles of heritance
- Ability to use the pointers in the C++ programs.

UNIT I **(12 hrs)**

Principles of object oriented programming – Basic concepts of OOP – Object oriented languages – Applications of OOP – Introduction to C++ - Tokens, keywords , Identifiers , Variables , Operators , Manipulators , Expressions and Control Structures in C++ - Simple programs – Addition of two numbers – Finding the smallest and biggest among n numbers – To find the displacement of a particle.

UNIT II **(12 hrs)**

Function in C++ - Main Function – Function Prototyping – Call by reference - Return by reference – Function Overloading – Friend and Virtual functions – To Find the relativistic mass and length of the object

UNIT III **(12 hrs)**

Classes and Objects: Fibonnocci series, Sum of each digit of a number -Constructors and Destructors – Operators overloading and type conversions – To convert Binary to equivalent decimal number

UNIT IV **(12 hrs)**

Inheritance – Single Inheritance – Multilevel Inheritance – Multiple Inheritance – Calculation of factorial of a given number - Hierarchical Inheritance – Hybrid Inheritance. Pointers, Virtual Functions and Polymorphism – Managing I/O Operations – To find the most probable and rms speed of n particles.

UNIT V **(12 hrs)**

Working with files : Classes for file stream operations – Opening and closing a file – End-of- file deletion –File pointers –Updating a file – Error handling during file operations – Command line arguments.

Text book :

Object oriented programming in Turbo C++ by E.Balaguruswamy Tata McGraw-Hill, New Delhi, 2002

UNIT I : Chapters : 1,2,3 Section: 1.4-1.8, 3.1-3.24

UNIT II : Chapter : 4 Section: 4.1-4.5 , 4.9-4.10

UNIT III : Chapters : 5,6,7 Section: 6.2-6.11, 7.3-7.8

UNIT IV : Chapters : 8 ,9 Section: 8.1-8.3 , 8.6-8.7,9.1-9.5, 10.6

UNIT IV : Chapter : 11 Section: 11.2-11.10

Reference Book :

1. The Complete Reference C++, Herbert Schidt, Tata McGraw Hill, NewDelhi, Third Edition.
2. Object Oriented Programming by R.Rajaraman, New Age International

Sri Kaliswari College (Autonomous) - Sivakasi
Choice based credit system
U.G. Programme – (B.Sc. Physics) – 2015 – 2018
Semester – V

Optional Course- II: Astrophysics - 15UPHO52 **Duration: 60 Hours**
Credits : 3

Aim and Objectives:

- To impart the knowledge of planetary motion to students.
- To make the students to understand about stars.
- To make students to understand nature of gravitating systems.
- To make the students to understand about the cosmological models.
- To enable the students to understand about the perturbation in universe.

Course Outcome:

- Knowledge gained in planetary motion.
- Ability to understand the formation of stars.
- Knowledge acquired in cosmological models.
- Capable of understanding perturbation in universe.

UNIT I **(12Hrs)**

Kepler's Law of planetary motion – Longitude of perigee – Forward motion of the apse line – To calculate the eccentricity of the earth's orbit around the sun – Verification of the Kepler's law in the case of the earth – Explanation of the third law –Newton's deductions from Kepler's laws – To derive the Kepler's third law from the Newton's law of gravitation - To find the mass of the planet – To fix the position of the planet in the elliptical orbit – Mean Anomaly – Geocentric and heliocentric latitudes and longitudes.

UNIT II **(12Hrs)**

Introduction – Stellar motion – Solar motion – Distances of star - Magnitudes of star – Apparent, Visual and photo visual magnitudes – Absolute magnitudes – Relation between apparent and absolute magnitude – The color and size of the star – Double and multiple star – Variable star - Star cluster – Constellations – Zodiacal constellations – The milky way – The Winter constellations - The Spring constellations – The summer constellations.

UNIT III **(12 Hrs)**

Laws of gravity – Newtonian gravity – spherical system – Newton's theorem – circular and escape speed – useful spherical models – collision less systems – relaxation time – Jeans equation – the Virial theorem – applications of Virial theorem – Spherical Collapse Model – galaxy cluster mass to light ratio – flat rotation curve halos – masses from kinetic tracers – the Oort Limit – evolution of gravitation system – negative specific heats – phase mixing – violent relaxation – dynamical friction – collision between galaxies – Tidal stripping.

UNIT IV **(12 Hrs)**

Friedmann-Robertson-Walker Models (FEW Model) – Newtonian cosmology – solution of the energy equation – asymptotic behavior – the density parameter – the cosmology red shift – the horizon problem – cosmology with pressure – radiation dominated universe – number of quanta per horizon volume – curvature of space-time – Inflatation – the Inflation scenario – chaotic inflation – distances in FRW cosmologies – scale factor vs. Hubble parameter – Red

shift vs. commoving distance – angular diameter and luminosity distances – magnitudes and distance moduli – K-correction.

UNIT V **(12 Hrs)**

Linear cosmological perturbation theory – perturbations of zero pressure models – the spherical 'Top-Hat' perturbation – general perturbations – non-zero pressure and the Jeans length – matter domination era – radiation domination era – super horizon scale perturbations – Isocurvature vs. Isentropic perturbations – diffusion damping and free streaming – scenarios – The Adiabatic Baryonic Model – The Hot Dark Matter Model – The Cold Dark Matter Model – origin of cosmological structure – spontaneous generation of fluctuations – fluctuations from Inflatation – self ordering field – domain walls – cosmic strings.

Book for study:

1. Astronomy by S.Kumaravelu and Susheela Kumaravelu , 2007 edition, A.Bhaskara Selvan Printers, Sivakasi

Unit I: Pages: 172 to 189.

Unit II: Pages: 488 to 500, 503 to 515.

2. Elements of Astrophysics by Nick Kaiser, 2002 (Online version)

Unit III: Pages: 287 to 300.

Unit IV: Pages: 301 to 336.

Unit V: Pages: 337 to 367.

Sri Kaliswari College (Autonomous) - Sivakasi
Choice based credit system
U.G. Programme – B.Sc.[Physics] -2015-2018
Semester – V

Optional Course II: Optoelectronics - 15UPHO53 **Duration : 60 Hours**
Credits: 3

Aim and Objectives:

- To impart the knowledge of Optoelectronics and Optoelectronic devices
- To enable the students to understand the concepts of modern fiber optic communication system.
- To enable the students to be familiar with the Optical storage devices.
- To enable the students to learn the technique of light transmission.
- To enable the students to acquire knowledge on optical data storage devices.

Course Outcome :

- Through knowledge in the fundamental concepts of optoelectronics
- Impart the knowledge of Active and passive display devise.
- Able to analyze the physics behind semiconductor optoelectronics devices.
- Thorough knowledge in transmission of light through fibers.
- Fundamental knowledge acquired on different types of data storage devices.

