GOVERNMENT COLLEGE FOR WOMEN (AUTONOMOUS) KUMBAKONAM-612 001

DEPARTMENT OF PHYSICS

UG REVISED SYLLABUS
EFFECTIVE FROM 2020-2021 ONWARDS

2020 - 2021

SEMESTER I

Part	Course Type	Course Code	Title of the Course	Hrs/Week	Credits	Exam hrs	CIA	ESE	Total
I	LC	U211T1	Tamil	6	3	3	25	75	100
II	ELC	U211E1	English	6	3	3	25	75	100
III	CC- I	U21PHC101	Properties of Matter & Sound	6	5	3	25	75	100
III	CC- II	U21PHC102P	Major Practical -I	3	2	3	40	60	100
III	AC – I	U211AM1	Mathematics	5	4	3	25	75	100
III	AC –II	U212AM2	Mathematics	2	-	-	-	-	-
IV	AEC	U211VE	Value Education	2	2	3	25	75	100
			TOTAL	**30**	**19**	**-**	**-**	**-**	**700**

SEMESTER II

Part	Course Type	Course Code	Title of the Course	Hrs/Week	Credits	Exam hrs	CIA	ESE	Total
I	LC	U212T2	Tamil	6	3	3	25	75	100
II	ELC	U212E2	English	4	1	3	25	75	100
III	CC- III	U21PHC203	Mechanics & Relativity	6	5	3	25	75	100
III	CC- IV	U21PHC204P	Major Practical -II	3	2	3	40	60	100
III	AC –II	U212AM2	Mathematics	2	4	3	25	75	100
III	AC –III	U212AM3	Mathematics	5	4	3	25	75	100
IV	AEC	U212ES	Environmental Studies	2	2	3	25	75	100
IV	NAN Mudalvan course	U23NM2LP	Language Proficiency for Employability	2	2	2	-	100	100
			TOTAL	**30**	**23**	**-**	**-**	**-**	**700**

SEMESTER III

Part	Course Type	Course Code	Title of the Course	Hrs/Week	Credits	Exam hrs	CIA	ESE	Total
I	LC	U213T3	Tamil	6	3	3	25	75	100
II	ELC	U213E3	English	6	3	3	25	75	100
III	CC – V	U21PHC305	Thermal and Statistical Physics	6	5	3	25	75	100
III	CC – VI	U21PHC306P	Major Practical-III	3	2	3	40	60	-
III	AC – IV	U213ACH1	Chemistry	5	4	3	25	75	100
III	AC - V	U214ACH2P	Chemistry Practical	2	-	-	-	-	-
IV	NMEC - I	U21PH3NME1:1	Physics Made Easy	2	2	3	25	75	100
		U21PH3NME1:2	Energy Physics						
			TOTAL	**30**	**19**	**-**	**-**	**-**	**600**

	SSC - I	U213SS1	Mathematics Aptitude for Recruitment Board Examinations	-	2	2	-	100	100

SEMESTER IV

Part	Course Type	Course Code	Title of the Course	Hrs/ Week	Cre dits	Exam hrs	Marks		
							CIA	ESE	Total
I	LC	U214T4	Tamil	6	3	3	25	75	100
II	ELC	U214E4	English	6	3	3	25	75	100
III	CC - VII	U21PHC407	Optics	4	4	3	25	75	100
III	CC – VIII	U21PHC408P	Major Practical-IV	3	2	3	40	60	100
III	AC - V	U214ACH2P	Chemistry Practical	2	4	3	40	60	100
III	AC - VI	U214ACH3	Chemistry	3	3	3	25	75	100
IV	NMEC - II	U21PH4NME2:1	Simple Appliances	2	2	3	25	75	100
		U21PH4NME2:2	Photography						
IV	SEC - I	U214PHSE1	Electrical Appliances -Theory	2	2	3	25	75	100
IV	NAN Mudalvan Course	U23NM4DS	Digital skills for Employabillity	2	2	2		100	100
			TOTAL	**30**	**25**	**-**	**-**	**-**	**900**
	SSC - II	U214SS2	Social Study for Competitive Examinations	-	2	2	-	100	100

SEMESTER V

Part	Course Type	Course Code	Title of the Course	Hrs/ Week	Cre dits	Exam hrs	Marks		
							CIA	ESE	Total
III	CC – IX	U21PHC509	Electricity and Magnetism	5	5	3	25	75	100
III	CC - X	U21PHC510	Atomic Physics	5	5	3	25	75	100
III	CC - XI	U21PHC511	Basic Electronics	5	5	3	25	75	100
III	CC- XII	U21PHC512P	Major Practical-V	6	4	3	40	60	100
III	MBEC – I	U21PH5MBE1:1	Spectroscopy and Laser Physics	5	5	3	25	75	100
		U21PH5MBE1:2	Biophysics and Biomedical Applications						
		U21PH5MBE1:3	Materials Science						
IV	SEC -II	U214PHSE2	Medical Physics – Theory	2	2	3	25	75	100
IV	SEC -III	U214PHSE3	Audio and Video Systems - Theory	2	2	3	25	75	100
			TOTAL	**30**	**28**	**-**	**-**	**-**	**700**

Part	Course Type	Course Code	Title of the Course	Hrs/ Week	Credits	Exam hrs	Marks		
							CIA	ESE	Total
III	CC – XIII	U21PHC613	Wave Mechanics & Nuclear Physics	6	5	3	25	75	100
III	CC - XIV	U21PHC614	Solid State Physics	6	5	3	25	75	100
III	CC – XV	U21PHC615P	Major Practical-VI	6	4	3	40	60	100
III	MBEC – II	U21PH6MBE2:1	Integrated Electronics	6	5	3	25	75	100
		U21PH6MBE2:2	Electronic Communication						
		U21PH6MBE2:3	Opto Electronics and Fibre Optics						
III	MBEC – III	U21PH6MBE3:1	Computer Programming-C Language	5	5	3	25	75	100
		U21PH6MBE3:2	C++ Programming						
		U21PH6MBE3:3	Networking in Computer						
V	AEC	U216GS	Gender Studies	1	1	3	25	75	100
V		U21EA	Extension Activities	-	1	-	-	-	-

PART	COURSE	Total No. of Papers	Hours	Credit	Mark
I	Tamil	4	24	12	400
II	English	4	24	12	400
III	Core Course	15	74	63	1500
III	Allied Course	6	27	24	600
III	Major Based Elective Course	3	16	13	300
IV	Non- Major Elective Course	2	4	4	200
IV	Value Education	1	2	2	100
IV	Environmental Studies	1	2	2	100
IV	Value Added Course	3	6	6	300
V	Gender Studies	1	-	1	100
V	Extension Activities	-	1	1	-
	Total	40	180	140	4000
Extra Credit Courses					
Self Study Course		2	-	4	200
	Total	42	180	144	4200

CCI: PROPERTIES OF MATTER AND SOUND

SEMESTER I	**CREDIT**	**: 5**
COURSE CODE : U21PHC101	**INS. HRS.**	**: 6**

OBJECTIVES:
- To understand the basic principle of different form of matter.
- To understand the concept of elasticity of students.
- To understand the properties of liquids.
- To describe the concept of stress/strain and in its relation to force /displacement.
- To understand the propagation of sound waves.

UNIT – I ELASTICITY

Stress – Strain diagram – Elastic moduli, work done per unit volume in shearing – Relation between elastic constants –Poisson's Ratio – Expression for Poisson's Ratio in terms of elastic constants –Twisting couple on a wire – Work done in twisting – Torsional Pendulum –determination of rigidity modulus of a wire.

UNIT – II BENDING OF BEAMS:

Expression for bending moment- Cantilever- Expression for depression- Experiment to find Young's modulus- Cantilever oscillation- Expression for period – Uniform bending- Expression for elevation- Experiment to find Young's modulus using microscope – Non Uniform bending – Expression for depression – Experiment to determine Young's modulus using mirror and telescope.

UNIT –III SURFACE TENSION

Definition and dimensions of surface tension – surface energy – Excess of pressure over curved surfaces- Variation of surface tension with temperature – Jaeger's experiment – Determination of surface tension by capillary rise method.

LOW PRESSURE

Production and measurement of low pressure – Gaede moleculer pump – Kundsen absolute gauge – Detection of leakage.

UNIT-IV: VISCOSITY

Streamlined motion – Turbulent motion – Coefficient of viscosity and its dimension –Rate of flow of liquid in a capillary tube – Poiseuille's formula – Experiment to determine the coefficient of viscosity of liquid – Terminal velocity- Stoke's Experiment .

UNIT-V: SOUND

Free and damped oscillations - origin of sound - Material medium - Velocity of longitudinal waves in gases - Newton's formula for velocity of sound - Effect of pressure, temperature and density of medium - wind and humidity - velocity of sound in water, air - Beats - Helmholtz resonator-velocity of transverse waves in strings - Reverberation time - Sabine's formula.

UNIT-VI (Not for examination)

Katter's reversible pendulum -Moment of inertia of a horizontal Rod- Speed of sound in Air.https://www.youtube.com/watch?v=t0SWHprAj48&&t=15s
https://www.youtube.com/v=WB-Z-9k2Jow

https://www.youtube.com/watch?v=3LWGqdnOX40&t=2s

BOOKS FOR STUDY:
1. Properties of Matter – Brijlal and Subramanian, S.Chand & Company Pvt. Ltd (2001).
2. A text book of Sound – N. Subramanian and Brijlal, Vikas Publication House Pvt Ltd; Second edition |(1999).
3. Properties of Matter and Acoustics by R.Murugeshan, S.Chand & Company Pvt. Ltd. (2013).
4. Elements of Properties of Matter by D.S.Mathur, S.Chand & company Pvt. Ltd (1968).

BOOKS FOR REFERENCE:
1. Properties of Matter – D.S Mathur, S Chand & Company (2010).
2. Properties of Matter – Subramania Iyer and Jeyaraman
3. Oscillators, Waves and Sound – L.Sharma, H.C.Saxena
4. A Text book of Sound – R.L. Singal.

COURSE OUTCOMES:

By the end of the course, the students will be able to,

CO 1: Study the elastic behaviour and working of torsional pendulum.

CO 2: Learning the basic concepts of elasticity, surface tension, viscosity and sound.

CO 3: Understand the concepts of properties of matter and to recognize their applications in our day to day life.

CO4: Learn streamline and turbulent flow of liquids. Acquire knowledge about sound and reverberations.

CO 5: Study the basic properties of sound waves and their propagation in different media

MAPPING WITH PROGRAMME OUTCOMES

COURSE OUTCOME	PROGRAMME OUTCOME					
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	✓	✓	✓	✓		✓
CO 2	✓	✓	✓	✓	✓	✓
CO 3	✓	✓	✓	✓	✓	✓
CO 4	✓	✓	✓	✓		✓
CO 5	✓	✓	✓	✓	✓	✓

QUESTION PAPER PATTERN

Maximum Marks	**: 75**		**Exam Duration :** 3 hours

Part A : 20×1=20 Answer **ALL** Questions (Multiple Choice Questions) Four questions from each unit

Part B : 5× 5 = 25 Answer **ALL** Questions (Either or Type – Two Question from Each Unit)

Part C : 3×10=30 Answer Any **Three** (One Question from each Unit)

CC-II MAJOR PRACTICAL – I

SEMESTER II	**CREDIT : 2**
Internal: 40 External: 60	**INSTRU. HRS. : 3**

COURSE CODE: U21PHC102P

OBJECTIVES:
- Providing hands –on learning experience such as determining the basic concepts in properties of matter, sound, heat and optics.
- To enable the students to understand basic physical laws through appropriate experiments.

(Any six Experiments only)
1. Surface tension-Capillary rise method
2. Determination of Relative Density of solid and liquid using sonometer
3. Compound Pendulum-g and k
4. Thermal conductivity of a bad conductor-Lee's disc
5. Air wedge- thickness of insulation
6. Cantilever depression - scale and telescope.
7. Uniform bending – Single optic liver
8. P.O.Box –Temperature Co-efficient of resistance

BOOKS FOR REFERENCE:
1. B.Sc. Physics Practical Manual, Dept. of Physics, SJC (A), Trichy.
2. C.C Ouseph, C.Rangarajan, R.Balakrishnan- A Text Book of Practical Physics- S.Viswanathan, Publisher-Part II (1996)
3. S.L Gupta and V.Kumar- Practical Physics- Pragati Prakashan – 25th Edition (2002)

MAPPING WITH PROGRAMME OUTCOMES

COURSE OUTCOME	PROGRAMME OUTCOMES					
	PO1	PO2	PO3	PO4	PO5	PO6
CO1	✓		✓	✓		
CO2		✓	✓	✓		
CO3	✓	✓	✓	✓		
CO4	✓	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓	✓
CO6	✓	✓	✓	✓	✓	✓

COURSE OUTCOMES:

By the end of the course, the student will be able to

CO1: Validate the fundamentals of physics.
CO2: Verify the theoretical concepts in physics through experiments.
CO3: Understand the behavior of thermal properties of materials.
CO4: Understand the validity of basic laws and theories to determine various properties of materials.
CO5: Understand the application of various experiments in our day to day life.
CO6: Apply the knowledge of the fundamentals of physics and instrumentation to arrive at a solution for various problems.

CC-III-MECHANICS AND RELATIVITY

SEMESTER II		**CREDIT**	**: 5**
COURSE CODE : U21PHC203		**INS. HRS.**	**: 6**

OBJECTIVES:
- To enable the students to understand the basic concepts of mechanics.
- To impart the students fundamental ideas on conservation laws, projectiles and relativity.
- To understand the concept of static and dynamic nature of physical systems.
- To understand the basic concepts of relativity.

UNIT I: DYNAMICS PROJECTILE, IMPULSE AND IMPACT

Projectile – range of horizontal and inclined plane-Impulse- Impact- Impulsive force – Laws of impact _ Impact of a smooth sphere on a smooth horizontal plane – Direct and oblique impact-Loss in kinetic energy-Motion of two interacting bodies-Reduced mass.

UNIT II: DYNAMICS OF RIGID BODIES

Kinetic energy of rotation-Theory of Compound Pendulum-Equivalent simple pendulum-Reversibility of centre of oscillation and suspension-Determination of g and radius of gyration of a bar pendulum-Period of oscillation of Bifilar pendulum with and without parallel threads. Centre of mass-Velocity and acceleration of centre of mass-determination of motion of individual particles-system of variable mass-equation for Rocket-Conservation of linear momentum and angular momentum.

UNIT III: GRAVITATION AND CENTRE OF GRAVITY

Gravitational potential and field due to spherical shell-Gravitational energy-Boy's method of G-Centre of gravity of a solid and hollow tetrahedron, solid and hollow hemisphere-Stability-Types of Equilibrium-Banking of curves.

UNIT IV: CENTRE OF PRESSURE

Vertical rectangular lamina –Vertical triangular lamina-Vertical circular lamina-Atmospheric pressure-its variation with altitude-Reasons for such variation.

HYDRODYNAMICS

Equation of continuity of flow-Euler's equation for unidirectional flow-applications-Bernoulli's theorem -Torricelli's theorem.

UNIT V: RELATIVITY

Galilean-Newtonian relativity, Galilean transformations- Michelson Morley experiment and its importance-Einstein's postulates- Lorentz transformations and its interpretation-Consequences of Lorentz transformations-Length contraction, time dilation-relativistic addition of velocities-Mass-energy equivalence- Basic idea of general theory of relativity.

UNIT VI: [NOT FOR EXAMINATIONS]
1. Static and Dynamic Friction https://www.youtube.com/v=2nhUwy3dbWo&t=3s
2. Surface Tension https://www.youtube.com/watch?v=Xqb4-tZ2kLk&t=1s
3. Archimedes' Principle https://www.youtube.com/watch?v=g9ANIAJSwqs

BOOKS FOR STUDY:
1. Mechanics- Part-I & II Narayanamoorthy, National Publishing Company.
2. Classical Mechanics-Gupta, Kumar and Sharma. Pragati Prakashan Publishing - Meerut (2010).

3. Statics, Hydrostatics and Hydrodynamics by M.Narayanamoorthy & N.Nagarathinam. National Publishing Company, Chennai (1989)

BOOKS FOR REFERENCE:
1. Mechanics-D.S.Mathur, S.Chand & Co, II edition, (2001).
2. Elementary Statistical Mechanics-Gupta Kumar (Chand publication)
3. Modern Physics by J.B.Rajam, S.Chand & Company Pvt.Ltd.

COURSE OUTCOMES:

By the end of the course, the student will able to

CO1: Understand and define the laws involved in mechanics
CO2: Learn the concept of conservation of energy, momentum, angular momentum and apply them to basic problems.
CO3: Write the expression for the moment of inertia about the given axis of symmetry for different uniform mass distributions.
CO4: Understand the utility of equation of continuity of flow and their applications.
CO5: Understand the special theory of relativity and their impact on the mass and energy of a moving object.
CO6: Understand the concepts of Mechanics and to recognize their applications in various real life problems.

MAPPING WITH PROGRAMME OUTCOMES

COURSE OUTCOMES	PROGRAMME OUTCOMES					
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1	✓	✓	✓	✓		✓
CO2	✓	✓	✓			✓
CO3	✓	✓	✓	✓		✓
CO4	✓	✓	✓			✓
CO5	✓	✓	✓			✓
CO6	✓	✓	✓	✓	✓	✓

QUESTION PAPER PATTERN

Maximum Marks	**: 75**		**Exam Duration :** 3 hours

Part A : 20×1=20 Answer **ALL** Questions (Multiple Choice Questions) Four questions from each unit

Part B : 5× 5 = 25 Answer **ALL** Questions (Either or Type – Two Question from Each Unit)

Part C : 3×10=30 Answer Any **Three** (One Question from each Unit)

CC-IV MAJOR PRACTICAL – II

SEMESTER II   **CREDIT**   **: 2**
Internal: 40 External: 60   **INSTRU. HRS. : 3**
COURSE CODE: U21PHC204P

OBJECTIVES:

- Providing hands –on learning experience such as determining the basic concepts in properties of matter, sound, heat and optics.
- To enable the students to understand basic physical laws through appropriate experiments.