UNIT I **(12 Hrs)**

Introduction - Electroluminescence process - LED materials – Fabrication of LED – Applications - Classification of Photodetectors – Junction Photodiodes – PIN Photo Diodes – frequency response of silicon Photodiodes – Performance of Photodetectors – High speed and long wavelength Photo diodes Applications.

UNIT II **(12 Hrs)**

LCD- display devices – Active and passive display devices – Liquid crystals - types of Liquid crystals – General features of liquid crystals – Various modes of LCD Operation – Liquid crystal display system – TN-LCD – Merits and Demerits

UNIT III **(12 Hrs)**

Signal transmission in a Optical fiber – Types of Modulation – Optical Modulators – Quantum wells – Quantum well electro absorption modulators – Electro – Optic effect – Electro optic phase modulation - Electro optic amplitude modulation - Optical Switching and logic device – Self electro optic device (only)

UNIT IV **(12 Hrs)**

Principles of light transmission in a fiber – Modes of propagation – Types of rays – Number of modes supported in a fiber – Classification of fibers – Transmission characteristics of Fibers – Total dispersion - Fiber optic communication – Modulation – Fiber Amplifiers – Definitions - Fiber optic communication Link – Soliton Based Coherent optical fiber

communication – Application in Computers – Advantages and disadvantages of fiber optic communication.

UNIT V **(12 Hrs)**

Optical storage device – Disk Data storage – Structure and operating principle of CD-ROM- Magneto - Optical storage systems – Data storage and retrieval methods- Holographic Optical data storage – Storing and retrieving digital data – Advantage of using Holography in optical data storage devices

Text Book:

1. Semiconductor Physics and Optoelectronics by V.Rajendran, J. Hemalatha, M. Stalin Mano Gibson, Vikas Publishing House PVT LTD, 2004 edition

UNIT I: Chapter I - Lesson 5, 6 – Pages: 89-110.

UNIT II Chapter II - Lesson 2 – Pages: 129-144.

UNIT III: Chapter III - Lesson 1 – Pages: 171-195.

UNIT IV: Chapter IV - Lesson 1, 2 – Pages: 205-229.

UNIT V: Chapter V - Lesson 2 – Pages: 293-308.

Reference Book:

1. Semiconductor Physics and Optoelectronics by Dr.M.Arumugam, Anuradha publications, 2005 edition.
2. Opto Electronics and Fibre Optic Technology by Ray Tricker, Elsevier Pubishers, 2002.

Sri Kaliswari College (Autonomous) -Sivakasi
Choice based credit system
U.G. Programme – B.Sc. Physics -2015-2018
Semester – V

Skilled Based Course II: Medical Physics - 15UPHS51 **Duration: 30 Hrs**

Credits : 2

Aim and Objectives:

- To impart the knowledge of biomedical instrumentation.
- To give an exposure on use of transducers in medical instruments.
- To explain the working principle of modern instruments used as diagnostic tools.

Course Outcomes:

- Apply medical physics methods and tools related to physics, radiation biology and radiation detection and computation in research setting.
- Integrated knowledge in a specialized area in efforts to form a foundation for future research in medical physics.
- Understand the principles and use of imaging devices and instrumentation.
- Apply knowledge of X- rays systems and to analysis and compare the performance of the X-ray imaging system.
- Learn many of the techniques from system that have proven useful in improving quality and safety in health care.

UNIT I **(6Hrs)**

Introduction – Cells and their nature - Transport of ions through cell membrane - Resting and action potential – Bio electric potentials – Nerve tissues and organs - Design of medical instrumentation – Components of the biomedical instrument system – Electrodes - Types of electrodes – Micro electrodes –Depth and needle electrodes - Surface electrodes

UNIT II **(6Hrs)**

Transducers – Types of transducers – Loading and sensitivity effect – Loading effect and sensitivity of bridge – strain gauge - Photo electric type resistive transducer - Thermistor type transducers - Capacitive transducers - Inductive transducer - LVDT

UNIT III **(6Hrs)**

Biosignal analysis – Analog and digital methods – Signal to Noise Improvement – Amplitude measurements – Analysis of random signals - Properties of recording systems – Electron microscope – Scanning Electron microscope- Digital thermometer – X – ray Machine.

UNIT IV **(6Hrs)**

Electrocardiography – ECG lead configuration – ECG recording setup – Practical considerations for ECG Recording - Defibrillators – Internal and external defibrillators.

UNIT V **(6Hrs)**

Electroencephalography - Modern EEG UNIT – Analysis of EEG – Electromyography – Recording setup –Computer tomography – Block diagram of CT scanner – Applications.

Text Book :

1. Biomedical Instrumentation, Dr.M.Arumugam, Anuradha publications,Kumbakonam, II Edition, (reprint) 2010.

UNIT I: Chapter 1.1, 1.2, 1.4, 1.5, 1.6, 1.7, 2.2, 2.3 and 2.4 to 2.4.7
UNIT II: Chapter 2.5.1 to 2.5.11, 2.5.13, 2.5.14, 2.5.15
UNIT III: Chapter 3.9 to 3.9.5 ,7.3 , 7.6, and 7.9
UNIT IV: Chapter 4.2 , 4..3 to 4.3..4 and 5.5.
UNIT V: Chapter 4.4,4.4.1,4.4.4,4.4.5,4.5,4.5.1,4.5.2 and 10.7

Book for Reference:

1. Hand book of Biomedical Instrumentation, R.S. Khandpur, 1999 edition, Tata McGraw - Hill Ltd., Neww Delhi, Edition.

Skilled Based Course III: Energy Physics- I - 15UPHS52 **Duration: 30 Hours**
Credits : 2

Aim and Objectives:

- To gain knowledge of various energy resources.
- To get an exposure on applications of solar energy.
- To know the methods of extraction energy of wind energy.
- To learn about methods of producing biomass energy.
- To understand geothermal energy.

Course Outcome:

- Evaluate the role of different energy sources in today and future energy supply.
- Understand the availability of biomass in different area and weather condition and their potential attributes to biofuels production.
- Gain knowledge of substainable energy.
- Compare the benefits and drawbacks of different energy resources and technologies such as wind, geothermal, solar and biomass.
- Measure and evaluate different solar energy technologies through the physical function of the devices.

UNIT I

(6 Hrs)

Introduction – Classification of Energy resources – Energy chain Common forms of energy – Advantages & disadvantages of conventional energy sources – Salient features of Non-conventional energy sources – World energy status – Energy scenario in India - Green house effect – Consequences of Global warming – Pollution.

UNIT II

(6 Hrs)

Introduction to solar energy – Sun, earth radiation spectrums – Measurement of solar radiation data – Solar collectors: Liquid Flat plate collector – Flat plate air heating collector – Evacuated tube collector- Solar cooker - Solar cell, module, panel and array configuration.

UNIT III

(6 Hrs)

Introduction to wind energy – Origin of winds – Major applications of wind power – Energy available in wind – Power extraction from wind – Wind turbine types – Components of Horizontal Axis Wind Turbine (HAWT) and Vertical Axis Wind Turbine (VAWT)

UNIT IV **(6 Hrs)**

Introduction to Biomass energy – Usable form of biomass – Biomass Resources- Biomass conversion technologies – Biomass gasification – Down draft type – Various staes from

anaerobic digestion process- Advantage of anaerobic digestion- Classification of biogas plants- Floating drum and fixed dome type biogas plants.

UNIT V **(6 Hrs)**

Introduction to Geothermal energy – Applications of Geothermal energy – Origin & Distribution of Geothermal energy – Types of Geothermal resources (Vapor dominated steam) – Environmental consideration – Geothermal energy in India.

Text Book

1. Non – Conventional Energy Resources by B.H. Khan, Tata McGraw Hill- 2006

UNIT I : Section 1.3 to 1.9,1.10.3 to 1.10.6,1.13,1.14
UNIT II : Section 4.1, 4.3, 4.7, 5.1.4, 5.1.6, 5.1.7, 5.6 and 6.4.1 to 6.4.4
UNIT III : Section 7.1.1,7.1.2,7.4,7.6.1,7.6.2, 7.7.1 and 7.7.2
UNIT IV : Section 8.2 to 8.6, 8.6.1, 8.9, 8.9.3, 8.9.4, 8.9.7 and 8.9.8
UNIT V : Section 9.1 – 9.3,9.3.1,9.6 and 9.7

Reference books:

1. Solar Energy Utilization by G.D. Rai (V Edition), Khanna Publishers, Delhi. (1995)

Core XIV: Condensed Matter Physics - 15UPHC61 **Duration: 75 Hrs**
Credits : 5

Aims and Objectives:

- To be familiar with different types of bonding in solids
- To acquire knowledge in different types of crystal and X – crystal analysis
- To give an exposure on theory and applications of superconductor .
- To be familiar with the origin of different types of magnetic materials
- To acquire sufficient knowledge in dielectric materials and its applications.
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Course Outcome:

- Thorough knowledge in the basic concepts of Condensed Matter Physics
- Familiarity with types of bonding and theories of specific heat capacity
- Familiarity with types of crystal structure and X-ray diffraction techniques
- Ability to understand the concept of occurrence of superconductivity
- Knowledge acquired on different types of magnetic materials, dielectric materials and its applications.
- Capable of solving problems in condensed matter physics

UNIT I **(15 Hrs)**

Bonding in solids: Introduction – Forces between the atoms – Variation of interatomic force with interatomic spacing – Cohesive energy – Types bonds in crystal – Ionic bonding – Cohesive energy of ionic solids – Covalent bonding – Metallic bonding - Hydrogen bonding- Vander Waals bonding – Specific heat of solid- Classical theory – Einstein theory of specific heat capacity – Debye's theory (No derivation)

UNIT II **(15 Hrs)**

Crystal Structure : Crystal lattice - Seven classes of crystals- Simple cubic structure – Body centered cubic structure – Close packed structures - Other cubic structure – Directions in crystals - Planes in crystal- Miller indices – Distance of separation between successive (hkl) planes -Diffraction of X – ray by crystals – Experimental methods of X – ray diffraction.

UNIT III **(15 Hrs)**

Classical theory of conduction – Superconductors : Classical theory of electrical conduction – Relation between electrical and thermal conductivity – Sources of resistance - Superconductors

– General Properties – Effect of magnetic field – Effect of current - Thermal properties – Isotope effect- Type I and Type II superconductors– Explanation for the occurrence of superconductivity BCS theory – Applications of Superconductors

UNIT IV **(15 Hrs)**

Magnetic properties : Introduction - Different types of magnetic materials - Classical theory of Diamagnetism - Langevin's theory of paramagnetism - Weiss theory of paramagnetism – Ferromagnetism – Domain theory of ferromagnetism – Hysteresis – Hard and soft magnetic materials

UNIT V **(15 Hrs)**

Dielectric properties : Introduction - Fundamental Definitions – Electronic Polarization- Ionic Polarization – Orientational Polarization – Space –charge polarization – Frequency effect on polarization – Temperature effect on polarization - Dielectric loss - Local Field or Internal Field - Clausius-Mosotti relation - Dielectric breakdown – Properties of different types of insulating materials - Important applications of dielectric materials

Text Book:

1. Solid State Physics by P.K.Palanisany, (2006), Scitech Publications (India) Pvt., Ltd.,

UNIT I: Chapter 6, 7.1,7.3.1 and 7.3.2

UNIT II: Chapter 1 and 2.1 – 2.3

UNIT III: 8.1 - 8.6 and 8.9 -8.12

UNIT IV: 4.1 - 4.6, 4.7 and 4.8

UNIT V: 5.1 – 5.7 , 5.9 and 5.10

Books for Reference:

1. Introduction to Solid State Physics by Kittel, Wiley and Sons, 7th Edition.
2. Fundamentals of Solid State Physics by Saxena, Gupta Saxena, Pragathi Prakashan Publisher, Meerut, 2009.

Core XV: Nuclear Physics - 15UPHC62 **Duration: 75 Hours**
Credits : 5

Aim & Objectives:

- To learn the physical properties of a nucleus.
- To understand the radioactive disintegration laws.
- To give an exposure on nuclear decay process.
- To acquire knowledge on nuclear stability and nuclear reactions.
- To be familiar with nuclear detectors and particle physics.

Course Outcome:

- Thorough knowledge in different Nuclear Models.
- Familiarity with half life and mean life period of radioactive elements.
- Understand the importance of applications of radio-isotopes.
- Ability to recognize the need of nuclear power plants.
- Ability to understand the various types of electrostatic accelerators.
- Apply quark models to analyze weak interactions such as beta decay and Kaon decay.

Unit I **(15 Hrs)**

Properties of nuclei – Size and structure of nuclei – Nuclear stability – Nuclear spin and magnetic moment – Nuclear magnetic resonance and magnetic resonance imaging – Binding energy and nuclear forces – Nuclear models – Liquid drop model – Independent-Particle model – collective model - Radioactivity – Decay process – Alpha decay – Beta decay – Gamma decay – Natural radioactivity – Four radioactive series – Determining the age of the earth.

Unit II **(15 Hrs)**

Rutherford and Soddy's theory of radioactive disintegration – Average or mean life of a radioelement – Half life period – Determination of decay constant and half life – Soddy's displacement law – Example Problems (1 - 9)

Interaction of particles with matter – Heavy charged particles – Electrons – Photons – Radiation damage in matter – Uses of radiation – Tracing – Neutron activation analysis – Radiation therapy – Food preservation.