(Any Six Experiments only)

1. Non-Uniform bending –Pin and Microscope
2. Melde's experiment –Transverse and longitudinal mode of vibrations
3. Specific heat capacity of a liquid – Newton's Law of cooling
4. Spectrometer-μ of a solid prism
5. Viscosity – Poiseuille's flow of method
6. Surface Tension – Drop Weight Method
7. Long focus convex lens –f,R,μ.
8. Concave lens –r,R,μ.

BOOKS FOR REFERENCE:

1. B.Sc. Physics Practical Manual, Dept. of Physics, SJC (A), Trichy.
2. C.C Ouseph, C.Rangarajan, R.Balakrishnan- A Text Book of Practical Physics- S.Viswanathan, Publisher-Part II (1996)
3. S.L Gupta and V.Kumar- Practical Physics- Pragati Prakashan – 25th Edition (2002)

COURSE OUTCOMES:

By the end of the course, the student will be able to

CO1: Validate the fundamentals of physics.
CO2: Verify the theoretical concepts in physics through experiments.
CO3: Understand the behavior of thermal properties of materials.
CO4: Understand the validity of basic laws and theories to determine various properties of materials.
CO5: Understand the application of various experiments in our day to day life.
CO6: Apply the knowledge of the fundamentals of physics and instrumentation to arrive at a solution for various problems.

MAPPING WITH PROGRAMME OUTCOMES

COURSE OUTCOME	PROGRAMME OUTCOMES					
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1	✓		✓	✓		
CO2	✓	✓	✓	✓		
CO3	✓	✓	✓	✓		
CO4	✓	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓	✓
CO6	✓	✓	✓	✓	✓	✓

CC   V: THERMAL AND STATISTICAL PHYSICS

SEMESTER III **CREDIT** **: 5**
COURSE CODE : U21PHC305 **INS. HRS.** **: 6**

OBJECTIVES:
- To understand the laws of thermodynamics and their applications to low temperature physics.
- To acquire the knowledge in heat transfer, entropy, production of low temperature, thermal radiation and statistical thermodynamics.
- To study the basics of classical and quantum statistics.

UNIT I: THERMODYNAMICS
Zeroth law of thermodynamics – First law of thermodynamics - Work done in an isothermal and adiabatic processes-Heat engines - Reversible and irreversible processes - isobaric, isochoric process - Carnot's theorem -Second law of method thermodynamics - Thermodynamic scale of temperature - Maxwell's Thermo dynamical relations - derivations.

UNITII: ENTROPY
Entropy - change in entropy in reversible and irreversible processes - temperature – entropy diagram – Classius - Clayperon equation – Enthalpy - Nernst heat theorem.
Thermal conductivity – Forbe's method Lee's disc method - Thermal conductivity of glass and rubber.

UNIT III: LOW TEMPERATURE
Joule - Thomson's effect - Porous plug experiment - Liquefaction of gases (air, H_2 and He) Adiabatic expansion process - Adiabatic demagnetization - Practical application of low temperature - Refrigerating mechanism -Electrolux refrigerator - Air conditioning machine.

UNIT IV: RADIATION
Blackbody radiation - Stefan's law - Boltzmann law - Blackbody-Rayleigh radiation - Rayleigh Jean's law -Wien's displacement law - Planck's law - Stefan's fourth power law – Pyrometry - Solar constant - Sources of solar energy.

UNIT V: STATISTICAL PHYSICS
Phase space – Maxwell - Boltzmann distribution law - Fermi Dirac distribution law - Application to electron gas – Bose - Einstein distribution law - Application to photon gas - Radiation Laws - Comparison of three Statistics.

UNIT VI: [NOT FOR EXAMINATIONS]
1. https://phet.colorado.edu/en/simulation/diffusion
2. https://phet.colorado.edu/en/simulation/legacy/my-solar-system
3. https://phet.colorado.edu/en/simulation/blackbody-spectrum
4. https://phet.colorado.edu/en/simulation/legacy/radiating-charge

BOOKS FOR STUDY:
1. Heat and Thermodynamics – Brijilal & Subramaniam S Chand; edition (2008)
2. Heat and Thermodynamics – J.B.Rajam & C.L.Arora, S. Chand, 9th Edition.
3. Statistical Mechanics - Satyaprakash & Agarwal, (KedarNathRamnath and Co., Meerut, (2003).

BOOKS FOR REFERENCE:
1. Thermodynamics and Statistical Physics – Sharma & Sarkar. Himalaya Publishing House, (1988).
2. Thermal Physics by R.Murugesan, S.Chand & Company Pvt.Ltd.
3. Thermal Physics, Garg and others, Tata McGraw Hill, New Delhi. (1996)

COURSE OUTCOMES:

By the end of the course, the student will able to

CO1: Comprehend the basic concepts and laws of thermodynamics.
CO2: Describe the thermodynamic potentials and their physical interpretations.
CO3: Understand concepts of entropy and the associated theorems.
CO4: Differentiate between principles and methods to produce low temperature to liquefy air, helium and hydrogen.
CO5: Learn the basic aspects of radiation, solar constant and energy.
CO6: Understand the concepts of classical (Maxwell-Boltzman) and quantum (Bose and Fermi) statistics and their applications.
CO7: Solving problems based on heat transfer, entropy and thermal radiation.

MAPPING WITH PROGRAMME OUTCOMES

COURSE OUTCOME	PROGRAMME OUTCOME					
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1	✓	✓		✓	✓	✓
CO2	✓	✓	✓	✓		✓
CO3	✓	✓	✓	✓		
CO4		✓	✓	✓		✓
CO5	✓	✓		✓		
CO6	✓	✓		✓		✓
CO7	✓		✓	✓	✓	

QUESTION PAPER PATTERN
Maximum Marks **:** 75 **Exam Duration :** 3 hours

Part A **:** 20×1=20 Answer **ALL** Questions (Multiple Choice Questions) Four questions from each unit
Part B **:** 5× 5 = 25 Answer **ALL** Questions (Either or Type – Two Question from Each Unit)
Part C **:** 3×10=30 Answer Any **Three** (One Question from each Unit)

CC VI: MAJOR PRACTICAL III

SEMESTER III   **CREDIT** **: 2**
Internal: 40 External: 60   **INS. HRS.** **: 3**
COURSE CODE: U21PHC306P

OBJECTIVES:
- To gain in depth of knowledge regarding the fundamentals of physics and instrumentation to arrive at a solution for various problems in physics.
- To understand various properties of the materials given.
- To providing a hands on learning experience for studying the basic concepts in properties of matter, heat, optics and electricity.

Any six Experiments only
1. Static Torsion –Determination of Rigidity Modulus
2. Stok e's method –Determination of viscosity of highly viscous liquid
3. Comparison of viscosity-Poiseuill's Flow method
4. Joule's calorimeter-Determination of specific heat capacity of liquid
5. Carey foster's Bridge-Determination of resistance and specific resistance.
6. Potentiometer-Calibration of low range Ammeter
7. Potentiometer-Calibration of low range voltmeter
8. A periodic Galvanometer-Figure of merit

BOOKS FOR REFERENCE:
1. B.Sc. Physics Practical Manual, Dept. of Physics, SJC (A), Tricy.
2. C.C Ouseph, C.Rangarajan, R. Balakrishnan- A Text Book Of Practical Physics- S. Viswanathan Publisher-Part II (1996).
3. S.L Gupta And V.Kumar- Practical Physics- Pragati Prakashan- 25th Edition(2002).

 Web Link:
 Torsion Pendulum: https://youtu.be/OGAdMAm1-3o
 Heat conduction: http://virtlabs.tech/apps/thermodynamics/08/labwork.html

COURSE OUTCOMES (COS):

By the end of the course, the students will be able to

 CO1: Apply knowledge of physics fundamentals and instrumentation to arrive at a solution for various problems.
 CO2: Understand applications of the experiments.
 CO3: Understand the concepts learnt in the theory courses.
 C04: Acquire the knowledge about the various properties of the materials given.
 CO5: Learn the spectral properties and optical properties of the given prism.
 CO6: Understand the utility of basic laws and theories.

MAPPING WITH PROGRAMME OUTCOMES (POs)

<table>
<tr><td rowspan="2">COURSE OUTCOMES</td><td colspan="6">PROGRAMME OUTCOMES</td></tr>
<tr><td></td><td>PO1</td><td>PO2</td><td>PO3</td><td>PO4</td><td>PO5</td><td>PO6</td></tr>
<tr><td></td><td>CO1</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td></td><td>CO2</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td></tr>
<tr><td></td><td>CO3</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td><td>✓</td></tr>
<tr><td></td><td>CO4</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td><td>✓</td></tr>
<tr><td></td><td>CO5</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td></td><td>CO6</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td></tr>
</table>

ALLIED PHYSICS – I

SEMESTER III	**CREDIT**	**: 4**
COURSE CODE: U213APH1	**INS. HRS.**	**: 5**

OBJECTIVES:
- To understand the basic principles of properties of matter.
- To understand the of ultrasonic waves
- To calculate the center of gravity of object with different geometry.
- To understand the concept of convection, conductivity and radiation and their branches.
- To study the basic ideas of fiber optic Communication system

UNIT I: PROPERTIES OF MATTER
Elasticity - Elastic constants relation - Bending of beams - Young's modulus by Non-uniform bending -Determination of rigidity modulus by torsional pendulum - Static torsion – Viscosity - Co-efficient of viscosity -Poiseuille's Formula - Comparison of viscosities - Burette method.

UNIT II: SOUND
Simple Harmonic Motion - Composition of two S.H.M along a straight line & at right angles - Lissajous figures - Demonstration of Lissajoous figures - Uses. Ultrasonic - production of ultrasonic waves - Magentostriction, Piezoelectric oscillator-Properties, Application of Ultrasonic waves- Acoustics of an auditorium requisites of a good auditorium.

UNIT III: MECHANICS
Introduction to center of gravity-Center of gravity of a solid hemisphere-hollow hemisphere and solid cone. Floatation-Stability of floating bodies-Metacentre-Determination of metacentric height of a ship.

UNIT IV: THERMAL PHYSICS
Newton's law of cooling-Verification-Specific heat capacity of a liquid by cooling – Bomb calorimeter. Conduction-Co-efficient of thermal conductivity-Good and bad conductors-thermal conductivity of a bad conductor – Lee's disc method -Radiation-Black body-Stefan's law of radiation-Solar constant-Angstrom's Pyro heliometer-Surface temperature of the sun.

UNIT V: OPTICS AND SPECTROSCOPY
Electromagnetic spectrum-Types of spectra-Absorption & Emission spectra-Spectral response of human eye-Raman effect-Theory and experimental arrangement-Application of Raman Effect. Introduction to fiber optic communication - Optical fiber - Numerical Aperture.

UNIT VI: (NOT FOR EXAMINATIONS)
Simple harmonic oscillations https://www.youtube.com/watch?v=GfAXVdHsJog
Thermal expansion of solid bodies
http://virtlabs.tech/apps/thermodynamics/09/labwork.html
newtons law of cooling http://youtube/QT9z4JNzHyY
Emission spectra http://youtu.be/jaOzColeAdk

BOOKS FOR STUDY
1. Allied Physics – Sundaravelusamy.
2. Properties of Matter -R.Murugesan, S.Chand & Company Pvt.Ltd.
3. Applied Impact Mechanics- C. Lakshmana Rao, V. Narayanamurthy, K. R. Y. Simha, Wiley Publishers (2016).
4. Heat and thermodynamics – Brijilal & Subramaniyam, S.Chand & Company Pvt.Ltd.
5. Sound – Brijilal & Subramaniyam. Vikas Publishing.
6. Optics – Brijilal & Subramaniyam. S Chand; 23rd Rev. Edn. (2006).

BOOKS FOR REFERENCE:
7. Optical Fibres and Fibre Optic Communication Systems- Subir Kumar Sarkar. S Chand & Co Ltd (2007).
8. Allied Physics Paper I & II– R.Murugesan. S. Chand Publishing, (2005).
9. Ancillary Physics by Dr.Sabesan and others.
10. Ancillary Physics Vol.1 and Vol. 2 by Kamalakkannan and others.

COURSE OUTCOMES:

By the end of the Course, the students will be able to

CO 1: Learn the basic concepts of electricity, sound, mechanics, thermal physics and optics

CO 2 : Calculate the centre of gravity of objects with different geometry.

CO 3 : Describe the production of Ultrasonic waves and applications.

CO 4 : Analyze different types of spectra.

CO 5 : To understand the importance of fiber optic communication in comparison to conventional communication system.

MAPPING WITH PROGRAMME OUTCOMES (POs)

COURSE OUTCOMES	PROGRAMME OUTCOMES					
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**
CO 1	✓	✓	✓	✓	✓	✓
CO 2	✓		✓	✓		✓
CO 3	✓	✓	✓	✓	✓	
CO 4	✓	✓		✓	✓	✓
CO 5	✓	✓	✓	✓	✓	✓

QUESTION PAPER PATTERN

Maximum Marks	**: 75**	**Exam Duration :** 3 hours

Part A	**:** 20×1=20 Answer **ALL** Questions (Multiple Choice Questions) Four questions from each unit
Part B	**:** 5× 5 = 25 Answer **ALL** Questions (Either or Type – Two Question from Each Unit)
Part C	**:** 3×10=30 Answer Any **Three** (One Question from each Unit)

ALLIED PHYSICS PRACTICAL-II

SEMESTER IV   **CREDIT** : 4
Internal: 40 External: 60   **INS. HRS.** : 3
COURSE CODE: U214APH2P

OBJECTIVES:

- To understand the nature of basic equipments/ instrumentation for measuring different physical variables like viscosities, surface tension.
- To enable the students to explore the field of properties of matter.
- The learner will be able to understand the concept of mechanics and sound.
- The concepts that are learnt in lecture sessions will be translated to the laboratory session thus providing a hands on learning experience on heat, electricity and magnetism, optics.

Any Ten Experiments

1. Young's modulus-non-uniform bending-pin and microscope method
2. Surface tension-Drop weight method
3. Interfacial surface tension-Drop weight method
4. Viscosity-Graduated burette method
5. Sonometer-Verification of laws
6. Spectrometer-Refractive index of a solid prism
7. Spectrometer-Grating-Normal incidence method
8. Newton's Ring-Radius of curvature
9. Air wedge-Thickness of the material
10. Newton's Law of Cooling-Specific heat capacity of a given liquid
11. Lee's disc-Thermal conductivity of a bad conductor
12. EMF of a Thermocouple-Direct deflection method
13. Carey foster's Bridge-Specific resistance
14. Carey foster's Bridge-verification of laws of series and parallel
15. Meter Bridge-Specific resistance
16. Meter Bridge-Verification of laws of series and parallel
17. A periodic galvanometer-figure of merit
18. Junction diode characteristics
19. Zener diode characteristics
20. Logic gates using discrete components.
21. Spherical calorimeter – Determination of emissive power of a surface.
22. Potentiometer – calibration of low range voltmeter.
23. Static torsion – Determination of η.

BOOK FOR REFERENCE:

1. B.Sc. Physics Practical Manual, Dept. of Physics, St. Joseph college(A), Trichy.

COURSE OUTCOMES

By the end of the Course, the students will be able to

CO1: Apply fundamental knowledge of Mathematics , Physics and an Instrumentation to arrive at a solution for various problems in physics
CO2: Educate the basics of instrumentation data acquisition and interpretation of results.
CO3: Understand the usage of basic laws and to determine various properties of materials given.
CO4: Have a fundamental knowledge of Optical, electrical and electronic circuits.
CO5: Calibrate the given low range voltmeter and Ammeter for measuring voltages and currents.
CO6: To measure the resistance of the given coil of wire for design electrical circuits.

MAPPING WITH PROGRAMME OUTCOMES

COURSE OUTCOMES	PROGRAMME OUTCOMES					
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1	✓	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓
CO3	✓	✓		✓	✓	✓
CO4	✓		✓		✓	✓
CO5	✓	✓	✓	✓	✓	✓
CO6	✓	✓	✓	✓	✓	✓

APPLIED PHYSICS-I

SEMESTER III	**CREDIT**	**: 4**
COURSE CODE: U213AAPH1	**INS.HRS.**	**: 5**

OBJECTIVES:
- To understand the mathematical expression for Gauss law and its application to real life situations.
- To identify the connection between electricity and magnetism.
- To introduce the basic laws involved in electrical circuits.
- To study the nature of various magnetic materials.

UNIT I: ELECTROSTATICS

Gauss theorem and its applications-intensity due to charged sphere-capacitor-Principle of capacitor-Capacitors in series and parallel-Energy of a charged capacitor-Loss of energy due to the sharing of charges.

UNIT II: MAGNETOSTATICS

Magnetic field-Magnetic flux density-Magnetization-Permeability-Susceptibility-Relation between them-Magnetic potential-Properties of Dia, Para and Ferromagnetic Materials-Hysteresis-B-H Curve using Ballistic Galvanometer.

UNIT III: CURRENT ELECTRICITY

Laplace's law-Magnetic field intensity at a point due to a straight conductor carrying current-Circular coil-Solenoid-Force between two parallel conductors-Ohms law- Kirchhoff's law-Wheatstone's bridge-Carey Foster's bridge-Potentiometer-Measurement of current.