Unit III **(15 Hrs)**

Nuclear reactions – Reaction cross section – Interactions involving neutrons - Nuclear fission – Nuclear reactors - Neutron leakage – Regulating neutron energies – Neutron capture – Control of power level - Safety and waste disposal – Nuclear fusion – Fusion reactions – Magnetic field confinement – Inertial confinement – Fusion reactor design – Advantages and problems of fusion – Kudankulam Nuclear Power Project (KKNPP) – Safety features of Kudankulam Nuclear Power plant – Advanced Safety features of Kudankulam Nuclear Power plant.

Unit IV **(15 Hrs)**

Introduction – Electrostatic accelerators – Van de graaff generator – Linear accelerator (LINAC) - Cyclotron – Synchro Cyclotron – Betatron – Electron synchrotron – Proton synchrotron (Bevatron) – Ionisation chamber – Proportional counter - G.M counter – Scintillation counter – Cloud chamber – Bubble Chamber – Nuclear emulsion techniques.

Unit V **(15 Hrs)**

The fundamental forces in nature – Positrons and other antiparticles – Mesons and the beginning of particle physics – Classification of particles - Hadrons – Leptons – The solar neutrino mystery and neutrino oscillations - conservation laws – Baryon number - Lepton number – Strange particles and strangeness – How are elementary particles produced and particle properties measured? - Resonance particles – Energy considerations in particle production – The eightfold way – Quarks.

Text Book

1. Modern Physics by Serway, Moses and Moyer, third edition, 2005, Cengage Learning.

Unit I: Sections: 13.1 – 13.6

Unit II: Sections: 14.7 – 14.8, 14.9 – 14.10

Unit III: Sections: 14.1 – 14.6

Unit V: Sections: 15.1 – 15.9

2. Nuclear Physics and Particle Physics by Satya Prakash, First edition, 2005, Sultan Chand and Sons, Educational Publishers, New Delhi.

Unit II (First Half): Sections: 3.4 – 3.8, Ex.1 – Ex.9 (Page 154 - 158)

Unit IV: Sections: 10.1 – 10.3, 10.5 – 10.8, 10.10, 10.11, 10.13 – 10.6, 10.16, 10.19 – 10.21.

3. Nuclear energy Safe, Clean and Green energy by Kudankulam Nuclear Power Project, NPCIL India 2013.

Reference Book

1. Concepts of Modern Physics by Arthur Beiser, Sixth Edition, Tata McGraw Hill Edition, 2004.
2. Nuclear Physics by Irvin Kaplan, Narosa Publishing House, New Delhi, 1998.

Core XVI: Digital Electronics - 15UPHC63 **Duration: 60 hours**
Credits : 4

Aim and Objectives:

- To improve the applied knowledge of electronics
- To gain the knowledge of modern updated electronic technology
- To learn about various registers and counters.
- To enable the knowledge of flip-flops and 555 Timer.
- To have the exposure on registers and counters.

Course Outcome:

- Understand the application of digital devices /circuits
- Ability to solve problem in digital electronics using K-map
- Ability to construct various digital circuit like multipliers adders
- Capable to design simple memory circuits.
- Capable to understand the use of various registers in the field of communication

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UNIT I **(12 Hrs)**

Number system – Binary number system – Binary to decimal conversion – Decimal to binary conversion - Octal numbers - Hexa decimal numbers – ASCII code – Excess-3 code – Gray code – Binary addition - Binary subtraction by 1's complement & 2's complement – Binary Multiplication & Division – Boolean laws and theorems – Principle of duality – De'Morgans theorems and their proof.

UNIT II **(12 Hrs)**

Logic gates – NOT, OR, AND – Universal gates – NOR, NAND, AND-OR-invert gates – Positive and negative logic – Sum of the product method – Truth table to K map – Pairs , Quads, Octets – K map simplifications - Don't care conditions - Product of sum method – product of sum simplifications.

UNIT III **(12 Hrs)**

Arithmetic building blocks - Half adder – Full adder – Adder - Subtractor - Fast adder - Multiplexers –16-to-1 Multiplexer - Nibble multiplexers - De multiplexers – 1-of-16 decoder – BCD to decimal decoders - 7 segment decoders – Encoders – Decimal – to- BCD encoder - Parity generators – Checkers.

UNIT IV **(12 Hrs)**

RS flip-flop – Gated flip-flops – Edge-triggered RS flip-flop – Edge triggered D flip flop – Edge-triggered JK flip flop - Flip-flop timing – JK Master slave flip flop – Schmitt trigger – 555 timer Astable – 555 timer – Astable and monostable multivibrators – Monostable with input logic.

UNIT V **(12 Hrs)**

Register – Types of registers – Serial in - Serial out (SISO) – Serial in Parallel out – Applications of shift registers - Counters – Asynchronous counter- Synchronous counter – MOD counter (Mod 3, Mod 6 counters only) – Counter design as a synthesis problem.

Text book:

Digital Principles and Applications, by Albert Paul Malvino & Donald P. Leach & Goutam Saha Sixth edition, Tata McGraw Hill, NewDelhi.

UNIT I: Chapters: 3,5,6 - Section: 5.1 - 5.8, 6.11 & 3.1

UNIT II: Chapters: 2, 3 - Section: 2.1-2.4 & 3.2-3.8

UNIT III: Chapters: 4,6 - Section: 6.7- 6.9 , 4.1 - 4.8

UNIT IV: Chapters: 7,8 -Section: 8.1-8.7, 7.3-7.6

UNIT V: Chapters: 9,10 - Section: 9.1-9.3, 9.6, 10.1 & 10.3, 10.7

Reference book :

1. Digital electronics an introduction to theory and practice by Willam H.Gothmann second edition, prentice hall of India pvt ltd, New Delhi.
2. Digital Electronics Theory and Experiments by Virendhra Kumar, New Age International Publishers, NewDelhi, 2002.