UNIT IV: ELECTROMAGNETIC INDUCTION

Introduction-Laws of electromagnetic induction-Eddy currents & determination of self-inductance-Anderson's method- Mutual induction-Determination – Coefficient of coupling - Transformer theory.

UNIT V: ALTERNATING CURRENT

AC circuits with double components-Measurements of current and voltage-Power in an AC circuit-Power factor derivation-Wattless current-Choke-Series and Parallel resonance circuits.-Oscillatory discharge of a condenser.

UNIT VI:[NOT FOR EXAMINATIONS]

https://youtu.be/pmUltGfrbnk
https://youtu.be/xvs8puf4tiw

BOOKS FOR STUDY:
1. Electricity and Magnetism – Brijilal & Subramaniyam, Ratan Prakashan Mandir, Agra, (1995).
2. Electricity and Magnetism- R.Murugesan, S.Chand & Company Pvt.Ltd.(2005)
3. Applied Physics –I- Sundaravelusamy.

BOOKS FOR REFERENCE:
1. Electricity and Magnetism- D.L.Seghal and Chopra, Sultan Chand and Sons, New Delhi.
2. Electricity and Magnetism – M.Narayanamurthi and N.Nagaratnam

COURSE OUTCOMES:

By the end of the Course, the students will be able to

CO1: The use Gauss law and apply it to real world problems.
CO2: Explain the basic principles of capacitors.
CO3: Have in depth knowledge about magnetic potential and different types of magnetic materials.
CO4: Explain the laws that underlie the properties of electric circuit element and basic principles of Potentiometer, Carey foster's bridge etc.,
CO5: understand the operation of such as series and parallel resonance circuits.

MAPPING WITH PROGRAMME OUTCOMES

COURSE OUTCOMES	PROGRAMME OUTCOMES					
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	✓	✓	✓	✓		✓
CO 2	✓	✓	✓	✓		✓
CO 3	✓	✓	✓	✓		✓
CO 4	✓	✓	✓	✓		✓
CO 5	✓	✓	✓	✓	✓	✓

QUESTION PAPER PATTERN

Maximum Marks	**: 75**	**Exam Duration :** 3 hours
Part A	**:** 20×1=20 Answer **ALL** Questions (Multiple Choice Questions) Four questions from each unit	
Part B	**:** 5× 5 = 25 Answer **ALL** Questions (Either or Type – Two Question from Each Unit)	
Part C	**:** 3×10=30 Answer Any **Three** (One Question from each Unit)	

NON MAJOR ELECTIVE – I - PHYSICS MADE EASY

SEMESTER III   **CREDIT   : 2**
COURSE CODE: U21PH3NME1:1   **INS. HRS.   : 2**

OBJECTIVE:

- To impart the students a simple understanding of the basic concepts of physics.

UNIT I - MECHANICS

Force – Weight – Work – Energy – Power – Horsepower – Centrifuge – Washing Machine,

UNIT II - CONVENTIONAL ENERGY SOURCES

Conventional energy sources: Fossil fuels – Water power – Nuclear power – Hazards of nuclear energy – Non-conventional energy sources:

UNIT III - NON-CONVENTIONAL ENERGY SOURCES

Solar energy – applications solar energy – wind energy – Ocean energy – Geothermal energy – Wind energy – Ocean thermal energy conversion – energy from waves and tides (Basic ideas)

UNIT IV- SOUND OPTICS

Sound waves – Doppler effect – Power of lens – long sight and short sight – Microscope – Telescope – Binocular - Camera

UNIT V - COSMOS

Visible universe – Galaxies – Milky way – Solar system – Birth and death of stars – Neutron star, Pulsars, Black holes – Big Bang theory.

UNIT VI - (NOT FOR EXAMINATIOS)

Vibrating body produce sound
https://youtu.be/zstmGnaaaC1
Hooks lawhttps://youtu.be/AuaoAeoprty
Force ,work,energy
https://youtu.be/WSY411ZWZ110
Solar system
http://youtu.be/Kj4524AAZdE

BOOKS FOR STUDY:

1. Almost Everyone's guide to science, John Gribin – University Press (1998)
2. Inside Science, Edited by John Allen – BBC Books, (1988)
3. Physical Science Fundamentals, John J Merill, W Kenneth Hamblin, James M Thorne –Macmillan.
4. The Learner's Series – Everyday Science – Published by INFINITY BOOKS, New Delhi

BOOK FOR REFERENCE:

1. "Renewable Energy sources and their environmental impact" – S. A. Abbasi and NasemaAbbasi PHI Learning Pvt. Ltd., New Delhi (2008).

COURSE OUTCOMES

CO1: To learn the various source of renewable energy.
CO2: Understand the principle and mechanism of simple machines.
CO3: Understand the earth and its relation to the solar system and universe.
CO4: Apply Doppler effect to understand simple problems in our day to life.
CO5: To understand the operation of a microscope

MAPPING WITH PROGRAMME OUTCOMES

		PROGRAMME OUTCOMES					
		PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**
COURSE OUTCOMES	**CO 1**	✓	✓	✓	✓	✓	✓
	CO 2	✓	✓	✓	✓	✓	✓
	CO 3	✓	✓	✓	✓	✓	✓
	CO 4	✓	✓	✓	✓	✓	✓
	CO 5	✓	✓	✓	✓	✓	

QUESTION PAPER PATTERN

Maximum Marks   **: 75**   **Exam Duration :** 3 hours

Part A   **:** 5×15=75Answer **ALL** Questions (Either or Type – Two Question from Each Unit)

NON MAJOR ELECTIVE – I – ENERGY PHYSICS

SEMESTER III	CREDIT	: 2
COURSE CODE: U21PH3NME1:2	INS. HRS.	: 2

OBJECTIVE:

- To make the students to understand the present day crisis of need for conserving energy and alternatives are provided.

UNIT I: Conventional Energy Sources World reserve- Commercial energy sources and their availability – Various forms of energy – Renewable and Conventional energy system – comparison – Coal, oil and natural gas – applications – Merits and Demerits.

UNIT II: Solar energy Renewable energy sources – Solar energy – nature and Solar radiation – components – Solar heaters – Crop dryers – Solar cookers – Water desalination (block diagram) -Photovoltaic generation – merits and demerits.

UNIT III: Biomass energy fundamentals: Biomass energy – classification – Photosynthesis – Biomass conversion process

UNIT IV: Biomass Utilization Gobar gas plants – Wood gasification – advantage & disadvantages of biomass as energy source

UNIT V : Other forms of energy sources Geothermal energy – Wind energy – Ocean thermal energy conversion – Energy from waves and tides (basic ideas).

UNIT VI: [NOT FOR EXAMINATION]

https://youtu.be/8nJXN6kwyqA

https://youtu.be/Zgp86PVXXuQ

https://youtu.be/IASV8IH-ytE

BOOKS FOR STUDY:

1. D.P. Kothari, K.C. Singal & Rakesh Ranjan, Renewable energy sources and emerging Technologies, Prentice Hall of India Pvt. Ltd., New Delhi (2008).

2. Suhas P Sukhatme, Solar energy -- Principles of thermal collection and storage, Tata McGraw-Hill Publishing company, New Delhi, Second edition, 2012.

BOOK FOR REFERENCE:

1. S.A. Abbasiand Nasema Abbasi, Renewable Energy sources and their environmental impact, PHI Learning Pvt. Ltd., New Delhi (2008).

COURSE OUTCOMES:

At the end of the course, the students will able to

CO1: Understand the various types of energy

CO2: To learn the renewable and nonrenewable sources

CO3: Gain knowledge about Biomass energy and conversion process

CO4: Acquire in depth knowledge of Geothermal energy

MAPPING WITH PROGRAMME OUTCOMES

		PROGRAM OUTCOME					
		PO1	PO2	PO3	PO4	PO5	PO6
COURSE OUTCOME	CO1	✓	✓	✓	✓	✓	
	CO2	✓		✓	✓	✓	
	CO3	✓	✓	✓		✓	✓
	CO4	✓	✓	✓	✓	✓	✓
	CO5	✓		✓	✓	✓	
	CO6	✓		✓	✓	✓	

QUESTION PAPER PATTERN

Maximum Marks : 75	**Exam Duration :** 3 hours
Part A	**:** 5× 15 = 75 Answer **ALL** Questions (Either or Type – Two Question from Each Unit)

CC VII : OPTICS

SEMESTER IV   **CREDIT**   **: 4**
COURSE CODE: U21PHC407   **INS. HRS.**   **: 4**

OBJECTIVES:
- To understand and acquire an in depth knowledge regarding the behavior of light and its propagations.
- To study the phenomenon of interference, diffraction and polarization of light.
- To use the tools needed to formulate problems in optics and spectroscopy.
- To understand the working of various optical instruments and their measurements.

UNIT I: ABERRATION IN LENSES
Spherical aberration - Aberration of a thin lens – Methods of Reducing spherical aberration – Chromatic aberration – Condition for achromatism of lenses – Coma – Astigmatism – Curvature of the field.

UNIT II: OPTICAL INSTRUMENTS
Ramsden's eyepiece – Huygen's eyepiece – Resolving power – Rayleigh's criterion of Resolution – Resolving power of a (1) Telescope (2) Microscope (3) Prism (4) Grating- Optical Fibre – Construction – Derivation of Numerical aperture – Optical fibre communication system with block diagram - Fibre optic Sensor-Temperature and Displacement sensor.

UNIT III: INTERFERENCE
Principle of superposition – Coherent sources – Colours of thin films – Air wedge – Newton's rings – Brewster's fringes – Michelson interferometer and its applications (measurement of wavelength and different between wavelengths of two close lines) – Haidinger's fringes – Fabry Perrot interferometer.

UNIT IV: DIFFRACTION
Fresnel's diffraction – Diffraction at a circular aperture, opaque circular disc, Straight edge, Narrow wire – Fraunhofer diffraction at a single slit – Double slit – Grating with theory – Oblique incidence – Overlapping of Spectral lines.

UNIT V: POLARIZATION
Polarization by reflection – Refraction – Principal section – Principal plane – Brewster's law – Malu's law – Nicol prism – Nicol prism as an analyzer and polarizer – Optical activity –Fresnel's explanation of optical activity.

UNIT-VI: (NOT FOR EXAMINATIONS)
1. Brewster Angle Determination: https://youtu.be /ZiVAfXaG97E
2. Numerical aperture of an optical fibre:https://youtu.be/b7dcc1N1VWE
3. Malus law experiments: https://youtu.be/0qlmq1jqDAO4
4. Michelson Interferometer :https://youtu.be /lzBK1Y4f1XA
5. Optical activity, polarimeter : https://youtu.be/mFE1EBspEaS

BOOKS FOR STUDY:
1. Textbook of Optics, Brijal & N. Subramaniam, S.Chand & Company Pvt.Ltd.
2. Optics, Khanna & Gulati
3. Optics, Gosakan
4. Optics and Spectroscopy, R.Murugesan, S.Chand & company Pvt.Ltd.

BOOKS FOR REFERENCE:
1. Engineering Physics- M.N. Avadhanulu & P.G.K. Shirsagar.
2. Optics and Atomic Physics-Singh & Agerwal, Pragati Prakashan, Meenit, 9th edition, (2002).
3. Optics- Ajay Ghatak. McGraw Hill Education; 5 edition (2012)

COURSE OUTCOMES:

By the end of the course, the students will be able to

CO1: Understand different types of aberration in lenses and methods of solving them.
CO2: Correlate the principle of interference in the field of spectroscopy.
CO3: Acquire knowledge on the principle and construction of optical instruments.
CO4: Analyze the application of polarization in our day to day life.
CO5: Get exposure to modern experimental methods in solving physical phenomena.
CO6: Demonstrate experiments related to optical activity and polarization.
CO7: Demonstrate the application of diffraction.

MAPPING WITH PROGRAMME OUTCOMES (POs)

COURSE OUTCOME	PROGRAMME OUTCOME					
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1	✓		✓	✓		
CO2	✓	✓	✓	✓		✓
CO3	✓	✓	✓	✓	✓	✓
CO4	✓		✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓	✓
CO6	✓		✓	✓	✓	
CO7	✓	✓	✓	✓	✓	✓

QUESTION PAPER PATTERN
Maximum Marks   **: 75**   **Exam Duration :** 3 hours

Part A   : 20×1=20 Answer **ALL** Questions (Multiple Choice Questions) Four questions from each unit

Part B   : 5× 5 = 25 Answer **ALL** Questions (Either or Type – Two Question from Each Unit)

Part C   : 3×10=30 Answer Any **Three** (One Question from each Unit)

CC VIII: MAJOR PRACTICAL IV

SEMESTER IV	**CREDIT**	**: 2**
Internal: 40 External: 60	**INS. HRS.**	**: 3**
COURSE CODE: U21PHC408 P		

OBJECTIVES:
- To gain in depth of knowledge regarding the fundamentals of physics and instrumentation to arrive at a solution for various problems in physics.
- To understand various properties of the materials given.
- To providing a hands on learning experience for studying the basic concepts in properties of matter, heat, optics and electricity.

Any six Experiments only
1. Torsional pendulum - Determination of n and I.
2. Potentiometer - Calibration high range voltmeter.
3. Spectrometer - Determination of Refractive index of a liquid.
4. Spectrometer - Grating - Determination of - λ' Normal Incidence method.
5. Spherical calorimeter - Determination of Emissive power of a surface.
6. Potentiometer –Determination of Temperature coefficient of resistance.
7. Carey foster 's Bridge- Determination of Temperature coefficient of resistance.

BOOKS FOR REFERENCE:
1. B.Sc. Physics Practical Manual, Dept. of Physics, SJC (A), Tricy.
2. C.C Ouseph, C.Rangarajan, R. Balakrishnan- A Text Book Of Practical Physics- S. Viswanathan Publisher-Part II (1996).
3. S.L Gupta And V.Kumar- Practical Physics- Pragati Prakashan- 25th Edition (2002)

Web Link:
Torsion Pendulum: https://youtu.be/OGAdMAm1-3o
Heat conduction: http://virtlabs.tech/apps/thermodynamics/08/labwork.html

COURSE OUTCOMES (COS):

By the end of the course, the students will be able to

CO1: Apply knowledge of physics fundamentals and instrumentation to arrive at a solution for various problems.
CO2: Understand applications of the experiments.
CO3: Understand the concepts learnt in the theory courses.
C04: Acquire the knowledge about the various properties of the materials given.
CO5: Learn the spectral properties and optical properties of the given prism.
CO6: Understand the utility of basic laws and theories.

MAPPING WITH PROGRAMME OUTCOMES (POs)

	PROGRAMME OUTCOMES					
COURSE OUTCOMES	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1	✓	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓		
CO3	✓	✓	✓	✓		✓
CO4	✓	✓	✓	✓		✓
CO5	✓	✓	✓	✓	✓	✓
CO6	✓	✓	✓	✓		

ALLIED PHYSICS PRACTICAL-II

SEMESTER IV   **CREDIT**   : 4
Internal: 40 External: 60   **INS. HRS.**   : 3
COURSE CODE: U214APH2P

OBJECTIVES:

- To understand the nature of basic equipments/ instrumentation for measuring different physical variables like viscosities, surface tension.
- To enable the students to explore the field of properties of matter.
- The learner will be able to understand the concept of mechanics and sound.
- The concepts that are learnt in lecture sessions will be translated to the laboratory session thus providing a hands on learning experience on heat, electricity and magnetism, optics.

Any Ten Experiments

24. Young's modulus-non-uniform bending-pin and microscope method
25. Surface tension-Drop weight method
26. Interfacial surface tension-Drop weight method
27. Viscosity-Graduated burette method
28. Sonometer-Verification of laws
29. Spectrometer-Refractive index of a solid prism
30. Spectrometer-Grating-Normal incidence method
31. Newton's Ring-Radius of curvature
32. Air wedge-Thickness of the material
33. Newton's Law of Cooling-Specific heat capacity of a given liquid
34. Lee's disc-Thermal conductivity of a bad conductor
35. EMF of a Thermocouple-Direct deflection method
36. Carey foster's Bridge-Specific resistance
37. Carey foster's Bridge-verification of laws of series and parallel
38. Meter Bridge-Specific resistance
39. Meter Bridge-Verification of laws of series and parallel
40. Aperiodic galvanometer-figure of merit
41. Junction diode characteristics
42. Zener diode characteristics
43. Logic gates using discrete components.
44. Spherical calorimeter – Determination of emissive power of a surface.
45. Potentiometer – calibration of low range voltmeter.
46. Static torsion – Determination of η.

BOOK FOR REFERENCE:

1. B.Sc. Physics Practical Manual, Dept. of Physics, St. Joseph college(A), Trichy.

COURSE OUTCOMES

By the end of the Course, the students will be able to

CO1: Apply fundamental knowledge of Mathematics , Physics and an Instrumentation to arrive at a solution for various problems in physics

CO2: Educate the basics of instrumentation data acquisition and interpretation of results.

CO3: Understand the usage of basic laws and to determine various properties of materials given.

CO4: Have a fundamental knowledge of Optical, electrical and electronic circuits.

CO5: Calibrate the given low range voltmeter and Ammeter for measuring voltages and currents.

CO6: To measure the resistance of the given coil of wire for design electrical circuits.

MAPPING WITH PROGRAMME OUTCOMES

COURSE OUTCOMES	PROGRAMME OUTCOMES					
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1	✓	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓
CO3	✓	✓		✓	✓	✓
CO4	✓		✓		✓	✓
CO5	✓	✓	✓	✓	✓	✓
CO6	✓	✓	✓	✓	✓	✓

ALLIED PHYSICS-III

SEMESTER IV   **CREDIT   : 3**

COURSE CODE: U214APH3   **INS. HRS.   : 3**

OBJECTIVES:

- To understand the concept of conductors and capacitor.
- To learn the basic properties of nuclei and atomic nucleus
- To understand the different atom models and related experiments.
- To understand the basic of semiconductor devices like diode, transistor, FET and OP-amp to electronic circuits.