Core XVII: Major Physics Practical III – 15UPHC6P **Duration: 90 Hrs**
Credits : 5

1. Spectrometer – Refractive index of the liquid using hollow prism – Minimum deviation
2. Spectrometer – I-I$^{'}$ Curve
3. Spectrometer – Grating - Minimum deviation method
4. Spectrometer – Cauchy's constant
5. Rayleigh Bridge – Self Inductance.
6. Spectrometer - Hartmann's Interpolation
7. LCR – Series resonance circuit
8. LCR – Parallel resonance circuit
9. Anderson's bridge – Self inductance
10. Maxwell's bridge – Self inductance
11. Wien's Bridge – C_1/C_2 and to find un-known C
12. Impedance & power factor LR circuit
13. Impedance & power factor CR circuit
14. Boltzmann's Constant using transistor
15. Spot galvanometer- High resistance by leakage.
16. Absorption coefficient of transparent solid

Core XVIII: Major Physics Practical IV – 15UPHC6Q **Duration: 3 Hrs**
Credits : 5

1. Zener Diode - Reverse Bias Characteristics and voltage regulation
2. Transistor Characteristics - C. E. Mode
3. Bridge Rectifier - LC and Pi filters
4. Integrator and Differentiator using discrete components
5. Hartley Oscillator - Frequency and inductance of pair of coils
6. Colpitt's Oscillator - Frequency and inductance of pair of coils
7. Astable Multivibrator - Discrete components only
8. Logic Gates (And, Or, Not, Nand, Nor) - Discrete components only
9. Dual power supply - IC 7812 and IC 7912
10. Astable Multivibrator - IC 555
11. Shift Register
12. Four bit binary adder
13. Ring Counter
14. Integrator and Differentiator – Op-amp IC 741
15. Adder and Subtractor - IC 741
16. Universality of NAND & NOR gate - IC 7400 & IC 7402

Semester - VI

Optional course III: Electronic Communication – 15UPHO61 **Duration: 60 Hrs**
Credits : 3

Aim and Objectives:

- To understand the concepts of Electronic Communication.
- To understand the different types of modulation.
- To impart the basic skills to solve the problems in Electronic Communication.

Course Outcome:

- Utilize the basic knowledge in electronics in the field of communication
- Ability to design and conduct experiments as well as to analyze and interpret data.
- Ability to identify and prevent various hazards and timing problems in a digital design.
- Ability to understand the different types of modulation.

UNIT I **(12 Hrs)**

Communications – Information – Transmitter – Channel-Noise – Receiver – Modulation – Need for modulation – Bandwidth requirements – Sine wave and Fourier series review – Frequency spectra of nonsinusoidal waves – Amplitude modulation – Theory Frequency spectrum of the AM wave – Representation of AM – Power relations in the AM wave.

UNIT II **(12 Hrs)**

Evolution and description of SSB – Suppression of carrier – Suppression of unwanted sideband – The filter system – The phase shift method – Theory of frequency and phase modulation – Description of systems – Mathematical representation of FM – Frequency spectrum of the FM wave – Phase modulation – Intersystem comparisons – Generation of frequency modulation – FM methods – Direct methods.

UNIT III **(12 Hrs)**

Pulse communications – Information theory – Information in a communications systems – Coding – Noise in an information-Carrying signal – Pulse modulation – Types – PAM – PTM – PWM – PPM – PCM – Pulse systems – Telegraphy – Telemetry.

UNIT IV **(12 Hrs)**

Digital communications – Digital technology – Digital fundamentals – The binary number system – Digital electronics – The emergence of the data communications systems – Characteristics of data transmission circuits – Digital codes – Error detection and correction – Modem classification – Modem interfacing – Interconnection of data circuits to telephone loops.

UNIT V **(12 Hrs)**

Broadband communications systems – Multiplexing – Frequency-division multiplex - Time-division multiplex – Short and medium Haul systems – coaxial cables – Fiber optic links – Microwave links – Tropospheric links – Long Haul systems – Submarine cables – Satellite communications – Routing codes and signaling systems – Telephone systems and routing – Miscellaneous practical aspects – Introduction to traffic engineering.

Text Book

1. Electronic communications systems by Kennedy and Davis, Fourth edition, Tata McGraw Hill Publishing Company Limited, New Delhi, 2002.

UNIT I: Chapter 1 full, and 3.1
UNIT II: Sections: 4.1 – 4.3, 5.1, 5.3
UNIT III: Chapter 13 full
UNIT IV: Sections 14.1 – 14.3
UNIT V: Chapter 15 full

Reference Book

1. Electronic Communications by Dennis Roddy, John Coolen, Fourth Edition,1995, Prentice Hall of India Products.

Optional Course III: Microprocessor Fundamentals- 12UPHO62 **Duration: 60 Hrs**
Credits: 3

Aim and Objectives:

- To gives an introduction to Architecture of the microprocessor.
- To enrich the basic concept of assembly programming language.
- To improve the knowledge of the students in microprocessor

Course Outcome:

- Familiarity with the microprocessor memory unit.
- Ability to execute a simple program.
- Familiarity with the looping, Counting, and indexing.
- Knowledge developed in code conversion.

Unit I **(12 hrs)**

Microprocessor Architecture and it's operation – Memory – Input and output devices – Example of microprocessor system – Logic devices for interfacing – 8085 microprocessor unit – Memory interfacing – Interfacing the 8155 memory facing.

Unit II **(12 hrs)**

8085 Programming model – Instruction classification – Instruction and data format – How to write assemble language program and execute a simple program – 8085 Instruction set Data transfer operation

Unit III **(12 hrs)**

Arithmetic operation– Logic operation – Branch operation – Write assemble language program – looping, Counting, and indexing – Additional data transformation and 16 bit arithmetic instruction – Arithmetic operation related to memory Logic operation : Rotation and compare

Unit IV **(12 hrs)**

Counters and time delay – Illustrative program: Hexadecimal counter – Illustrative program: Zero to nine (Modulo ten) counter – Illustrative program: Generating pulse wave form – Subroutine – Reset , conditional call and return instructions.

Unit V **(12 hrs)**

BCD to binary conversion – Binary to BCD conversion – BCD to seven segment LCD code conversion – BCD addition, Subtraction ,multiplication – The 8085 Interrupt – Digital to analog(D/A) convertor – Analog to digital(A/D) convertor.

Text Book

1. Microprocessor Architecture programming and application with the 8085 By Ramesh Gaonkar, Ulhas phatak for penram International Publishing, Fifth edition.

Unit – I Chapters: 2.1, 2.2, 2.21, 2.27,2.3, 2.4, 2.5, 3.11,3.3,

Unit – II Chapter: 5.1, 5.2, 5.3, 5.4, 5.5, 6.1,6.11

Unit – III Chapters: 6.22, 6.23, 6.3, 6.31, 6.32, 6.33, 6.4, 6.41, 6.42 6.43 , 6.5, 7.11, 7.12, 7.2, 7.21, 7.4, 7.41, 7.42

Unit – IV Chapters: 7.5, 7.51, 7.52, 8.1, 8.11, 8.15, 8.2, 8.3, 8.4, 9.3, 9.32, 9.4,

Unit – V Chapters: 10.1, 10.2, 10.21, 10.3, 10,31, 10.5, 10.51,10.6, 10.6110.8, 10.81, 12.1, 12.12, 12.11, 13.11, 13.12, 13.21, 13.22

Reference Book

1. Microprocessor Microcomputer and their applications by A.K.Mukhopadhyay, Narosa Publishing house, Edition 2005.
2. Microprocessor and Micro Computer Based System by Mohamed Rafiquzzaman, Universal Book Stall, New Delhi, 2001

Optional Course III: Nano technology and Instrumentation-15UPHO63 Duration: 60 Hrs
Credits : 3

Aim and Objectives:

- To impart the basic knowledge in Nanomaterials.
- To make the students to understand the various methods of synthesis of Nanomaterials.
- To give some ideas to students about characterization techniques of Nanomaterials.
- To make students to understand the quantum behavior of Nanomaterials.
- To give an exposure to students on some applications of nanotechnology.