UNIT I: ELECTRICITY AND MAGNETISM
Capacitor-Principle of a capacitor-Capacity of isolated spherical, cylindrical capacitor-Energy of charged capacitors-Sharing of charges and loss of energy. Magnetic field due to a current carrying conductor-Oersted Experiment-Maxwell's cork screw rule-Biot-Savart's law.

UNIT II: ATOMIC PHYSICS
Introduction to Atom model-Vector atom model-Spatial quantization, spinning of electron-quantum numbers-Pauli's exclusion principle - Stern Gerlach Experiment; X-ray-production of X-rays-Continuous and characteristic z-ray-Mosley's law and its importance-Bragg's law-Miller indices

UNIT III: NUCLEAR PHYSICS
Nuclear model-Liquid drop model-Nuclear energy-Mass defect-Binding energy-Radioactivity-Nature of Alpha, Beta and Gamma rays-Exponential law-Half life period-Mean life period. Fission and Fusion-Atom Bomb-Hydrogen bomb –Nuclear reactor-Thermonuclear reactions-Source of solar energy.

UNIT IV: BASIC ELECTRONICS
Semiconductors-Types Junction diode-Biasing-Characteristics-Zener diode Characteristics - Voltage regulator. Junction transistors-Working-Circuit configuration-CB and CE mode Characteristics-Transistor Biasing-Voltage divider method –CE transistor-Amplifier (single stage).

UNIT V: DIGITAL ELECTRONICS
Number system-Decimal, Binary, Octal, Hexadecimal and inter conversion-AND, OR, NOT gates-Construction using diodes and transistors. NAND and NOR gates-Universal building blocks –Boolean algebra-Demorgan's theorem-Verification.

UNIT VI : (NOT FOR EXAMINATIONS)
Simple DC motor https://youtu.be/-MD1knpHs-M
Binding energy per Nucleon https://youtu.be/AUaoAeoPrty
Liquid drop model   https://youtu.be/4q1i7yTcQmA

BOOKS FOR STUDY:
1. Electricity and Magnetism Brijlal and Subramaniyam, S.Chand & Company Pvt.Ltd.
2. Principle of Electronics V.K. Mehta . S Chand; 7th Revised edition (2005).
3. Allied Physics Paper I & II-R. Murugeshan. S Chand (2006).
4. Allied Physics-II Sundaravelusamy. Priya Publications Karur (2012).
5. Ancillary Physics Vol.1 and Vol. 2 by Kamalakkannan and others.

BOOKS FOR REFERENCE:
1. Nuclear Physics, D.C. Tayal. Himalaya Publishing House (2011).
2. Digital Principle and Application Malvino and Leach. McGraw-Hill, 5th edition (1994).
3. Modern Physics R. Murugeshan, S.Chand & Company Pvt.Ltd.

COURSE OUTCOMES

By the end of the Course, the students will be able to

CO1: Gain knowledge of electric and magnetic field.
CO2: To be able to sketch an atom and indicate the location of the nucleus, the shell and the electronic orbital.
CO3: Able to calculate the maximum number of electron that can occupy a specific shell.
CO4: Demonstrate familiarity with basic electronic components and use them to design simple electronic circuit.
CO5: The ability to understand, analyze and design various combinational sequential circuits.
CO6: To understand and examine the structure of various number system and its application in digital circuits.

MAPPING WITH PROGRAMME OUTCOMES

	PROGRAMME OUTCOMES					
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**
CO 1	✓	✓	✓	✓	✓	✓
CO 2	✓	✓	✓	✓	✓	✓
CO 3	✓	✓	✓	✓	✓	✓
CO 4	✓	✓	✓	✓	✓	✓
CO 5	✓	✓	✓	✓	✓	

QUESTION PAPER PATTERN

Maximum Marks   : 75   **Exam Duration :** 3 hours

Part A   **:** 20×1=20 Answer **ALL** Questions (Multiple Choice Questions) Four questions from each unit
Part B   **:** 5× 5 = 25 Answer **ALL** Questions (Either or Type – Two Question from Each Unit)
Part C   **:** 3×10=30 Answer Any **Three** (One Question from each Unit)

APPLIED PHYSICS-II-PRACTICAL

SEMESTER IV **CREDIT** **: 4**
Internal: 40 External: 60 **INS. HRS.** **: 3**
COURSE CODE: U214AAPH2P

OBJECTIVES:
- To gain in depth of knowledge regarding the Physics fundamentals.
- To study the aspects related to the application side of experiments.
- To understand the utility of transistor, FET and OP- Amp.
- To provide hands on learning experience in understanding the basic concepts of electronic circuits.

LIST OF EXPERIMENTS(Any ten experiments)
1. Semiconductor Diode-Characteristics
2. Zener diode-Characteristics
3. FET Characteristics
4. Transistor Characteristics in CE mode
5. Transistor Characteristics in CB mode
6. Bridge rectifier and Zener controlled Regulated power Supply
7. Field along the axis of a coil-M and H
8. Potentiometer-Measurement of resistance
9. Potentiometer-Measurement of current
10. Carey Foster's bridge-Specific resistance
11. Calibration of a thermistor and determination of its energy gap
12. Series resonance circuits
13. Single stage amplifier
14. FET Amplifier
15. Astable multivibrator
16. Mathematical operators-Addition, subtraction using Op-amp
17. Printed circuit board design.
18. LCR parallel resonance circuit
19. Logic gates (AND, OR, NOT ,NAND AND EX-OR) using Ics
20. NAND and NOR as universal gates.
21. Verification of Demorgan,s theorem.
22. Half adder and half subtractor using logic gates.

BOOK FOR REFERENCE:
1. B.Sc. Physics Practical Manual, Dept. of Physics, St. Joseph college(A), Trichy.

COURSE OUTCOMES:
By the end of the Course, the students will be able to

CO1: Application of these circuits to create amplifiers, regulators, power supplies.
CO2: Calibrate given low range and high range voltmeter and ammeter.
CO3: To measure the and specific resistance of the coil wire for designing electrical circuits
CO4: Basic laws and theories involving diodes, transistors etc.,
CO5: Understand the given concepts and its physical significance.
CO6: Apply the theory to design basic electrical and electronic circuits.

MAPPING WITH PROGRAMME OUTCOMES

COURSE OUTCOMES	PROGRAMME OUTCOMES					
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	✓	✓	✓	✓		✓
CO 2	✓	✓	✓	✓	✓	✓
CO 3	✓	✓	✓	✓	✓	✓
CO 4	✓	✓	✓	✓		✓
CO 5	✓	✓	✓	✓	✓	✓
CO 6	✓	✓	✓	✓		✓
CO 7	✓	✓	✓	✓	✓	✓

APPLIED PHYSICS-III

SEMESTER IV   **CREDIT**   : 3
COURSE CODE: U214AAPH3   **INS. HRS.**   : 3

OBJECTIVES:
- To expose the students towards different number system and their conversions.
- To identify the connection between electricity and magnetism.
- To make the student understand the characteristics and applications of   FE T and transistor.
- To understand how different devices can be integrated in an IC.
- To acquire the knowledge of operational amplifiers and its applications.

.UNIT I: NUMBER SYSTEMS, CODES

Number systems- conversions – Binary addition, subtraction- multilplication- division- 8421 code – BCD code- Excess 3 code- Gray code- Binary to Gray and Gray to Binary conversion- ASCII code.

UNIT II: TRANSISTORS

PNP and NPN Transistors-DC characteristics of CE and CB configuration-Hybrid parameters-Only equation-Functions of transistors as an amplifier and oscillator-FET-Construction and Working-Characteristics of FET amplifier.

UNIT III: OPERATIONAL AMPLIFIERS

Basics of Op-amp-Inverting and Non-inverting Op-amp-Differential Op-amp-CMRR-Basic uses of Op-amp as sign and scale changer, phase shifter-Integrator-Differentiator-Adder-A/D conversion-Counter methods –Op-amp as a comparator.

UNIT IV: DIGITAL LOGIC CIRCUITS

Logic gates (AND, OR, NOT, XOR ONLY)-Boolean algebra-Demorgan's Theorem-Karnaugh map simplification-two variable-SOP-Encoder-Decoder-Half Adder and Half Sub tractor –RS Flip flop.

UNIT V: DIGITAL COMPONENTS

Integrated circuits-Fabrication of diode and transistor-Decoders (Basic circuit 2 into 1) –Multiplexers (Basic circuit 1 into 4)-Shift right and shift left registers.

UNIT VI: (NOT FOR EXAMINATIONS)

Electrostatic experiments demohttps://youtu.be/yMLIS-P
Biot – savat's law https://youtu.be/X9myH8aG2AQ
Electric free energt generaror https://youtu.be/iaUt5GDqG5W

BOOKS FOR STUDY:
1. The Fundamentals of Solid State Physics, Theraja, S. Chand and Co.
2. Digital Logic and Computer Design, Morris Mano, Pearson Education; (2004)

BOOKS FOR REFERENCE:
1. Digital Principles and Applications, Malvino & Leach, McGraw-Hill, 5th edition (1994).

2. Electronic Devices and Circuits- Jacob Millman, Christos C. Halkias , McGraw Hill Education (1967).

COURSE OUTCOMES:

By the end of the Course, the students will be able to

CO1: Convert between different number systems which are used in digital communication and digital devices.
CO2: Have a thorough knowledge of transistor and FET and its applications in Amplifer, oscillator etc.
CO3: Analyze different type of digital electronic circuits using logic gates .
CO4: Ability to use OP-amp as summer, subtractor, differentiator, integrator etc.,
CO5: Design and explain analog to digital conversion.

MAPPING WITH PROGRAMME OUTCOMES

		PO1	PO2	PO3	PO4	PO5	PO6
COURSE OUTCOME	CO 1	✓	✓	✓	✓		✓
	CO 2	✓	✓	✓	✓	✓	✓
	CO 3	✓	✓	✓	✓	✓	✓
	CO 4	✓	✓	✓	✓		✓
	CO 5	✓	✓	✓	✓	✓	✓

QUESTION PAPER PATTERN

Maximum Marks   : 75   **Exam Duration :** 3 hours

Part A   : 20×1=20 Answer **ALL** Questions (Multiple   Choice Questions) Four questions from each unit

Part B   : 5× 5 = 25 Answer **ALL** Questions (Either or Type – Two Question from Each Unit)

Part C   : 3×10=30 Answer Any **Three** (One Question from each Unit)

NON MAJOR ELECTIVE – II - SIMPLE APPLIANCES

SEMESTER IV	CREDIT	: 2
COURSE CODE: U21PH4NME2:1	INS. HRS.	: 2

OBJECTIVES :

- To give simple introduction to various electrical appliances.
- To provide basic ideas for inspection of electrical devices useful in our day to day life.
- To impart basic knowledge of designing, testing and troubleshooting in simple home appliances.

UNIT I: SAFETY PRECAUTION

Electricity – Basic principles – Practical unit of electricity – International system (S.I) of units – Electric shock- Precautions to avoid electric shock – Rescue steps in electric shock – methods of resuscitation – Electric Line Circuit breaker (ELCB).

UNIT II: WIRING

Wiring system – electric supply to house and factories – Types of wiring – ISI Rules – Megger testing – Earthing.

UNIT III: ELECTRICAL MEASURING INSTRUMENTS

Moving coil instruments – Voltmeter – Ammeter – Wattmeter – Kilowatt meter – Frequency meter – Multimeter.

UNIT IV: ELECTRICAL APPLIANCES

Electricity in house – design for heating element – electric iron –induction stove Cooling appliances - principle, construction and working of refrigerator – air conditioner Other important electrical appliances; principle, construction and working of fluorescent lamp – LED lamp –washing machine.

UNIT V: ELECTROMAGNETIC APPLICATION

Basics of Electromagnetic theory – Solenoid – Electric motor (AC & DC) – Electric generator – transformer – Backup power suppliers (UPS, Invertors)

BOOKS FOR STUDY:

1. Basic Electrical Engineering, A. L. Anwani and I. Anwani. 2003, DhanpatRai and Co (P) Ltd. Delhi.
2. Textbook of Electrical Technology, B. L .Theraja, Vol. 1 & 2.
3. Electrical Instruments and Measurement Techniques – William D. Cooper – PHI Pvt Co., New Delhi, 1997.

BOOK FOR REFERENCE:

1. Consumer Electronics – S.P. Bali.

COURSE OUTCOMES:

By the end of the course, the students will able to

CO1: Acquire knowledge on simple introduction to electrical appliances and precautions in handling them.
CO2: Understand basics of wiring system.
CO3: Expertise on simple electrical measuring instruments.
CO4: Create an awareness on maintaining simple electronic devices and cooling appliances.
CO5: Develop skill in working with electric motors.
CO6: Develop skill in earthing and giving insulation in electric circuits.

MAPPING WITH PROGRAMME OUTCOMES

		PROGRAM OUTCOME					
		PO1	PO2	PO3	PO4	PO5	PO6
COURSE OUTCOME	CO1	✓	✓	✓	✓	✓	
	CO2	✓		✓	✓	✓	
	CO3	✓	✓	✓	✓	✓	✓
	CO4	✓	✓	✓	✓	✓	✓
	CO5	✓		✓	✓	✓	
	CO6	✓		✓	✓	✓	

QUESTION PAPER PATTERN

Maximum Marks	: 75	Exam Duration : 3 hours
Part A	: 5× 15 = 75 Answer **ALL** Questions (Either or Type – Two Question from Each Unit)	

NON MAJOR ELECTIVE – II - PHOTOGRAPHY

SEMESTER IV   **CREDIT   : 2**
COURSE CODE: U21PH4NME2:2   **INS. HRS.   : 2**

Objectives:

- Enhance the understanding of photographic equipment and the science and the technology behind it.

- Understand the role of light in photography.

- To be able to analyze the photographic image technically and aesthetically.

UNIT I. Still Photography:

Shutter types and their limitations. Aperture and its effects. Depth of field, depth of focus, hyper focal distance. Factors affecting the depth of field and the depth of focus. Circle of confusion and its effect on sharpness/ blurr.

UNIT II. Camera Lens:

Optical materials, Plastics/ Glass, Lens coating, Types of lenses- Normal/ Standard, Telephoto, Teleconverter, Wide angle, Fish eye lens, Zoom,Micro lens, Macro lens, Supplementary lenses-Close up lens, Extension tubes. Faults in lenses, Aberrations, Resolution, Flare, and Ghost image etc. Lenses for digital camera, cropping factor.

UNIT III. Exposure:

Methods of estimation. Thumb Rule. Law of reciprocity, Reciprocity failure. Exposure meter- types and comparison, differences between hand-held exposure meter and TTL exposure meter, spot meter, flash meter. Reading exposure levels, interpreting the meter reading.

UNIT IV. Lighting:

Types of light Sources, natural and artificial light. Hard & soft light. Basic lighting set up for a portrait. Key, Fill, Back & Top light. Brightness ratio and lighting ratio. Lighting for different subjects / situations. Flash light, Flash curves, Guide number. Electronic flash. Flash synchronization for different shutter speeds. Studio flash lights.

UNIT V. Techniques of Photographing Action:
Lazy shutter, Freeze-action Blurring, Superimposition, double exposure, and multiple exposures composition.

UNIT – VI: [NOT FOR EXAMINATION]

https://youtu.be/r1l3RdPFJjM

https://youtu.be/-Mo_FH6QH70

BOOKS FOR STUDY:
1. The 35 mm Hand Book- Michael Freeman
2. Focal encyclopedia of Photography, Focal Press.
3. Basic Photography- M.J. Langford, Focal Press.
4. Advanced Photography (Vol.-I & Vol.-II) - M.J. Langford, Focal Press.

BOOKS FOR REFERENCE:
1. Creative Colour Photography Techniques- Marshall Cavendish.
2. Colour How to see it, How to paint it- Judy Martin (Chartwell Books Inc.)
3. Making Colour Prints- Jack H.Coote (Focal Press)
4. Applied Photographic Optics- Sidney F. Ray; Focal Press
5. The Practical Guide to Photographic Lighting, John Tarrant, Focal Press 13.
Light Science and Magic, An Introduction to Photographic Lighting, Fill Hunter,

COURSE OUTCOMES:

By the end of the course, the students will able to

CO 1: Discuss the history of Photography, moving images and Photo Journalism
CO 2: Demonstrate a brief understanding of news values, photo journalism and sources.
CO 3: Explain various types of cameras, its components and accessories
CO 4: Discuss the legal and ethical aspects of photography and photojournalism.
CO 5: Assess the importance of digital technology in photography

MAPPING WITH PROGRAMME OUTCOMES

		PROGRAM OUTCOME					
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
COURSE OUTCOME	**CO1**	✓	✓	✓	✓	✓	
	CO2	✓		✓	✓	✓	
	CO3	✓	✓	✓	✓	✓	✓
	CO4	✓	✓	✓	✓	✓	✓
	CO5	✓		✓	✓	✓	
	CO6	✓		✓	✓	✓	

QUESTION PAPER PATTERN

Maximum Marks   : 75   **Exam Duration :** 3 hours

Part A   : 5× 15 = 75 Answer **ALL** Questions (Either or Type – Two Question from Each Unit)

SKILL BASED – I
ELECTRICAL APPLIANCES

SEMESTER IV   **CREDIT   : 2**
COURSE CODE: U214PHSE1   **INS. HRS.   : 2**

OBJECTIVES:
- To learn fundamentals of electricity, explain the characteristics and hazards associated with power arcs and precautions that should be taken to avoid injury in the work place.
- To enable the students to understand basics of measuring instruments.
- To familiarize the concept of commercial electrical billing.(problem)
- To understand the design, working principles of fluorescent lamp and LED.
- To understand the basics of various modern electrical appliances.

UNIT I: FUNDAMENTALS OF ELECTRICITY

Electricity – Charge - Electric current – AC – DC - Advantages of AC over DC - Advantages of DC over AC – Phase – Single Phase - Poly phase – Advantage of poly phase over single phase – Electrical shocks and its effect.

UNIT II: MEASURING INSTRUMENTS

Galvanometer-Ammeter-Voltmeter – Ohm meter – AVO meter – (Multi meter) – Watt hour meter – commercial electrical billing (Problem) – Line tester.

UNIT III: LIGHTING AND HEATING APPLIANCES

Design and working of Fluorescent lamp - CFL-LED- Electric hot plate.

UNIT IV: COOLING APPLIANCES

Design and working of Fan – Refrigerators – Air conditioning –Air cooler.

UNIT V: MODERN ELECTRICAL APPLIANCES

Design and working of 1. Water motors 2. Microwave oven   3. Vacuum cleaner 4. UPS 5. Inverter.

UNIT VI: (NOT FOR EXAMINATIOS)

https://youtu.be/rIT2dg-K5tQ
https://youtu.be/TduK6RPdlrA
https://youtu.be/h5WQOA15OnQ
https://youtu.be/maniMjCVS7m

BOOKS FOR STUDY:
1. Basic electrical engineering by M.L.Anwani, Dhanpat Rai and Co. New Delhi.
2. Textbook of Electrical Technology ,B.L.Theraja,Vol.1&2.

BOOK FOR REFERENCE:
1. Consumer Electronics – S.P.Bali.

COURSE OUTCOMES (COS):

CO1: Analysis of single phase AC circuits, and determining the power in these circuits.
CO2: Have in depth knowledge of the fundamentals of electricity.
CO3: Identify the type of electrical machine used for that particular application.
CO4: Awareness of electrical shocks and short circuit and its impact.
CO5: Acquire knowledge about electronic cooling appliances.
CO6: Study different meters and instruments for measurement of electronic quantities.

MAPPING WITH PROGRAMME OUTCOMES

	PROGRAMME OUTCOMES					
	PO1	**PO2**	**PO3**	**PO**	**PO5**	**PO6**
CO1	✓		✓	✓		✓
CO2	✓		✓	✓		✓
CO3	✓	✓	✓	✓	✓	✓
CO4		✓	✓	✓		
CO5	✓	✓	✓	✓		✓
CO6	✓	✓	✓			✓

QUESTION PAPER PATTERN

Maximum Marks   : 75   **Exam Duration :** 3 hours

Part A   : 5× 15 = 75 Answer **ALL** Questions (Either or Type – Two Question from Each Unit)

CC IX : ELECTRICITY AND MAGNETISM

SEMESTER V		**CREDIT**	**: 5**
COURSE CODE: U21PHC509		**INS. HRS.**	**: 5**

OBJECTIVES:
- To understand the general concepts of Electrostatics, magnetostatics and to educate scientifically the principles of magnetism and apply the physics concepts in solving problems.
- To study the nature of various magnetic materials.

UNIT I : ELECTROSTATICS
Gauss theorem and applications-Electric field due to a uniformly charged Sphere-Electric field due to charged spherical and Cylinder-Capacitor-Parallel plate capacitor-Cylindrical Capacitor- Spherical Capacitor- Energy Stored in a Capacitor – Loss of Energy Stored in a Capacitor – Loss of Energy on sharing of Charges.

UNIT II : MAGSNETIC PROPERTIES OF MATERIALS
Basic definitions – Electron theory of magnetism – Dia, Para, Ferro magnetic materials – Hysteresis – B-H curve using Ballistic Galvanometer – Energy loss due hysteresis and its importance.

UNITS III : CURRENT ELECTRICITY
Meter bridge – Construction & Working – Potentiometer – Calibration of ammeter-Calibration of low range voltmeter- \\ - Carey Foster's bridge – Theory – Determination Of Specific resistance of the material of the unknown coil – Thermoelectricity – Peltier and Thomson coefficients – Application of thermodynamics to a thermocouple – Thermoelectric diagram – Determination of Peltier and Thomson coefficients.

UNITS IV : ELECTROMAGNETIC INDUCTION
Laws of electromagnetic induction – Self-induction – Rayleigh's methods – Mutual Induction – experimental determination of mutual induction – AC and DC circuits – Growth and decay of current in an LR circuit – Growth and decay of charge in a CR Circuit – Series and Parallel Resonance circuits applied with AC – Sharpness of Resonance – Power factor.

UNITS V : MAGNETIC EFFECTS OF CURRENT
Biot- Savart's law – Force due to charged conductor - Force between two parallel Conductors – Magnetic intensity due to straight conductor , circular coil and solenoid – Theory of ballistic galvanometers – Damping correction – Conversion of galvanometer into voltmeters and ammeter – ohm meters and multimeter.

UNIT VI: (NOT FOR EXAMINATIONS)
1. https://phet.colorado.edu/en/simulation/coulombs-law
2. https://phet.colorado.edu/en/simulation/capacitor-lab-basics
3. https://phet.colorado.edu/en/simulation/circuit-construction-kit-dc-virtual-lab
4. https://phet.colorado.edu/en/simulation/charges-and-fields
5. https://phet.colorado.edu/en/simulation/legacy/circuit-construction-kit-ac
6. https://phet.colorado.edu/en/simulation/legacy/magnets-and-electromagnets
7. https://phet.colorado.edu/en/simulation/faradays-law

BOOKS FOR STUDY:
1. Electricity and Magnetism, Brijlal and Subramaniyam, RatanPrakashan Mandir, Agra, (1995).
2. Electricity and Magnetism, R.Murugeshan, S.Chand & Company Pvt.Ltd.

BOOKS FOR REFERENCE:
1. Electricity and Magnetism, K.K . Tewari, S. Chand and Company, New Delhi, (2002).
2. Electricity and Magnetism, Sehgal, Chopra and Sehgal, Sultan Chand and Sons, New Delhi.(1996).

COURSE OUTCOME:
CO1: Explain the basic physics of capacitors and resistors.
CO2: Predict the behavior of simple and complex DC circuits using the fundamental conservation laws.
CO3: Explain the basic electric and magnetic interactions due to charged particles and currents
CO4: Describe how the electric interactions due to single or collection of charged particles are embodied in the concepts of the electric field and the electric potential.
CO5: Predict the motion of charged particles in electric and magnetic fields.
CO6: Write a project on an application or on a natural phenomenon based on the fundamental laws of electricity and magnetism
CO7: Understand the necessity of electricity and magnetism in transportation technology.
CO8: Understand the occurrence of loss in energy due to charged particles.

MAPPING WITH PROGRAMME OUTCOMES

	PROGRAMME OUTCOMES					
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1	✓		✓	✓		✓
CO2	✓	✓	✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	
CO4	✓	✓	✓	✓	✓	✓
CO5	✓	✓		✓		
CO6	✓	✓	✓	✓	✓	✓
CO7	✓	✓	✓	✓		✓
CO8	✓		✓	✓		✓

QUESTION PAPER PATTERN

Maximum Marks	**: 75**	**Exam Duration :** 3 hours	

Part A : 20×1=20 Answer **ALL** Questions (Multiple   Choice Questions) Four questions from each unit

Part B : 5× 5 = 25 Answer **ALL** Questions (Either or Type – Two Question from Each Unit)

Part C : 3×10=30 Answer Any **Three** (One Question from each Unit)

CC X: ATOMIC PHYSICS

SEMESTER V   **CREDIT**   **: 5**
COURSE CODE: U21PHC510   **INS. HRS.**   **: 5**

OBJECTIVES:

- To understand the fundamental properties of positive rays.
- To learn photo conductivity and their applications
- To learn the basic concepts of X-rays and its applications.
- To understand the origin of atomic and alkali spectra.
- To study various atomic models in an attempt to study the fundamental properties of nature.

UNIT I: POSITIVE RAY ANALYSIS

Properties of positive rays-e/m of positive rays – Thomson's parabola method – Aston's method – Bainbridge's method-Dempster's mass spectrograph-Determination of masses-Isotopes.

UNIT II: PHOTO ELECTRICITY

Photoelectric emission – Laws –Lenard's experiment – Richardson & Compton experiment – Einstein's photoelectric equation –Experimental verification of Einstein's photoelectric equation by Millikan's experiment – Photoelectric cells – photo emissive photoconductive, photovoltaic cells – Application.

UNIT III : VECTOR ATOM MODEL

Salient features of Vector atom model-Various quantum numbers-L-S and j-j couplings-Pauli's exclusion principle – Electronic configuration of elements and periodic classification – Magnetic dipole moment of electron due to orbital and spin motion – Bohr magneton –Stern Gerlach experiment.

UNIT IV : ATOMIC SEPCTRA

Spectral terms and notations – Selection rules – Intensity rule and interval rule – Fine structure of sodium D lines – Alkali spectra – Fine structure in alkali spectra – Zeeman Effect – Larmor's theorem – Debye's quantum mechanical explanation of the normal Zeeman effect – Anamolous Zeeman effect – Theoretical explanation – Lande's g factor and Paschen Back effect and stark effect.

UNIT V : X-RAYS

X-rays – Bragg's law – Bragg's X-ray Spectrometer – Origin and analysis of continuous X-rays spectrum – Characteristics X-ray spectrum – Mosley's law and its importance – Compton effect – Derivation of expression for change in wavelength – its experimental verification.

BOOKS FOR STUDY:

1. Modern physics R.Murugeshan, S.Chand & Company Pvt.Ltd.(2003).
2. Atomic and Nuclear Physics Brijlal and Subramanyam. S.Chand & Company Pvt.Ltd.(2006)
3. Modern Physics for Degree Students, J.B.Rajam, 3rd Ed., S. Chand and Co., New Delhi, (1967).

BOOK FOR REFERENCE:

1. Concepts of modern Physics by A.Beiser, Tata Mac.Graw Hill edition.(2009)

COURSE OUTCOMES:

By the end of the Course, the students will be able to

CO 1 : Know about the Positive ray analysis.
CO 2 : Solve Einstein Photoelectric equation.
CO 3 : Understand the Quantum numbers ,including their physical significance and Quantum Mechanical state of hydrogen atom.
CO 4 : Know the origin of fine structure in atomic spectra.
CO 5 : Acquire the knowledge about the X-rays and its characteristics.
CO 6 : Understand the periodic table from the view point of the electronic structure

MAPPING WITH PROGRAMME OUTCOMES

	PROGRAMME OUTCOMES					
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**
CO 1	✓	✓				
CO 2	✓	✓	✓	✓		
CO 3	✓	✓			✓	✓
CO 4	✓	✓	✓	✓	✓	✓
CO 5	✓	✓	✓	✓	✓	✓
CO 6	✓	✓	✓	✓	✓	✓

QUESTION PAPER PATTERN

Maximum Marks   **: 75**   **Exam Duration :** 3 hours

Part A   : 20×1=20 Answer **ALL** Questions (Multiple Choice Questions) Four questions from each unit
Part B   : 5× 5 = 25 Answer **ALL** Questions (Either or Type – Two Question from Each Unit)
Part C   : 3×10=30 Answer Any **Three** (One Question from each Unit)

CC XI: BASIC ELECTRONICS

SEMESTER V   **CREDIT**   **: 5**
COURSE CODE: U21PHC511   **INS. HRS.**   **: 5**

OBJECTIVES:
- To summarize an overview of the evolution of electronics.
- To understand the basics of semiconductors.
- To impart basic ideas of basic amplifier.
- To enable the students to design oscillator and switching circuits.
- To analyze and design the application of OP-AMP circuits
- To acquire knowledge about analog electronic devices.

UNIT I: SEMICONDUCTORS AND TRANSISTORS
Biasing of p-n Junction-Characteristics of a Zener diode-Voltage Regulator. Junction Transistors in Common Base and Common Emitter mode-Load line-Operating point-Transistor biasing-Voltage divider method-Hybrid Parameters-Two Port network-Determinations of h-Parameters.

UNIT II: AMPLIFIERS
Transistor as non amplifiers-Lord lind analysis-Analysis of CE amplifier using hybrid parameters-Power amplifier classification-Class A Power amplifier, Transformers coupled-Class B Push pull amplifier-RC Coupled amplifier-Frequency response-Emitter follower-feedback-Negative feedback amplifiers.

UNIT III: OSCILLATOR AND SWITCHING CIRCUITS
Barkhausen criterion for oscillations-Transistor as an oscillator-Working of Tuned collector, Hartley and colpitt's oscillators-Calculation of frequency of oscillation-Multivibrators-Astable, Monostable and Bistable.

UNIT IV: OPERATIONAL AMPLIFIERS
Characteristics-Inverting amplifier-Non-inverting amplifier n-Adders-Subtractor – Differentiator-Integrator-Op-amp as low, high and band pass filters- Solving differential equations –first and second orders only

UNIT V: SPECIAL SEMICONDUCTOR DEVICES
FET-Working-Difference between FET and Transistor-Advantages of FET-Characteristics of FET-MOSFET-Working-SCR-Working-Characteristics-SCR as switch-UJT-Working-Characteristics-Application as relaxation oscillator.

UNIT VI: (NOT FOR EXAMINATIONS)
Testing of Junction Diode – Zener Diode - BJT - FET - UJT - SCR ,Measurement of Resistance - Capacitance - Testing of ICs using IC tester , Testing of CRO and AFO.
  https://www.fluke.com>bestpractices
  https://sciencing.com>check-devices
  https://www.electonicshub.org>test

BOOKS FOR STUDY:
1. Modern Physics R. Murugeshan, S.Chand & Company Pvt.Ltd.
2. Principle of Electronics V.K. Mehta, S.Chand & Company Pvt.Ltd.
3. Electronics(Minnanuvial) Sundaravelusamy.
4. Solid State Electronics B.L. Theraja, S. Chand Limited, 2006
5. Foundation of Electronics by Chattopadhyaya, South Asia books publisher.

BOOKS FOR REFERENCE:

1. Handbook of Electronics, Gupta and Kumar, Pragati Prakashan Publication-Meerut (2012)
2. A Textbook of Applied Electronics R.S. Sedha, S Chand; 3rd Revised edition.
3. Elements of Electronics, S P Singh & Bagde , S. Chand Group.

COURSE OUTCOMES:

By the end of the course, the students will be able to,

CO 1 : Acquire the knowledge about construction and working of Transistors.
CO 2 : Understand the ideas and basic of operational Amplifiers.
CO 3 : Gain in-depth knowledge of designing switching circuits.
CO 4: Designing of circuits using Op-Amps.
CO 5: To analyze analog electronic devices.
CO 6: Explore the avenues of employment in small scale electronic companies.

MAPPING WITH PROGRAMME OUTCOMES

COURSE OUTCOMES	PROGRAMME OUTCOMES					
	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6
CO_1	✓	✓	✓	✓	✓	✓
CO_2	✓	✓	✓	✓	✓	✓
CO_3	✓	✓	✓	✓	✓	✓
CO_4	✓	✓	✓	✓	✓	✓
CO_5	✓	✓	✓	✓	✓	✓
CO_6	✓	✓	✓	✓	✓	✓

QUESTION PAPER PATTERN

Maximum Marks   **: 75**   **Exam Duration :** 3 hours

Part A   **:** 20×1=20 Answer **ALL** Questions (Multiple Choice Questions) Four questions from each unit
Part B   **:** 5× 5 = 25 Answer **ALL** Questions (Either or Type – Two Question from Each Unit)
Part C   **:** 3×10=30 Answer Any **Three** (One Question from each Unit)

CC XII : MAJOR PRACTICAL-V

SEMESTER V   **CREDIT**   **: 4**
Internal: 40 External: 60   **INS. HRS.**   **: 6**
COURSE CODE: U21PHC512P
OBJECTIVES:
- To calculate refractive indexes of media using spectrometer.
- To understand the principle of potentiometer to calibrate voltmeter and ammeter.
- To calculate the moment of a bar magnet.
- To study the nature of semiconductors.

Any Twelve Experiments
1. Spectrometer-i-d curve
2. Spectrometer-i-i' curve
3. Spectrometer-Dispersive power of a prism-Mercury Spectrum
4. Spectrometer – Small angled prism
5. Spectrometer – Grating-Normal incidence method-Dispersive power
6. Spectrometer – Grating- minimum deviation method –Dispersive power
7. Spectrometer – Cauchy's constants
8. Spectrometer – Hartmann's constants
9. Field along the axis of a coil – Determination of magnetic moment
10. M and H – Absolute determination using deflection and vibration magnetometer.
11. Potentiometer – Specific resistance
12. Potentiometer – EMF of a thermocouple
13. Potentiometer – Resistance of thermistor
14. Potentiometer – Comparison of EMF's
15. Thermistor – Energy gap
16. Spot galvanometer – Figure of merit
17. Spot galvanometer – Comparison of EMF's.
18. Newton's rings-Determination of Refractive index of a liquid
19. Koenig's method-Determination of Young's modulus of a given material

BOOKS FOR REFERENCE:
1. B.Sc. Physics Practical Manual, Dept. of Physics, SJC (A), Tricy.
2. C.C Ouseph, C.Rangarajan, R. Balakrishnan- A Text Book of Practical Physics- S.Viswanathan Publisher-Part II (199)
3. S.L Gupta and V.Kumar- Practical Physics- Pragati Prakashan- 25th Edition (2002).