Outcomes:

- Can understand the need of nanometer-sized devices.
- Ability to synthesis nanoparticles by simple methods.
- Capable of analyzing the structure of nanomaterials.
- Familiarity with basic knowledge of quantum nanostructures.
- Enhance the interest for pursuing research in the field of nanotechnology.
- Ability to understand the various applications of nanotechnology.

UNIT I **(12 Hrs)**

Introduction – Length scale in physics – Size effects in smaller system: Pre-Quantum – Band structure and density of states at Nano scale: Energy bands – Density of states at low dimensional structures – Electron conduction in metals – The Drude Model – Free electron model – Conduction in insulators/ionic crystals.

UNIT II **(12 Hrs)**

Topdown vs bottom up techniques – Lithographic process – Non-lithographic techniques: Plasma arc discharge – Sputtering – Evaporation: Thermal evaporation – Electron beam evaporation – Chemical vapour deposition – Pulsed laser deposition – Molecular beam epitaxy – Sol-gel technique – Electro-deposition – Ball milling – Chemical Bath Deposition.

UNIT III **(12 Hrs)**

Atomic structure – X-ray diffraction – Particle size determination – Surface structure – Transmission Electron Microscopy (TEM) – Scanning Electron Microscopy (SEM) – Scanning Probe Microscopy (SPM): Basic principles of SPM techniques – Scanning Tunneling Microscopy – Some applications of STM – Atomic Force Microscopy (AFM).

UNIT IV **(12 Hrs)**

Metal Nano Clusters – Magic numbers – Theoretical modeling of nanoparticles – Geometric structure – Electronic structure – Reactivity – Fluctuations – Magnetic clusters – Bulk

to Nan transition – Preparation of Quantum nanostructures – Size effects – Conduction electrons and dimensionality – Fermi gas and density of states.

UNIT V **(12 Hrs)**

Carbon Clusters – Carbon Nano tubes – Fabrication – Structure – Electrical properties – Vibrational properties – Mechanical properties – Application of Carbon Nanotubes: Field emission and shielding – Computers – Fuel cells – Chemical sensors – Mechanical reinforcement.

Text books

1. Introduction to Nanoscience and Nanotechnology by K. K. Chattopadhyay and A. N. Banerjee, PHI Learning and private limited.
   UNIT I : 5.1, 5.2, 3.1, 3.2, 3.3, 4.1, 4.2.
   UNIT II : 6.2, 6.3, 6.4, 6.4.1 to 6.4.8, 6.4.9 (a) and (b).
   UNIT III : 7.1, 7.2.
2. Introduction to Nanotechnology by Charles P. Poole Jr. and Frank J. Owens, Wiley Interscience, John Wiley & Sons publication (2003).
   UNIT III : 3.2, 3.3.1, 3.33.
   UNIT IV : 4.2, 9.2, 9.3.1, 9.3.2.
   UNIT V : 5.3, 5.4, 5.5,

Books for reference:

1. Nanotechnolgy The science of small by Dr.M.A.Shah and Dr.M.A.Shah, Wiley India Pvt Ltd, New Delhi (2013).
2. Nano Materials by A.K.Bandyopadhyay, New Age Internationals Publishers, New Delhi (2012).
3. Nanomaterials, Nanotechnologies and Design byMichael F.Ashby, Paulo J.Ferreira, Daniel L.Schodek, Elsevier (2013).
4. Nanotechnology by S.Shanmugam, MJP Publishers, Chennai, (2010).

Value Based Course II: Physics of household appliances –II - 15UPHV61 Duration: 30 Hrs
Credit : 1

Aim and Objectives:

- To enable the students to understand the basic working of modern electronic
- appliances
- To Understand concept of memory storage devices.
- To be familiar with the functioning of energy storage peripherals.

Course Outcome:

- Familiarity with types of cells and basic requirements modern electronic devices
- Ability to understand the functioning of modern display devices
- Knowledge acquired on working of office devices like laptop, laser printer, 3D printer
- Be able to understand basic idea on space communication system

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UNIT I **(6 hrs)**

AC to DC converter – Voltage regulator - Primary cells – Rechargeable cells – Solar cells – Solar panels – Inverter - UPS

UNIT II **(6 hrs)**

Telephone – Cordless Phone – Principle of Cell phone communication – Bluetooth- WiFi – Touch screen

UNIT III **(6 hrs)**

Photo diode and transisitor – Remote control – Seven segment display in calculator – CRT Display – LCD display – LED Display – Plasma Display

UNIT IV **(6 hrs)**

Laptop- Scanner – Inkjet printer – Laser printer – 3d printer - Charge coupled device – Digital camera.

UNIT V **(6 hrs)**

Audio and video system – Dish Antenna – Satellite communication – GPS – Remote sensing.

Text book:

Study materials prepared by Department of Physics of Sri Kaliswari College.

U.G. Programme - B.Sc. Physics - 2015-2018
Semester - VI

Skill based Course IV: Energy Physics II - 15UPHS61 **Duration: 30 Hrs**

Credits: 2

Aim and Objectives:

- To gain the knowledge of tidal energy.
- To learn about ocean, thermal energy.
- To understand different types of fuel cells using hydrogen.
- To study the characteristics of fuel cell using hydrogen.
- To be familiar with power conversion and power generation techniques.

Course outcome:

- Ability to recognize the need of using of non-conventional energy resources.
- Apply the acquired knowledge to design new type of ocean energy and wave energy devices.
- Familiar with future energy technologies.

UNIT I **(6 Hrs)**

Introduction - Tidal Energy – Tidal Energy origin and nature – Tidal energy technology – Limitations and environmental impacts of Ocean energy- Wave Energy -Power in waves

UNIT II **(6 Hrs)**

Wave energy technology – Present Status – Environmental Impacts – Ocean thermal energy – Origin and characteristics of resource – Ocean thermal energy conversion technology – Environmental impacts.

UNIT III **(6 Hrs)**

Fuel cell – Potential Applications – Classification of fuel cells – Phosphoric fuel cell – Alkaline fuel cell – Solid Polymer fuel cell – Molten carbonate Fuel cell – Solid Oxide fuel cell – Fuel cell power plant – present status – Environmental impacts of fuel cells.

UNIT IV **(6 Hrs)**

Hydrogen Energy – Properties of Hydrogen – Production of Hydrogen – Storage and delivery of Hydrogen – Conversion of hydrogen into energy – Applications – Safety issues – present status – Bio – cells.

UNIT V **(6 Hrs)**

Magnetohydrodyanmic Power Conversion – Basic Principle – MHD Generator – Advantages and disadvantages - Thermoelectric Power conversion – Thermoelectric Power generator – Thermionic power conversion

Books for Study

1. Non – Conventional Energy Resources B.H. Khan, Tata McGraw Hill- 2006

UNIT I: Chapter 10.1 – 10.3.1

UNIT II: Chapter 10.3.2 – 10.4.4

UNIT III: Chapter 11.1 – 11.2.7, 11.2.10

UNIT IV: Chapter– 11.2.11- 11.3.7

UNIT V: Chapter 12.1 – 12.2.4, 12.3-12.4

Reference Book

1. Non – Conventional Energy systems By A.K.Agarwal, A.P.H Publishing Corporation, 2005 Edition.

Choice based credit system
U.G. Programme – 2015-2018
Semester – I/III

Allied Course I/II: Allied Physics – I - 15UMAA11/15UCHA31 Duration: 60 Hours
Credits: 3

Aim and objectives:

- To introduce the concept of Moment of inertia.
- To give an exposure on sound
- To understand the concept of elasticity
- To make the students to learn about viscocity and surface tension
- To enable the students to learn about the specific heat of gas and thermodynamic.

Course outcomes:

- Knowledge acquired in mechanics, wave motions, properties of matter and thermal physics.
- Ability to understand the applications of different organ pipes.
- Familiarities with different types moduli of elasticity and calculations of Young's modulus using different methods.
- Thorough knowledge in viscosity, surface tension and its applications.

UNIT I **(12 Hrs)**

Rotation of rigid bodies - Kinetic energy of rotating bodies – Angular momentum- Torque- Moment of inertia – Parallel axis and perpendicular axis theorems – Moment of inertia of uniform rod, circular ring, thin spherical shell, solid cylinder, solid sphere – Ball rolling down in an inclined plane – Compound pendulum.

UNIT II **(12 Hrs)**

Introduction – Progressive and stationary waves – Resonance – Beats - Vibration in a column of open and closed pipes – Over tones – Stroboscope – Doppler effect and its applications – Intensity and loudness – Kunt's tube experiment - Melde' string experiment - Transverse vibration of stretched string – Expression for the velocity of transverse waves – Laws of transverse vibration – Sonameter law verification – Ultrasonics – Production and uses.

UNIT III **(12 Hrs)**

Introduction- Stress and strain- Elasticity –Modulus of elasticity- Energy stored in stretched string- Work done in twisting a wire – Bending of beams – cantilever- Young's modulus by non-uniform and uniform bending – I section girders- Torsion in a wire – Determination of rigidity modulus by torsional pendulum – Static torsion- Poisson's ratio.

UNIT IV **(12 Hrs)**

Viscosity – Coefficient to viscosity – Poiseuelle's formula – Comparison of viscosities-Ostwald's Viscometer – Stoke's law – Terminal velocity – Viscosity of highly viscous liquid – Lubrication. Surface tension – Molecular theory of surface tension – Angle of contact-Surface tension by drop weight method - Excess pressure inside a drop and bubble – Interfacial surface tension.

UNIT V **(12 Hrs)**

Specific heat of gas – Work done in expansion – Mayer's relation – Joly's experimental determination of C_v – Regnault's experimental determination C_p – Methods of heat transfer and its applications - Kinetic theory of gases – Joule-Kelvin effect - Second Law of thermodynamics – Carnot's theorem.

Text Book:

Allied Physics- I Notes prepared by the Physics Department, Sri Kaliswari College (Autonomous), Sivakasi.

Reference Books:

1. Mechanics by D.S.Mathur, II Edition, S.Chand & Company Ltd, Ram Nagar, New Delhi
2. Text book of Sound by M.N.Srinivasan, 1991 Edition
3. Properties of Matter by Brijlal Subramani, VI Edition Eurasia Publishing House (Pvt); Ltd, New Delhi.

U.G. Programme – 2015-2018
Semester – II/IV

Allied Course I/ II: Allied Physics – II - 15UMAA21/15UCHA41 Duration: 60 hours
Credits : 3

Aim and objective:

- To impart the knowledge of geometrical Optics to the students.
- To give an exposure on Physical optics.
- To impart the knowledge of Electricity and Electronics to the students.
- To impart knowledge on Nuclear Physics.

Course outcome

- Be able to apply acquired knowledge in optics, electrostatics, electronics, nuclear physics in competitive exam.
- Capable of understanding the effect of interference, refraction, diffraction and polarization of light.
- Ability to calculate electric field due to the charge arrangements and magnetic field due to current carrying conductors.
- Ability to apply knowledge of electronics in a creative and innovative way to design develop and produce useful products.

UNIT I (12Hrs)

Refraction - Normal refraction - Spherical lenses – Combination of two thin lenses in contact and out of contact - defects of images - Distortion - Spherical and chromatic aberration in lenses – grazing incidence and grazing emergence in prisms - combination of two prisms to produce dispersion without deviation and deviation without dispersion – Direct vision spectrometer.

UNIT II (12Hrs)

Velocity of light - Michelson's method - Interference in thin films - Interference in wedge shaped film - Newton's rings- Theory and Experiment - Diffraction - Fresnel's explanation of rectilinear propagation of light - theory of transmission grating - Normal incidence - Polarization - Double refraction - Nicol prism - optical activity – Polarimeter

UNIT III (12Hrs)

Gauss law and its application – Electric field due to uniformly charged spherical shell, charged sphere – Capacitor - energy of charged capacitors - Loss of energy due to sharing of charges – Magnetic Field due to a current carrying conductor - Biot-Savart's law - Force on a conductor carrying current in a magnetic field – Moving coil galvanometer – Current and voltage sensitivities.

UNIT IV (12Hrs)

Junction diode- Forward and reverse bias – Full wave rectifier using diode –Zener diode – LED - Transistor - Characteristics - common emitter mode – Digital electronics- Decimal to Binary number Conversion – Binary to Decimal conversion – Binary addition and Subraction - AND, OR, NOT gates - construction using diodes and transistors -. Boolean algebra - Demorgan's theorem – verification

UNIT V (12Hrs)

Introduction to nucleus - nuclear energy - mass defect - Binding energy - Radio activity - Nature of Alpha, Beta, Gamma rays - Exponential law - Half life period - mean life period - fission and fusion - nuclear reactor – X- Rays Production and properties – X- Ray spectra and Mosley's Law – X- ray diffraction Bragg' Law and spectrometer

Book for a study:

Notes prepared by the Physics Department Sri Kaliswari College (Autonomous), Sivakasi

Books for reference

1. Optics and spectroscopy by R. Murugeshan, S. Chand & company LTD,1997
2. Basic electronics solid state by B.L.Theraja, S.Chand & company LTD, Ram nagar, Newdelhi 2003.