COURSE OUTCOMES:

By the end of the course, the students will be able to,

CO1: Application of spectrometer to calculate refractive indices of media in dispersive power of grating/prism.
CO2: Calculate Horizontal component of earth's magnetic field and moment of bar magnet.
CO3: Understand the principle of potentiometer to calibrate low range voltmeter/ammeter.
CO4: Understand the characteristics of spot galvanometer and calculate voltage/current sensitivities.
CO5: Calculate the energy gaps of semiconductors
CO6: Understand the application of potentiometer for designing electrical circuits to calculate resistance, voltage, current etc.,

MAPPING WITH PROGRAMME OUTCOMES

<table>
<tr><td colspan="2" rowspan="2"></td><td colspan="6" align="center">PROGRAMME OUTCOMES</td></tr>
<tr><td>PO1</td><td>PO2</td><td>PO3</td><td>PO4</td><td>PO5</td><td>PO6</td></tr>
<tr><td rowspan="6">COURSE OUTCOMES</td><td>CO1</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td><td>✓</td></tr>
<tr><td>CO2</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td><td>✓</td></tr>
<tr><td>CO3</td><td>✓</td><td>✓</td><td></td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>CO4</td><td>✓</td><td></td><td>✓</td><td></td><td></td><td>✓</td></tr>
<tr><td>CO5</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>CO6</td><td></td><td>✓</td><td></td><td>✓</td><td>✓</td><td>✓</td></tr>
</table>

MAJOR BASED ELECTIVE I: SPECTROSCOPY AND LASER PHYSICS

SEMESTER V	**CREDIT**	**: 5**
COURSE CODE: U21PH5MBE1:1	**INS. HRS.**	**: 5**

OBJECTIVES:
- To understand the basic principles of laser and its applications.
- Explain rotational, vibrational , electronic and Raman spectra of molecules.

UNIT I: SPECTROSCOPY
Definition of spectrum- Electromagnetic radiation- interaction of electromagnetic radiation with molecules – Type of spectra – Emission spectra- Absorption spectra- Fraunhofer lines-Molecular spectroscopy-Quantization of different forms of energies in molecules.

UNIT II: MICROWAVE SPECTROSCOPY
Rotation of molecule and its spectra-Rigid rotator and its spectrum-Linear, Symmetric top molecules-Microwave Spectrometer.

UNIT III: INFRARED SPECTROSCOPY
Vibrating diatomic molecules as harmonic oscillator – anhormonic oscillator-Interaction of vibrational & rotational energy -Double beam Spectrometer-Application of vibrational spectroscopy.

UNIT IV: RAMAN SPECTROSCOPY
Theory of Raman effect-Pure rotational spectra-linear, symmetric top molecules-Pure vibrational spectra- Raman activity of vibration-Structural determination from Raman and IR spectroscopy-Raman Spectrometer.

UNIT V: LASER PHYSICS
Population inversion-pumping processes-Threshold condition-Quantum yield-Three level system-ruby laser –pumping power-four level laser-CO_2 laser-Nd –YAG laser-He-Ne laser- Application of Laser (5 mark question).

UNIT VI : (Not For Examination)
Laser beam divergence and spot size -Emission spectra
https://youtube /xaq4YUd6e2E
https://youtube/jaOzCo1eAdk

BOOKS FOR STUDY:
1. Elements of Spectroscopy Gupta Kumar Sharma. Pragati Prakashan (2011).
2. Fundamental of Molecular Spectroscopy - C.N. Banwell. Tata McGraw Hill., New Delhi, (1993).

BOOKS REFERENCE:
1. Laser theory & Applications- K.Thyagarajan, A.K.Ghatak, Mc Millan, India Ltd, (1984).
2. Molecular spectroscopy P.R. Singh-S.K. Dikshit. New Delhi : S. Chand, (1981)
3. William T. Silfast, Laser fundamentals, University press, published in south Asia by foundation books, New Delhi, (1998).

COURSE OUTCOMES:

By the end of the course, the students will be able to

CO 1 : Impart knowledge related to the concepts of spectroscopy.
CO 2 : Analyze the prerequisites in a molecule towards its rotational and vibrational activity.
CO 3 : Understand the properties of laser and its applications.
CO 4 : To study the structure of new molecules based on Microwave spectroscopy/ IR & Raman spectroscopy.

MAPPING WITH PROGRAMME OUTCOMES

COURSE OUTCOMES	PROGRAMME OUTCOMES					
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	✓	✓	✓	✓		✓
CO 2	✓	✓	✓	✓		✓
CO 3	✓	✓	✓	✓	✓	✓
CO 4	✓	✓	✓	✓	✓	✓

QUESTION PAPER PATTERN

Maximum Marks	**: 75**	**Exam Duration :** 3 hours

Part A : 20×1=20 Answer **ALL** Questions (Multiple Choice Questions) Four questions from each unit

Part B : 5× 5 = 25 Answer **ALL** Questions (Either or Type – Two Question from Each Unit)

Part C : 3×10=30 Answer Any **Three** (One Question from each Unit)

MAJOR BASED ELECTIVE I: BIOPHYSICS AND BIOMEDICAL INSTRUMENTATION

SEMESTER V	**CREDIT** : 5
COURSE CODE: U21PH5MBE1:2	**INS. HRS.** : 5

OBJECTIVES:
- Be able to understand the underlying physical principles in different biological phenomena.
- Gain knowledge about the design and functioning of various biomedical instruments.

Unit 1 – Basics of Biophysics Introduction

Electronic structure of atoms – Molecular bonds and covalent bonds – Molecular interactions –Thermodynamics - Entropy – Enthalpy – The free energy of a system – Chemical potential - oxidation & reduction potential – Radioactivity – Rate of radioactive decay – Measurement of radioactivity – Effects of Radioactivity on matter – Biological effects of radiation -Applications of radio isotopes

Unit II – Physical Techniques to study Biomolecules

Introduction to Biomolecules – Hydration of molecules – Role of friction – Diffusion – Sedimentation – The Ultracentrifuge – Viscosity – Light Scattering – Small angle X–Ray scattering.

Unit III – Radiotheraphy

Principles , Dosage Data For Clinical Applications - Gamma Camera – Positron Emission Tomography – Cobalt 60 Machine – Therapeutic Application of Radio Isotopes – Applications Of UV Radiation For Treatments - X Ray Machine And Digital Radiography.

Unit IV – Physiological Assist Devices

Introduction- Types of biomedical instrumentation-sensors-actuators - Echocardiograph – Cardiac Pacemaker – Haemo Dialysis Machine – Portable Kidney Machine – Anaesthesis Machine – Ventilator.

Unit V - Advances in Biomedical Instrumentation

Computer and Laser in medicine – Endoscopes – Nuclear Imaging Techniques – Computer Tomography and its applications – Ultrasonic Imaging System – Magnetic Resonance Imaging - Positron Emission Tomography – Biomaterials – Recently Developed Biomaterials.

Unit VI – [NOT FOR EXAMINATION]

https://youtu.be/SSNC2nFxnuA
https://youtu.be/gJEAzy2VQs
https://youtu.be/FdZQ28qtgks

BOOKS FOR STUDY:

1. Vasantha Pattabhi and N. Gautham, Biophysics, Narosa Publishing house, 2002.

2. M.Arumugam, Biomedical Instrumentation, Anuradha Agencies, Publishers, Kumbakonam, 2005.
3. R.S. Khandpur, Handbook of Bio-medical Instrumentation, Tata McGraw Hill, 1992.

BOOKS FOR REFERENCE:

1. Carr & Brown, Introduction to Biomedical equipment Technology, Pearson Education, Asia, 2001.
2. Thomas. E.Creighton, Proteins Structures and Molecular properties, Freeman and Company, 1993.
3. D. Kipke (revised from M. O'Donnell), Biomedical Instrumentation and Design Winter, 2002
4. Leonard Banaszak, Foundations of structural biology, Academic press, 2000.

COURSE OUTCOMES:

By the end of the course, the students will able to
CO1: Illustrate the basic principle and techniques to understand the biological problem
CO2: Identify the physical principles responsible for maintaining the basic cellular function
CO3: Appraise the importance of various biophysical techniques
CO4: Practices the techniques of Chromatography and Spectroscopy

MAPPING WITH PROGRAMME OUTCOMES

		PROGRAMME OUTCOMES					
		PO1	**PO2**	**PO3**	**PO**	**PO5**	**PO6**
COURSE OUTCOME	**CO1**	✓	✓	✓	✓		✓
	CO2	✓	✓	✓		✓	✓
	CO3	✓	✓	✓			✓
	CO4	✓	✓	✓	✓	✓	✓
	CO5	✓	✓	✓	✓	✓	✓
	CO6	✓	✓	✓	✓	✓	
	CO7	✓	✓	✓	✓		✓
	CO8	✓	✓	✓			✓

QUESTION PAPER PATTERN

Maximum Marks : 75	**Exam Duration :** 3 hours

Part A : 20×1=20 Answer **ALL** Questions (Multiple Choice Questions) Four questions from each unit

Part B : 5× 5 = 25 Answer **ALL** Questions (Either or Type – Two Question from Each Unit)

Part C : 3×10=30 Answer Any **Three** (One Question from each Unit)

MAJOR BASED ELECTIVE I: MATERIALS SCIENCE

SEMESTER V	**CREDIT**	**: 5**
COURSE CODE: U21PH5MBE1:3	**INS. HRS.**	**: 5**

OBJECTIVE:

* To develop knowledge in material science and to understand the relationship between properties and material characteristics.

UNIT I: Crystal Structure

Types of crystals-space lattice-basis- unit cell and lattice parameters – Bravais lattices-Lattice planes and Miller indices-inter planar spacing in a cubic latticecubic lattice-SC – BCC – FCC- Sodium chloride and Diamond crystal structure – Bonding of solids (Ionic , Covalent , Metallic , Hydrogen and Van der Waal).

UNIT II :Super Conducting Materials

Superconductivity – Properties-Meissner's effect- London equations - types of superconductors Type I and Type II –High temperature superconductors - Josephson effects and its applications – SQUIDS - Applications of superconductor.

UNIT III: Nano Materials

Nanoscience and nanotechnology – Nanomaterials- Properties of nanomaterials (size dependent) -synthesis of nanomaterials- Fullurenes-Application of nanomaterials – Carbon nanotubes- Fabrication and structure of carbon nano tubes - Properties of carbon nanotubes (Mechanical and Electrical) - Applications of CNT's.

UNIT IV :Smart Materials

Metallic glass and its applications — Fiber reinforced metals – SAW Materials and its applications – Biomaterials – Ceramic-Nuclear engineering materials-Nanophase materials - SMART materials- Conducting polymers- Optical materials - Fiber optic materials and their applications.

UNIT V :Mechanical Behavior Of Materials

Different mechanical properties of engineering materials – creep – Fracture technological properties – factors affecting mechanical properties of material-Heat treatment-cold and hot working-types of mechanical tests- metal forming process deformation of metals-Deformation of crystals and polycrystalline materials.

UNIT VI: [NOT FOR EXAMINATION]

https://youtu.be/iyJvxOLq02s
https://youtu.be/7wMu6Yl4lgM
https://youtu.be/iUGCp8fU7vw

BOOKS FOR STUDY:

1. Dr. M.N. Avadhanulu, Material science, S.Chand & Company, New Delhi, 2014. Books for Reference: 1. M.Arumugam, Material science, Anuradha puplishers, 1990.

2. V. Raghavan, Material Science and Engineering , Printice Hall India.,2004.

BOOK FOR REFERENCE:
1. V. Rajendran, Material Science, Tata McGraw Hill Ltd, New Delhi,2001.

COURSE OUTCOMES:

At the end of the course, the students will able to
 CO1: Understand the fundamental structure and related properties of individual materials.
CO2: Get knowledge about the superconducting materials and Nanomaterials.
CO3: Gain knowledge about the smart and mechanical behavior of materials.

MAPPING WITH PROGRAMME OUTCOMES

		PROGRAMME OUTCOMES					
		PO1	**PO2**	**PO3**	**PO**	**PO5**	**PO6**
COURSE OUTCOME	**CO1**	✓	✓	✓	✓		✓
	CO2	✓	✓	✓		✓	✓
	CO3	✓	✓	✓			✓
	CO4	✓	✓	✓	✓	✓	✓
	CO5	✓	✓	✓	✓	✓	✓
	CO6	✓	✓	✓	✓	✓	
	CO7	✓	✓	✓	✓		✓
	CO8	✓	✓	✓			✓

QUESTION PAPER PATTERN

Maximum Marks	**: 75**	**Exam Duration**	**: 3 hours**
Part A	**: 20×1=20 Answer ALL Questions (Multiple Choice Questions) Four questions from each unit**		
Part B	**: 5× 5 = 25 Answer ALL Questions (Either or Type – Two Question from Each Unit)**		
Part C	**: 3×10=30 Answer Any Three (One Question from each Unit)**		

SKILL BASED – II - MEDICAL PHYSICS - THEORY

SEMESTER V	**CREDIT**	**: 2**
COURSE CODE: U214PHSE2	**INS. HRS.**	**: 2**

OBJECTIVES:
- To understand the nature of heat loses from a human body and pressure in skull, eye and urinary bladder.
- To acquire knowledge about the biomedical instruments.
- To learn the basic principle and applications of laser in medical field.
- To understand the application of ultrasonics in diagnostics

UNIT – I: MECHANICS OF HUMAN BODY

Static, Dynamic and Frictional forces in the body - Heat and temperature – Temperature scales – clinical thermometer – Thermography – Heat Theraphy – Cryogenics in medicine – Heat losses from body – Pressure in the body – Pressure in skull, Eye and Urinary Bladder.

UNIT – II: DIAGNOSTIC DEVICES

X-ray machine – Comparison between Radiography and Fluroscopy – Angiography (Basic concept) – Thermography – Comparison between normal and cancer cells.

UNIT – III: THERAPEUTIC DEVICES

External and internal defibrillators – ac defibrillator – DC defibrillator – Pace maker – Comparison between External and internal pace makers.

UNIT – IV: LASER IN MEDICINE

Laser – Principle – Properties – General applications – Laser based blood cell counting – Laser surgery – Advantages.

UNIT – V: ULTRASONICS IN MEDICINE

Ultrasonics – Properties – Ultrasonic propagation through tissues – Ultrasonic diathermy – B mode Ultrascan – applications of diagnostic ultrasound.

UNIT VI:[NOT FOR EXAMINATION]

https://www.youtube.com/v=2nhUwy3dbwo&t=3s
https://youtu.be/a5HI2-AVQJS
https://youtu.be/60vhaU-KAPUO
https://youtu.be/NVQicaddvXK

BOOKS FOR STUDY:
1. John R. Cameron, Medical Physics, University of Wisconsin, Madison & James G. Skofronick, Florida State university, Tallahassee, A wiley-interscience Publication, John Wiley & sons, Singapore, 2005.
2. Dr. M. Arumugam, Biomedical Instrumentation, Second Edition, Anuradha Publicaions PVT, Kumbakonam, 10th Reprint 2010.

BOOK FOR REFERENCE:
1. Leslie Cromwell, Fred J. Weibell, Enrich A. Pfeiffer, Biomedical Instrumentation and Measurements, Prentice Hall of India, PVT, New Delhi, Second Edition, 2005.

COURSE OUTCOMES:

At the end of the course, the students will able to

CO1: Understand static,dynamic and frictional forces in the body.
CO2: Get knowledge about the pressure in skull,eye and urinary bladder.
CO3: Acquire in depth knowledge of various therapeutic devices.
CO4: The information will teach the student about the normal and cancer cells.
CO5: understand the nature of ideas of ultrasonic propagation.
CO6: Gain knowledge about the pacemaker and how it is works and analyze external and internal pacemarker.
CO7: Describe laser based blood cell counting.
CO8: Perform research on the ultrasonic diathermy and its application.

MAPPING WITH PROGRAMME OUTCOMES

		PROGRAMME OUTCOMES					
		PO1	**PO2**	**PO3**	**PO**	**PO5**	**PO6**
COURSE OUTCOME	**CO1**	✓	✓	✓	✓		✓
	CO2	✓	✓	✓		✓	✓
	CO3	✓	✓	✓			✓
	CO4	✓	✓	✓	✓	✓	✓
	CO5	✓	✓	✓	✓	✓	✓
	CO6	✓	✓	✓	✓	✓	
	CO7	✓	✓	✓	✓		✓
	CO8	✓	✓	✓			✓

QUESTION PAPER PATTERN

Maximum Marks	**:** 75	**Exam Duration :** 3 hours

Part A : 5× 15 = 75 Answer **ALL** Questions (Either or Type – Two Question from Each Unit)

SKILL BASED – III AUDIO AND VIDEO SYSTEMS - THEORY

SEMESTER V	**CREDIT**	**: 2**
COURSE COPDE: U214PHSE3	**INS. HRS.**	**: 2**

OBJECTIVES:

- To introduce the basic concepts of Audio and Video Systems.
- To study the characteristics of Microphones, loud Speakers.
- To learn the working principles of televisions.
- To understand the nature of various types of TV Cameras.
- To provide in depth knowledge about trouble shooting in Audio and Video equipments.

UNIT I: MICROPHONES

Characteristics of Microphones – Moving coil Microphone – Crystal Microphone – Carbon Microphone – Special Microphones.

UNIT II: LOUDSPEAKERS

Characteristics of Loudspeakers – Moving coil cone LS – Electrodynamic LS – Horn type LS – Multi-way Speaker System (Woofers and Tweeters)

UNIT III: TELEVISION

Introduction – TV Transmitter – TV Receiver – MAC Encoder – MAC Receiver – Digital TV system.

UNIT IV: TV CAMERA

Vidicon camera tube – Plumbicon camera tube – Colour cameras – Video Monitors – CCTV.

UNIT V: TROUBLESHOOTING IN AUDIO AND VIDEO EQUIPEMENT

General Troubleshooting Procedure – Testing of Power Supply unit – Identifying the Faulty Section (functional area approach) – Identifying the Faulty stage.