Semester – II/IV

Allied Physics Practical -15UMAA2P/15UCHA4P **Duration: 60 Hours**
Credits: 4

Any Fourteen

1. Young's Modulus - Non uniform bending – Optic lever
2. Young's Modulus -Uniform bending – Pin and Microscope
3. Compound pendulum – Determination of 'g'
4. Torsion pendulum – Determination of I
5. LCR – Series resonance circuit
6. Spectrometer - μ of the prism –minimum deviation
7. Sonometer- Verification of laws
8. Comparison of the co-efficient of viscosities by Ostwald's Viscometer
9. Table Galvanometer - Voltage and current sensitivities
10. Air wedge - Thickness of a wire
11. Newton's rings -Determination of Radius of curvature of a lens
12. Sonometer – Determination of AC frequency
13. Transistor Characteristics-CE mode
14. Zener diode – Forward and reverse biased Characteristics
15. Logic Gates (NAND, NOR) - Discrete components only
16. Logic Gates (AND, OR, NOT)-Discrete components only

Extra Credit Course : Electricity and Electrical Appliances- 15UPHEX1

Duration: 60 Hours
Credits: 2

Aims and Objectives:

To enable the students

- To understand the basic concepts of electricity
- To give an exposure on electric devices to produce light and heat.
- To acquire the knowledge of electrical wiring and safety measurements
- To gather the basic knowledge in a.c and d.c equipments
- To receive the Hand on training in electrical equipments

Course Outcome

- Understanding the basic concept of Direct current and Alternative current
- Ability to maintain various domestic electrical appliances
- Ability to rectify simple errors/troubles occruing in home appliances
- Fundamental knowledge in different types of motors and transformer
- Skill developed in constructing simple circuits

UNIT I

(12 Hrs)

Fundamental concepts and Direct current :AC and DC supply – Ohm's law - conductors and insulators – Arrangement of resistances in series and parallel – Three types of circuit – Effects of Electric current – Work , Power, Energy and related problems – Primary and secondary cells , Lechlanche cell, Dry cell , Daniel cell, Lead acid cell – Grouping of cells and related problems – DC generator and types – DC motor (Qualitative)

UNIT II **(12 Hrs)**

Types of electrical lamp and heating devices: Filament lamp – Fluorescent lamp – LED lamp – Room Heater – water heater – Electric iron – Electric range – Hot Plate

UNIT III **(12Hrs)**

Electrical accessories and Safety measurements: Switches – Lamp holders – Wires and cables – Various types of wires and current ratings–Casing and capping wiring – Conduit pipe wiring – T.R.S or C.T.S or P.V.C wiring – I.S.I rules for wiring (general) – I.S.I rules for wiring – I.S.I rules for lighting – I.S.I rules for socket outlets and fans Earthing and reason for earthing – Method of pipe eathing – Fuses – Types of fuse – Current rating of fuse – Precaution against shock – Artificial respiration – Safety precaution in electricity – safety precaution to be followed in handling the tools

UNIT IV **(12 Hrs)**

A.C. machine :A.C generator – Poly Phase - Star , delta connection – Three phase for four wire system – Transformer – Parts of transformer – Types of transformer – Transformer in distribution system – Alternator working principle – Parts of Alternator – Relation between speed and frequency of an alternator – Induction motor construction and working – Construction of Permanent capacitor motor – Application of permanent capacitor motor in table fan and ceiling fan – Working method, defects in fans – Application of universal motor in sewing machine – Working method and possible defects in Hair dryer, Mixer

UNIT - V (Not for theory examination)

Hand on training (12 Hours)

1. Transformer, Eliminator
2. Line Tester, Use of multimeter
3. Electric Bell
4. Soldering Iron, Iron Box, Immersion Heater
5. Fan and Speed regulator
6. Filament Lamp, Tube Light, Mercury Vapor Lamp
7. To test Choke and Starter
8. To control one Lamp using single switch
9. To control two Lamp using single switch
10. Stair case switch
11. Connection of voltmeter and ammeter and to measure voltage and current
12. To Connect 3 lamps in series and verify the properties of series circuit
13. To Connect 3 lamps in parallel and verify the properties of parallel circuit
14. To familiarize with electrical equipments

Book For study:

Electricity and electrical appliances manual

Extra Credit Course : Applied Physics - 15UPHEX2 **Duration: 90 Hours**
Credits: 2

Aim and Objectives:

- To understand the principle of Laser and its applications
- To get an exposure on modern optoelectronic devices and their uses.
- To acquire knowledge about nanoscience and nanotechnology
- To learn modern applications of nanomaterials

Outcomes:

- Ability to understand application of laser.
- Familiarity with the fiber optic communication system
- Awareness created about using renewable energy resources
- Ability to understand fundamental concepts of nanotehnology

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UNIT I **(18 Hrs)**

Characteristics and principles of Laser: Characteristics of laser – Principles of laser action – Absorption and emission of light – Spontaneous emission - Stimulated emission – Population Inversion – Pumping methods – Three and four level laser scheme (No derivation) – Ruby Laser – He-Ne Laser – Copper vapour Laser – Dye laser

UNIT II **(18 Hrs)**

Applications of Laser: Laser applications in medicine and surgery – Laser Diagnostic – Laser ophthalmology – Photocoagulation – Treatment of glaucoma – LASIK – PRK – LASEK- Laser cutting – Laser drilling – Applications of Holography – Laser in free space communication

UNIT III **(18 Hrs)**

Optoelectronics: Optical Fibre – Modes of propagation – Acceptance angle – Numerical aperture – Stepped index and graded index optical fibre – Fibre optic communication systems – LED and LCD – Photodiode and Phototransistor – Optical data storage – CD-ROM – DVD

UNIT IV **(18 Hrs)**

Energy Physics: Introduction – Classification of Energy – Advantages and disadvantages of conventional energy sources – Salient features of Non-Conventional energy – Solar energy – Wind Energy – Geothermal energy – Bio mass energy : Biogas production from waste .

UNIT V **(18 Hrs)**

Applications of Nanomaterials: Introduction to nanomaterials - Cleaning the air with nanotechnology— Crystal clear water with nanotechnology — Making better materials for

clothing - Fuelling energy with nano - Quantum dots and its applications - Mapping our genes using nano technology - biochips –Quantum computing

Book for study:

Study materials prepared by Department of Physics, Sri Kaliswari College (Autonomous), Sivakasi

Books for reference:

1. Introduction to Nanotechnology by Charles P. Poole Jr. and Frank J. Owens, Wiley Interscience, John Wiley & Sons publication (2009).
2. Laser Systems and applications by Richa Sharma and Vibhu Sharma, ALTBS Publishers, India, 2010 Edition
3. Semiconductor Physics and Optoelectronics by Dr.M.Arumugam, Anuradha publications, 2005 Edition
4. Non – Conventional Energy Resources by B.H. Khan, Tata McGraw Hill- 2006