UNIT: VI (NOT FOR EXAMINATIONS)

1. Television Camera**: https://youtu.be/rYaZailFwA**
2. CCTV Camera: **https://youtu.be/2vKMaT5icmo**
3. LED and LCD: **https://youtu.be/mYrgbU2_nzY**

BOOKS FOR STUDY:

1. Audio and Video Systems principles, Maintenance and Troubleshooting by RG GUPTA Tata McGraw Hill Publishing Company limited, New Delhi(Unit: I,II&IV)
2. George Kennedy, Bernard Davis, S R M Prasanna, Electronic Communication system Tata McGraw- Hill Publishing Company Limited, New Delhi,2002 (Unit: III&IV)

BOOK FOR REFERENCE:

1. R.R. Gulati, Modern Television Practice (Fourth revised edition), New Age International Publishers, 2007. (Unit: VI)

COURSE OUTCOMES:

By the end of the course, the students will be able to

CO1: Understand the basic concepts of audio and video systems.

CO2: Understand the characteristics of sound

CO3: Acquire in depth knowledge about the Microphone and loud speakers.

CO4: Enable the students to understand the basic operation of for television.

CO5: Understand the operation of TV Cameras.

CO6: Learn trouble shooting in Audio and Video equipments.

MAPPING WITH PROGRAMME OUTCOMES

		PROGRAMME OUTCOMES					
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
COURSE OUTCOMES	**CO1**	✓	✓	✓	✓	✓	
	CO2	✓	✓	✓	✓	✓	✓
	CO3	✓	✓	✓	✓	✓	✓
	CO4	✓	✓	✓	✓		
	CO5	✓	✓	✓	✓	✓	✓
	CO6	✓	✓	✓	✓		

QUESTION PAPER PATTERN

Maximum Marks	**:** 75 **Exam Duration :** 3 hours
Part A	**:** 5× 15 = 75 Answer **ALL** Questions (Either or Type – Two Question from Each Unit)

CC XIII : WAVE MECHANICS AND NUCLEAR PHYSICS

SEMESTER VI   **CREDIT**   : 5
COURSE CODE: U21PHC613   **INS. HRS.**   : 6

OBJECTIVES:
- To understand the basic concepts of quantum mechanics.
- Acquire knowledge about Schrodinger time dependent and independent equations.
- To understand the basic building blocks of matter starts from elementary particles.
- To understand the structure of nucleus and its fundamental properties.

UNIT I: DUALITY
Dual nature-De Broglie waves-Wave packet, phase and group velocities-Davisson-Germer experiment-G.P. Thomson experiment – Gamma ray microscope-Uncertainly principle-Non-existence of electron inside the nucleus.

UNIT II: WAVE MECHANICS
Wave function for a free particle-Time independent and Time dependent Schrodinger equation-Physical significance of wave function-Operators-Eigen value and Eigen function-Postulates-Probability current density-Normalization of wave function-Expectation values-Applications of Schrodinger equation-Free particles-particle in one-dimensional box-One dimensional linear harmonic oscillator.

UNIT III: NUCLEAR PHYSICS
Basic properties of nuclei-Nuclear size, mass density, radius, charge and spin-Mass defect- Binding energy-Packing fraction-Magnetic moments of nucleus-Rutherford's scattering experiment-Radioactivity-Properties of α, β, ϒ rays Soddy Fregen's Law-Radioactive equilibrium-Laws of successive disintegration –Half-Life –Mean Life Cyclotron-Betatron-Linear accelerator-Geiger Muller Counter.

UNIT IV: NUCLEAR MODELS
Liquid drop model-Application to fission-Shell model-Magic numbers-Spin-Orbit coupling-Nuclear reactions-Types-Q-value of nuclear reaction-Nuclear energy –Nuclear fission-Atom bomb-Nuclear fusion-Thermonuclear reactions-Hydrogen bomb-Basic ideas of cold fusion.

UNIT V: ELEMENTARY PARTICLES
Classification of elementary particles-Particles and antiparticles-Leptons-Mesons-Baryons-Strange particles-Hyperons-Conservation laws-Fundamental interactions-Basic ideas of Quarks.

UNIT VI:(NOT FOR EXAMINATIONS)
Nuclear fission-Binding energy-Elementary particles-Cyclotron and Synchrotron (Particle Accelerator).
1. https://youtu.be/f1e/m1Vjftokdg
2. https://youtu.be/AUaOAeoPrtY
3. https://youtu.be/pdccXNuT3G4
4. https://youtu.be/rOXfm6EezeA

BOOKS FOR STUDY:
1. Modern Physics - R. Murugeshan, S.Chand & Co.
2. Nuclear Physics (Anukkaru iyarpiyal)- Sundaravelusamy.
3. Atomic and Nuclear Physics - Brijlal and Subramanyam, S.Chand & Co.
4. Nuclear Physics-D.C.Tayal, Himalaya Publisher house, 2nd edition, 201.

BOOKS FOR REFERENCE:
1. Concepts of Modern Physics, Arthur Beiser, McGraw Hill Education; 6 edition (17 July 2009)
2. Fundamentals of Modern Physics, Duggal and Chopra, 8th edition, Shobnlal Nagin Chand and Co., 1997.
3. Modern Physics J.B. Rajam, S. Chand; 3rd edition (1967)
4. Quantum mechanics, Bagde & Singh. S. Chand & Company Ltd. (2004)
5. S.B.Patel, Nuclear Physics, Wiley Eastern Publications, 1st edition, 1992.

COURSE OUTCOMES(COS):
By the end of the course, the students will be able to
CO1: understand wave particle duality.
CO2: Solve the time dependent and independent schrodinger equations
CO3: Acquire knowledge of the nuclear physics.
CO4: Understand the nuclear structure and radioactivity and its applications.
CO5: understand the concepts of fission and fusion process and the basic properties of the nuclear and fusion reactors.
CO6: Understand the nature of elementary particles and their fundamental interactions.

MAPPING WITH PROGRAMME OUTCOMES

		PROGRAMME OUTCOMES					
		PO1	**PO2**	**PO3**	**PO**	**PO5**	**PO6**
	CO1	✓	✓	✓	✓		✓
	CO2	✓	✓		✓		✓
COURSE OUTCOMES	**CO3**	✓	✓	✓	✓	✓	✓
	CO4	✓	✓	✓	✓	✓	✓
	CO5	✓	✓	✓	✓	✓	✓
	CO6	✓	✓	✓	✓	✓	✓

QUESTION PAPER PATTERN

Maximum Marks : 75   **Exam Duration** : 3 hours

Part A : 20×1=20 Answer **ALL** Questions (Multiple Choice Questions) Four questions from each unit

Part B : 5× 5 = 25 Answer **ALL** Questions (Either or Type – Two Question from Each Unit)

Part C : 3×10=30 Answer Any **Three** (One Question from each Unit)

CC XIV: SOLID STATE PHYSICS

SEMESTER VI   **CREDIT**   **: 5**
COURSE CODE: U21PHC614   **INS. HRS.**   **: 6**
OBJECTIVES:

- To expose the students to the basics of Solid State Physics.
- To understand the basics of crystal structure and their defects.
- To understand the basics of X-ray crystallography to determine the crystal structure.
- To expose the students towards the concept of superconductivity and its origin.

UNIT I: CRYSTAL STRUCTURE

Introduction – Periodic array of atoms – Crystal lattice – Unit cell _ Basis – Symmetry considerations – Classification of crystals – Bravais lattices in three dimensions – Crystal Planes and Miller indices – Single crystal Structure.

UNIT II: CRYSTAL DIFFRACTION

Bragg's law – Laue equations - Experimental X-ray diffraction methods _ Laue method – Rotating crystal method – Powder method – Neutron diffraction.

UNIT III: THERMAL PROPERTIES

Heat capacity – Classical theory – Einstein model – Debye model – Density of modes (3d) – Debye model – An harmonicity and thermal expansion of crystals – Principal coefficients – Gruneisen relation – Thermal conductivity.

UNIT IV: FREE ELECTRON THEORY OF METALS

Introduction – Free electron model – Free electron gas in 3-dimensions – Density of states – Thermal capacity of free electron system – Paramagnetism of free electrons – Sommerfeld theory of electrical conductivity – Thermal conductivity – Wiedemann Franz law – Hall effect – Failure of free electron theory.

UNIT V: SUPERCONDUCTORS

Effect of magnetic field – Meissner effect –Persistent current - Type of superconductors- Intermediate state – Entropy – Specific heat capacity - Thermal Conductivity – Penetration Depth – London equation's – AC and DC Josephson's effect – BCS theory (qualitative only).

UNIT VI :[NOT FOR EXAMINATIONS]

1. Thermal Expansion of Solid Bodies
   http://virtlabs.tech/apps/thermodynamics/09/labwork.html
2. Energy Band Gap Using Four Probe
   https://youtu.be/ZsN5addTRe8

BOOKS FOR STUDY:

1. R. Asokamani, Solid state physics, principles and applications, I edition (2006), Anamaya publishers
2. Solid State Physics Kakani, Hemarajani, Sultan Chand & Co.,
3. Solid State Physics, S. O . Pillai.
4. Solid State Physics, Gupta, Kumar and Sharma.

BOOKS FOR REFERENCE:

1. Solid State Physics, Dekker A.N. MacMillan
2. Solid State Physics Hall H. E, E.L.B.S Manchester Physics series
3. An Introduction to Solid State Physics (5th edition), Kittel. C.

COURSE OUTCOMES:

By the end of the course, the students will be able to

CO1: Understand the relationships between crystal structure and their defects.
CO2: Understand and utility of X-ray diffraction measurements in determining crystalline structures.
CO3: Examine the success and failure of free electron theory, the origin of band gap and Hall Effect.
CO4: Extend their knowledge to understand the nature of super conductivity.
CO5: Explore new areas of research in modern engineering materials and allied fields of science and technology.
CO6: Outline the importance of solid state physics in the modern society.

MAPPING WITH PROGRAMME OUTCOMES:

<table>
<tr><th rowspan="2">COURSE OUTCOMES</th><th colspan="6">PROGRAMME OUTCOMES</th></tr>
<tr><th>PO1</th><th>PO2</th><th>PO3</th><th>PO4</th><th>PO5</th><th>PO6</th></tr>
<tr><th>CO1</th><td>✓</td><td>✓</td><td>✓</td><td></td><td></td><td>✓</td></tr>
<tr><th>CO2</th><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td><td>✓</td></tr>
<tr><th>CO3</th><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td><td>✓</td></tr>
<tr><th>CO4</th><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td><td>✓</td></tr>
<tr><th>CO5</th><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><th>CO6</th><td>✓</td><td></td><td></td><td></td><td>✓</td><td>✓</td></tr>
</table>

QUESTION PAPER PATTERN

Maximum Marks   **: 75**   **Exam Duration**   **: 3** hours
Part A   **:** 20×1=20 Answer **ALL** Questions (Multiple Choice Questions) Four questions from each unit
Part B   **:** 5× 5 = 25 Answer **ALL** Questions (Either or Type – Two Question from Each Unit)
Part C   **:** 3×10=30 Answer Any **Three** (One Question from each Unit)

CC XV : MAJOR PRACTICAL –VI

SEMESTER VI   **CREDIT   : 4**
Internal: 40 External: 60   **INS. HRS.   : 6**
COURSE CODE: U21PHC615P

SECTION – A (Electronics)

OBJECTIVES:

- To understand the operation of basic logic gates, zener diode, and transistors.
- To understand the construction of basic electronic circuits.
- To understand the application of operational amplifier such as astable multivibrator, monostable multivibrator, etc.,
- To understand the architecture of microprocessor 8085 and its applications.
- To write the sources code in C for basic mathematical operations.

(Any 8 Experiments)

1. Series and Parallel resonant circuits.
2. Junction diode and Zener diode- Characteristics
3. Transistor characteristics in CE mode
4. Zener regulated Powers Supply – Percentage of regulation
5. Semiconductor diodes – Voltage Doubler and Tripler
6. Single Stage RC coupled amplifier – Transistor
7. Hartley oscillator –Transistor
8. Colpitt's oscillator –Transistor
9. Astablemultivibrator – Transistor
10. Monostablemultivibrator – Transistor
11. FET Characteristics
12. Logic gates – AND, OR and NOT Gates using discrete components – Verification of truth table
13. NAND, NOR gates using discrete components – Verification of truth table
14. Verification of De Morgan's theorem
15. Universal gates NAND/NOR and Basic gates from Universal Gates (ICs) – Verification of truth table
16. Half adder and Half subtractor

SECTION – B (Using 8085 Microprocessor)

(Any 2 Experiments)

17. 8-bit addition and 8-bit subtraction
18. 8-bit multiplication and 8-bit division
19. Conversion from Decimal to Hexadecimal system
20. Conversion from Hexadecimal to Decimal system
21.16-bit addition.Solving Quadratic Equations

SECTION – C (C PROGRAMMING)

(Any 2 Experiments)

22. Roots of Algebraic Equations –Newton Raphson method.
23. Finding the smallest/largest element in an array
24. Sorting a set of numbers in ascending/descending order.
25. Addition/Subtraction/Multiplication of two matrices

BOOKS FOR REFERENCE:

1. B.Sc. Physics Practical Manual, Dept. of Physics, SJC (A), Tricy.
2. C.C Ouseph, C.Rangarajan, R. Balakrishnan- A Text book of Practical Physics- S.Viswanathan Publisher-Part II (1996).
3. S.L Gupta and V.Kumar- Practical Physics- Pragati Prakashan- 25th Edition (20020).

COURSE OUTCOMES

By the end of the course, the students will be able to

CO1: Understand simple applications [addition, subtraction, multiplication, division etc.,] using 8085 microprocessor.
CO2: to code simple mathematical operation such as addition, subtraction, multiplication, division, etc.,in C.
CO3: Verify the truth tables of basic logic gates, universal gates and design circuits using universal gates such as NAND and NOR.
CO4: Design the basic electronic circuits and exploit them to create amplifier circuits, oscillator, and regulated power supplies etc.,
CO5: Construct regulated power supply using transistors and Zener diode and draws the regulation curve.
CO6: Design of electronic circuits to generate sinusoidal signals

MAPPING WITH PROGRAMME OUTCOMES

	PROGRAMME OUTCOMES					
COURSE OUTCOMES	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1	✓	✓	✓	✓		✓
CO2	✓	✓	✓	✓		✓
CO3	✓	✓		✓		✓
CO4	✓		✓	✓	✓	✓
CO5		✓	✓		✓	✓
CO6	✓			✓	✓	✓

MAJOR BASED ELECTIVE II: INTEGRATED ELECTRONICS

SEMESTER VI   **CREDIT   : 5**
COURSE CODE: U21PH6MBE2:1

                                                   INS. HRS.   : 6

OBJECTIVES:
- To introduce the concepts of different number systems and to give a description of logic gates and Boolean algebra.
- To give exposure to the fabrication of integrated circuits.
- To impart the basic knowledge of semiconductor memories and their working.
- To give a detailed description of combinational and sequential logic systems and their applications to microprocessors.
- To familiarize the architecture of 8085 and to develop programming skills.

UNIT I: BINARY LOGIC
Decimal, Binary, Octal, Hexadecimal number system and interconversion- Binary addition and subtraction—BCD code-Excess 3 code-Gray code- Laws of Boolean algebra-Demorgan's theorems-Logic gates-Universal gates- Minterms and maxterms – Karnugh map (upto four variables)-SOP only .

UNIT II: INTERGRATED CIRCUITS
Fabrication of basic monolithic integrated circuits using different steps – Integrated diode, transistor, registers and capacitors – Advantages and limitations of integrated circuits – SSI, MSI LSI – Basic ideas.

UNIT III: COMBINATIONAL AND SEQUENTIAL LOGIC
Half and full adder – Half and sub tractor – BCD to 7 segment Decoder – Decimal to BCD encoder – 4:1 Multiplexer – 1:4 Demultiplexer – RS flip Flop – Clocked RS flip flop – JK flip flop – Shift registers.

UNIT IV: SEMICONDUCTOR MEMORIES
Basics – ROM – PROM – EPROM –RAM – DRAMS – Memory addressing memory cells – CAM – CCD.

UNIT V: MICROPROCESSOR
Architecture of 8085 - Buses – Pin configuration – Microprocessor Programming – Machine language – Assembly language – Addressing modes – Instruction format – Types of instruction – Programming for 8-bit addition, 8-bit subtraction, Largest number in an array of 8bit unsigned numbers and Smallest number in an array of 8-bit unsigned numbers.

UNIT VI:(NOT FOR EXAMINATIONS)
Introduction to mobile processors-Memory card-Microprocessor based Traffic light controller- Micro wave oven - washing machine - toys. www.electronichub.org.

BOOKS FOR STUDY:
1. Digital Principles and Applications – Malvino & Leach, Tata McGraw Hill, New Delhi, (1991).
2. Modern Digital Electronics - R.P.Jain McGraw Hill Education; 4 edition (2009)
3. Integrated Electronics – Milmann & Hakias, McGraw Hill Education; 2 edition (2017)

4. Introduction to integrated electronics, Digital & Analog Electronics - V. Vijayendran, S.Viswnathan (Printers & Publishers) PVT., LTD. (2008).
5. Microprocessor architecture programming and application with 8085/8080- A Gaonkar, Penram International Publishing; 6th edition (2013)

BOOKS FOR REFERENCE:

1. Digital Electronics, W.H.Gothmann, Prentice Hall of India, Pvt. Ltd., New Delhi (1996).
2. Digital Electronics and Microcomputers, R.K.Gaur, Dhanpat Rai (Publishers), (1993).
3. Digital logic and Computer Design, Morris and Mano, Prentice Hall, New Delhi, (1999).

COURSE OUTCOMES:

At the end of the course, the students will be able to,

CO1: Understand various number systems and design logic circuits.
CO2: Acquire knowledge about fabrication of Integrated Circuits.
CO3: Design Combinational and sequential logic circuits independently.
CO4: Enhance their knowledge in Semiconductor memories.
CO5: Learn the architecture of microprocessor and its applications.

MAPPING WITH PROGRAMME OUTCOMES

		PROGRAMME OUTCOMES					
		PO$_1$	PO$_2$	PO$_3$	PO$_4$	PO$_5$	PO$_6$
COURSE OUTCOMES	**CO$_1$**	✓	✓	✓	✓	✓	✓
	CO$_2$	✓	✓	✓	✓	✓	✓
	CO$_3$	✓	✓	✓	✓	✓	✓
	CO$_4$	✓	✓	✓	✓	✓	✓
	CO$_5$	✓	✓	✓	✓	✓	✓

QUESTION PAPER PATTERN

Maximum Marks   : 75   **Exam Duration   :** 3 hours

Part A   **:** 20×1=20 Answer **ALL** Questions (Multiple   Choice Questions) Four questions from each unit

Part B   **:** 5× 5 = 25 Answer **ALL** Questions (Either or Type – Two Question from Each Unit)

Part C   **:** 3×10=30 Answer Any **Three** (One Question from each Unit)

MAJOR BASED ELECTIVE COURSE II - ELECTRONIC COMMUNICATION

SEMESTER VI   **CREDIT   : 5**

COURSE CODE: U21PH6MBE2:2

                                                   INS. HRS   : 6

OBJECTIVE

- To understand the key modules of digital communication systems with emphasis on digital modulation techniques.

UNIT - I: Modulation

Definition - types of modulation AM, FM, PM – expression for amplitude modulated voltage - wave form of amplitude modulated wave - collector modulation circuit - AM transmitter - block diagram and explanation- frequency modulation - expression for frequency modulated voltage -side bands in FM, AM production by transistor modulator -comparison of AM, FM, PM.

UNIT - II: Demodulation

Definition - diode detection of AM signals – FM detection - Foster Seely discriminator - radio receivers – straight receivers - TRF receivers - super heterodyne receivers - block diagram- explanation of each stage - FM receivers – block diagram.

UNIT - III: Television

Plumbicon - vidicon - scanning and interlaced scanning – block diagram of TV transmitter and receiver - colour TV - generation R, G,B signals - simplified block diagram of colour TV transmitter and receiver – TV transmitting antennas - dipole panel - TV receiving antenna - Yagi antenna.

UNIT - IV: RADAR and Satellites

Principle of radar - Radar equation - radar – transmitting systems - radar antennas - duplexer - radar receivers uses of radar – introduction to Satellite communication system –Basic components – Telemetry – and command system (Block diagram) – Satellite links

UNIT - V: Digital communication

Digital technology - fundamentals of data communication systems - characteristics of data transmission circuits– digital codes - error detection and correction - data sets and interconnection - requirements - modern classification – modern interfacing

BOOKS FOR STUDY:

1. Gupta & Kumar, Hand book of Electronics, Pragati Prakhasan, Meerut (2012)

2. Kennedy and Davis , Electronics Communication Systems, TMH

BOOKS FOR REFERENCE:

1. Dennis Roddy and John Coolen, Electronics Communications, Pearson Education Publication (1995)

2. Louis E. Frenzel, Principles of Electronic Communication Systems, McGraw-Hill Education

COURSE OUTCOMES: At the end of the course, the students will be able to,

CO1: Apply the knowledge of statistical theory of communication and explain the conventional communication system.

CO2: Apply the knowledge of signals and system and evaluate the performance of communiunication system in the presence of noise.

CO3: Apply the knowledge of electronics and describe the error control codes like block code, cyclic code.

CO4: Describe and analyze the communication system with spread spectrum modulation.

CO5: Design as well as conduct experiments, analyze and interpret the results to provide valid conclusions..

MAPPING WITH PROGRAMME OUTCOMES

	PROGRAMME OUTCOMES					
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	✓	✓	✓	✓		✓
CO 2	✓	✓		✓	✓	✓
CO 3		✓	✓		✓	
CO 4		✓	✓	✓		
CO 5	✓	✓	✓	✓	✓	✓

QUESTION PAPER PATTERN

Maximum Marks   : 75   Exam Duration: 3 hours

Part A   **:** 20×1=20 Answer **ALL** Questions (Multiple   Choice Questions) Four questions from each unit

Part B   **:** 5× 5 = 25 Answer **ALL** Questions (Either or Type – Two Question from Each Unit)

Part C   **:** 3×10=30 Answer Any **Three** (One Question from each Unit)

MAJOR BASED ELECTIVE II - OPTO ELECTRONICS AND FIBER OPTICS

SEMESTER VI	**CREDIT : 5**
COURSE CODE: U21PH6MBE2:3	
	INS. HRS. : 6

OBJECTIVE

- To get the concept and basics of optoelectronics, photonics and fibre optics.

Unit - I: Interaction of Light with Matter

 Introduction – Absorption – optical absorption in metals, dielectrics and semiconductors – Reflection – trap – excitons - color centies – Generation of colour centers – Luminescence – Photoluminescence.

Unit - II: Opto electronics

Materials Construction of LED - Advantages of LEDs in electronic display - LCD – Characteristics of LCD materials – Action of LCD display device – Photo detectors - Detector performance parameters – Photo conductive materials – Photo diode – LDR, Phototransistors.

Unit - III: Electro optic modulators

Electro optic modulators and switches-scanners-directional couplers-spatial light modulators-electro optics of liquid crystals-wave retarders and modulators-spatial light modulators.

UNIT - IV: Fiber optic Communication

Introduction – Principles of light transmission in a fiber - - Fiber index profiles – Modes of propagation – Losses in fibers – Light sources – Laser diode – Light detector – Avalanche photo diode – Fiber optic communication link (-Block diagram) Advantages of fiber optics communication.

Unit - V: Optical Data Storage Surface

 Storage Phase change recording – Magneto optical data storage - Hi- tech evolved in system development – Automatic focussing – Automatic track following capacity of CD – advantages of CD – holographic storage.

BOOK FOR STUDY:

1. Palanisamy P.K.Semiconductor Physics and Opto electronics, Ed II Scitech Publications. (2003).

BOOK FOR REFERENCE:

1. Palanisamy P.K. Material Science Ed II Scitech (2003).

COURSE OUTCOMES

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

CO1: Explain the basic concepts of optical transmitting and receiving .

CO2: Describe different opto- electronic devices.

CO3: Elucidate different methods of photonics.

CO4: Describe selection of the appropriate optical fiber sensors for industrial application.

CO5: Understand the application of fiber optics in communication system.

MAPPING WITH PROGRAMME OUTCOMES

	PROGRAMME OUTCOMES					
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**
CO 1	✓	✓	✓			✓
CO 2				✓	✓	
CO 3	✓	✓	✓		✓	✓
CO 4		✓	✓	✓		
CO 5	✓		✓	✓	✓	✓

QUESTION PAPER PATTERN

Maximum Marks	**:** 75 **Exam Duration** : 3 hours
Part A	**:** 20×1=20 Answer **ALL** Questions (Multiple Choice Questions) Four questions from each unit
Part B	**:** 5× 5 = 25 Answer **ALL** Questions (Either or Type – Two Question from Each Unit)
Part C	**:** 3×10=30 Answer Any **Three** (One Question from each Unit)

MAJOR BASED ELECTIVE III
COMPUTER PROGRAMMING – 'C' LANGUAGE

SEMESTER VI		CREDIT	: 5
COURSE CODE: U21PH6MBE3:1		INS. HRS.	: 5

OBJECTIVES:
- To understand the basic concepts of C Programming.
- To understand the library functions and control statements.
- To study the Arrays and string functions.
- To understand the basics of pointers.
- Write down the source codes in C for solving mathematical problems.

UNIT I: DATA TYPES, OPERATORS AND EXPRESSIONS
History of C – Importance of C – Basic structure of C Programs – Programming style – Executing a 'C; program – Character set – Keywords and identifiers – Constants – Variables – Data types – Declaration of variables – Assigning values to variables. Operators – Classification – Arithmetic expression and its evaluation – Precedence and Associativity of operators.

UNIT II : I/O , CONTROL STATEMENTS AND ARRAYS
Library functions- gets, puts, getchar, putchar functions – Formatted input (scanf) and Formatted output(printf)-Decision making with if-simple if-if …else-nested if …else .The Else if ladder-switch-goto-break-continue-while-do ….while-for statements.
Arrays-One dimensional arrays – Declaration of one dimensional arrays- Initialization of one dimensional arrays – Two dimensional arrays – Declaration of two dimensional arrays- Initialization of Two dimensional arrays- Multidimensional arrays – Character strings – Initialization-String handling function.

UNIT III: FUNCTION AND STRUCTURE
Function-Function definition-Return statement-Function call-Function declaration-Types of functions-Local and Global variables-Recursion-Storage class- Character Strings-Initialization-String Handling function. Structures-Declaring structure variables-Accessing structure member – structure initialization.

UNIT IV: POINTERS, FILES AND PREPROCESSORS
Pointers- The address operator (&)- The indirection operator(*)-Initialization of pointer variables- Pointer arithmetic- Pointers and functions-Pointers as function arguments-Pointers and arrays – Pointer to pointers.
Files in C-File declaration – Opening and closing a file- Accessing a file – Character, Integer and String oriented I/O functions- Formatted and Unformatted I/O functions-Error handling during I/O operations- Random access files – Functions used with Random Files.

UNIT V: PROGRAMS
Development of algorithm, flowchart and program for the following problems:
1. Solving Quadratic Equations
2. Roots of Algebraic Equations –Newton Raphson method.
3. Finding the smallest/largest element in an array
4. Sorting a set of numbers in ascending/descending order.
5. Addition/Subtraction/Multiplication of two matrices

UNIT VI: (NOT FOR EXAMINATIOS)
Introduction to C-pointers-functions.
https://youtu.be/iT_553vTyzl
https://youtu.be/pzdnFwwYjt8
https://youtu.be/CPG3oATGls
https://youtu.be/ZN3MrwUxPA

BOOKS FOR STUDY:
1. Programming in ANSI C - E. Balagurusamy. Tata McGraw Hill, New Delhi,(1999).
2. Schaum's outline series theory and problems of progeamming with C- Byron S.Gottrified. McGraw Hill Internationals, (1996).
3. Programming with C - Venugopal K.P & Sudep R.P., Tata McGraw Hill, New Delhi,(1998).
4. Programming in C – Siymala Krishanan.

BOOK FOR REFERENCE:
1. Pointers in C - Yashavant P. Kanetkar, BPB Publications

COURSE OUTCOMES (COS):
At the end of the course, the students will be able to
CO1: Understand the basic ideas of C programming.
CO2: Gain knowledge about library functions and arrays.
CO3: Understand the function, structures and concept of files.
CO4: To code mathematical problems in C.
CO5: To write the source code in C for unknown problems

MAPPING WITH PROGRAMME OUTCOMES

COURSE OUTCOMES		PROGRAMME OUTCOMES					
		PO1	PO2	PO3	PO	PO5	PO6
	CO1		✓	✓	✓		
	CO2	✓	✓	✓			✓
	CO3	✓	✓	✓	✓	✓	✓
	CO4	✓	✓	✓	✓	✓	✓
	CO5	✓	✓	✓	✓	✓	✓

QUESTION PAPER PATTERN

Maximum Marks : 75	**Exam Duration :** 3 hours

Part A : 20×1=20 Answer **ALL** Questions (Multiple Choice Questions) Four questions from each unit
Part B : 5× 5 = 25 Answer **ALL** Questions (Either or Type – Two Question from Each Unit)
Part C : 3×10=30 Answer Any **Three** (One Question from each Unit)

MAJOR BASED ELECTIVE III - C++ PROGRAMMING

SEMESTER VI	**CREDIT**	**: 5**
COURSE CODE: U21PH6MBE3:2	**INS. HRS.**	**: 5**

OBJECTIVES:

- To understand how C++ improves C with object-oriented features.
- To learn how to write inline functions for efficiency and performance.
- To learn how to design C++ classes for code reuse.
- To learn how to implement copy constructors and class member functions.
- To understand the concept of data abstraction and encapsulation.

Unit - I: An overview of C++

C++ console I/O - Differences between C and C++ classes – Constructor and Destructor function – inline function – automatic inlining.

Unit - II: Assigning object

Passing objects to functions – returning object from function – an introduction to friend function – arrays of objects – using pointers to objects – this pointer – new and delete – references – passing references to objects – returning references.

Unit - III: Overloading constructor function

Copy constructor – default argument – basis of operator overloading – overloading Binary operator – Overloading unary operator – using friend operator function.

Unit - IV: Inheritance

Base class access control – constructors, destructors and inheritance – multiple inheritance – virtual base classes.

Unit - V: File I/O basics

Unformatted binary I/O – random access – introduction to virtual functions – Exception Handling.

BOOKS FOR STUDY:

1. Herbert Schildt, "Teach Yourself C++", Third edition, Tata Mcgraw Hill, 2000.

2. E.Balagurusamy, "Object Oriented Programming with C++", Tata Mcgraw Hill Publishing Ltd., New Delhi, 2002.

3. Robert Lafore, "Object Oriented Programming in C++", - Galgotia, 1194

BOOKS FOR REFERENCE:

1. Yeswant Kanetkar, "Let us C++", BPB Publications, 1999.

2. John R.Hubbard, "Programming with C++", Schaum's Outline Series, 1996.

COURSE OUTCOMES

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

CO1: Choose appropriate data structures to represent data items in real world problems.

CO2: Analyze the time and space complexities .

CO3: Design programs using a variety of data structures such as stacks, queues, hash tables, binary trees, search trees, heaps, graphs, and B-trees.

CO4: Analyze and implement various kinds of searching and sorting techniques.

CO5: Develop the programs for unknown problems.

MAPPING WITH PROGRAMME OUTCOMES

			PROGRAMME OUTCOMES			
COURSE OUTCOMES	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**
CO 1	✓	✓	✓	✓		✓
CO 2				✓	✓	
CO 3	✓	✓	✓		✓	✓
CO 4	✓	✓	✓	✓		
CO 5	✓		✓	✓	✓	✓

QUESTION PAPER PATTERN

Maximum Marks	**:** 75 **Exam Duration** : 3 hours
Part A	**:** 20×1=20 Answer **ALL** Questions (Multiple Choice Questions) Four questions from each unit
Part B	**:** 5× 5 = 25 Answer **ALL** Questions (Either or Type – Two Question from Each Unit)
Part C	**:** 3×10=30 Answer Any **Three** (One Question from each Unit)

MAJOR BASED ELECTIVE III - NETWORKING IN COMPUTER

SEMESTER VI		**CREDIT**	**: 5**
COURSE CODE: U21PH6MBE3:3		**INS. HRS.**	**: 5**

Objectives:

- The students will learn : a. provides a general introduction to computer networking that would be useful to all personnel who deal with distributed systems,
- Encompassing both technical and managerial aspects.
- To help students better understand the challenges and opportunities faced by modern business.

UNIT-I Network structure :
Point to Point, Broadcast, Multicast - Horizontal and vertical distribution - Star, Mesh, tree, bus structures Functions of layers - Packet switches, circuit switching and message switching.

UNIT- II Transmission media:
Channel allocation methods - ALOHA, SALOHA, FINITE ALOHA - LAN Protocols

UNIT-III Data link layer:
Framing - Error detection - Error correction - CRC - Stop and wait - Go band N - Sliding window Protocol - Selective repeat.

UNIT-IV Network layer:
Routing algorithms and congestion control algorithms - Repeaters, Bridges, Routers and Gateways, Internetworking.

UNIT-V: Presentation layer:
Coding, compression and cryptography - Introduction to Application layer - High performance networks - ATM, Fast Ethernet.

BOOKS FOR STUDY :

1. Computer Networks - Andrew S. Tanenbaum, Pearson Education, 2005.

2. Data and Computer Communication - W. Stallings, Pearson Education, 2006.

BOOKS FOR REFERENCE:

1. Introduction to Data Communications and Networking - Behrouz & Forouzan, 4/e, McGraw Hill Book Company, 2004.

2. Telecommunication Networks - Protocols Modeling and Analysis - Misha Stewartz, 2/e, Pearson Education, 2002.

COURSE OUTCOMES:
    By the end of the Course, the students will be able to

CO1: Application of these circuits to create amplifiers, regulators, power supplies.
CO2: Calibrate given low range and high range voltmeter and ammeter.
CO3: To measure the and specific resistance of the coil wire for designing electrical circuits
CO4: Basic laws and theories involving diodes, transistors etc.,
CO5: Understand the given concepts and its physical significance.
CO6: Apply the theory to design basic electrical and electronic circuits.

MAPPING WITH PROGRAMME OUTCOMES

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		PROGRAMME OUTCOMES					
		PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**
COURSE OUTCOMES	**CO 1**	✓	✓	✓	✓		✓
	CO 2				✓	✓	
	CO 3	✓	✓	✓		✓	✓
	CO 4	✓	✓	✓	✓		
	CO 5	✓		✓	✓	✓	✓

QUESTION PAPER PATTERN

Maximum Marks	**: 75**	**Exam Duration**	**: 3**
hours			
Part A	**: 20×1=20** Answer **ALL** Questions (Multiple Choice Questions) Four questions from each unit		
Part B	**: 5× 5 = 25** Answer **ALL** Questions (Either or Type – Two Question from Each Unit)		
Part C	**: 3×10=30** Answer Any **Three** (One Question from each Unit)		