DEPARTMENT OF PHYSICS

H.H.THE RAJAH'S COLLEGE(AUTO)

PUDUKKOTTAI – 622 001

COURSE STRUCTURE

AND

SYLLABI

FOR UG PROGRAMME

CHOICE BASED CREDIT SYSTEM

(2018 – 2019 ONWARDS)

H.H. THE RAJAH'S COLLEGE (AUTONOMOUS), PUDUKKOTTAI

B. Sc. Physics   Programme Pattern – CBCS 2018 - 2019 Onwards

Sl. No.	Sem	Paper	Hrs /week	Credit	Exam hrs.	Marks		
						Internal	External	Total
1	I	Part-I – Tamil- I/ Hindi – I	6	3	3	25	75	100
2	I	Part-II – English – I	6	3	3	25	75	100
3	I	Major Paper – I –Gravitation, Properties of Matter and Sound	6	6	3	25	75	100
	I	Major Paper – II (Practical-I)*	3					
4	I	Allied Paper – I – Mathematics – I	5	5	3	25	75	100
5	I	Environmental Science	2	2	3	25	75	100
	I	Soft Skill – I * -	2					
6	II	Part-I – Tamil-II/ Hindi – II	6	3	3	25	75	100
7	II	Part-II – English – II	6	3	3	25	75	100
8	II	Major Paper – II (Practical-I)*	3	3	3	40	60	100
9	II	Major Paper – III – Mechanics and Relativity	6	5	3	25	75	100
10	II	Allied Paper – II – Mathematics – II	5	5	3	25	75	100
11	II	Value Education	2	2	3	25	75	100
12	II	Soft Skill – I * -	2	4	3	25	75	100
13	III	Part-I – Tamil- III/ Hindi – III	6	3	3	25	75	100
14	III	Part-II – English – III	6	3	3	25	75	100

15	III	Major Paper – IV – Thermal and Statistical Physics	5	5	3	25	75	100
	III	Major Paper – V(Practical-II)*	3					
	III	Allied Paper – III* - Chemistry	3					
	III	Allied Paper – IV(Chemistry Practical)*	3					
16	III	Non-Major Elective – I - Chemistry in everyday life	4	2	3	25	75	100
17	IV	Part-I – Tamil- IV/ Hindi – IV	6	3	3	25	75	100
18	IV	Part-II – English – IV	6	3	3	25	75	100
19	IV	Major Paper – V(Practical-II)*	3	3	3	40	60	100
20	IV	Major Paper – VI – Optics and Spectroscopy	5	5	3	25	75	100
21	IV	Allied Paper – III* - Chemistry	3	5	3	25	75	100
22	IV	Allied Paper – IV(Chemistry Practical)*	3	5	3	40	60	100
23	IV	Soft Skill –II -	2	4	3	25	75	100
24	V	Major Paper – VII – Electricity, Magnetism and Electromagnetism	4	4	3	25	75	100
25	V	Major Paper – VIII – Atomic Physics	4	4	3	25	75	100
26	V	Major Paper –IX – Basic Electronics	5	5	3	25	75	100
	V	Major Paper – X(Practical-III)*	3					
	V	Major Paper – XI(Practical-IV)*	3					
27	V	Elective Paper – I – Laser Physics and Fibre optics	5	5	3	25	75	100
28	V	Non-Major Elective – II – Astronomy	2	2	3	25	75	100
29	V	Soft Skill – III –	4	4	3	25	75	100
30	V	Major Paper – X(Practical-III)*	3	3	3	40	60	100

31	V	Major Paper – XI(Practical-IV)*	3	3	3	40	60	100
32	VI	Major Paper – XII – Solid State Physics	5	5	3	25	75	100
33	VI	Major Paper – XIII – Digital Electronics and Micro Procesor	5	5	3	25	75	100
34	VI	Major Paper – XIV – Wave Mechanics and Nuclear Physics	4	4	3	25	75	100
35	VI	Elective Paper – II – Computational Physics	5	5	3	25	75	100
36	VI	Elective Paper – III – Communication Systems	4	4	3	25	75	100
37	VI	Gender Studies	1	1	3	25	75	100
		Extension Activities		1				
			178	140				3700

* Exams will be held at the end of even semester

B. Sc. Physics 2018 - 2019 Onwards

Program Educational Objectives(PEOs)	
On obtaining an undergraduate degree the students will be able to,	
PEO1	have strong foundation in basic sciences,mathematics and computational platforms.
PEO2	acquire professional and ethical attitude,develop communicative skills,teamwork spirit,multidisciplinary approach and an ability to relate and solve scientific/technical issues.
PEO3	enter into higher studies leading to post-graduate and research degrees.
PEO4	apply and advance the knowledge and skills acquired to become a competent professional in their chosen field.
PEO5	serve the society with scientific advancement and to actively take part in building knowledge- based society
PEO6	Comprehence ,analyze,design and create novel products and solutions for the real life problems through good scientific and technical knowledge.
PEO7	become and enterepreneur who can make and sell scientific products in the market.
PEO8	engross in life-long learning to keep themselves abreast of new developments and to face to global challenges.

Program Specific Outcomes(PSOs)	
After the successful completion B.Sc.,Physics program,the students are expected to,	
PSO1	realize the role of physics in day to day life.
PSO2	communicate explicitly and exchange ideas with regard to the impacts of various components of physics on environment and society
PSO3	expertise in various domains of physics.
PSO4	Design and develop the skills towards the futuristic needs of the industry/society utilizing both theoretical and practical knowledge acquired in basic physics
PSO5	Identify and access the diverse applications of physics using mathematical concepts enriching towards career opportunities.

Program Outcomes (Pos)	
On successful completion of the B.Sc Physics program,the students will be able to,	
PO1	understand the basic concepts and significance of various physical phenomena.
PO2	transforms ideas into action i.e lab to land.
PO3	acquire a wide range problem solving skills,both analytical and computational and to apply them.
PO4	develop an independent and self-disciplined specialized learning in tune with the changing socio-technological scenario.
PO5	get motivated to pursue higher education and research activities in physics to find professional level employment get motivated to pursue higher education and research activities in physics to find professional level employment.
PO6	identify,analyze and formulate novel ideas to yields, substantial results in the fields of research utilizing the principle of physics.
PO7	Develop creative thinking and innovative tools.

CC01 : GRAVITATION, PROPERTIES OF MATTER AND SOUND

SUB.CODE: 18UPH1

Course Objectives:

The main objectives of this course are to,
1.to study the basic principles of gravitation.
2.to understand the elastic properties and modulus of the materials.
3.to learn the basic concepts of viscosity.
4.to gain knowledge about surface tension and Osmosis.
5/to analyze the properties of Sound and ultrasonics.

UNIT I GRAVITATION

Newton's law of gravitation – Determination of G by Boy's method –– Gravitational field – Gravitational potential at a point due to a body of   mass m –– Gravitational potential and field at a point outside and inside a solid sphere– Acceleration due to gravity, value of g at the poles and at the equator – Variation of g with altitude, Depth and rotation of the earth.

UNIT – II : ELASTICITY

Moduli of elasticity – Relation between them – Poisson's ratio – Bending of beams – Uniform and non uniform bending – Cantilever depression and oscillation – Koenig's method

Torsion – Couple per unit twist of solid and hollow cylinders – Work done in twisting a wire – Torsion pendulum – Searle's method of finding elastic constants of a short wire.

UNIT - III: VISCOSITY

Viscosity – Streamline and turbulent flow – coefficient of viscosity – Reynolds's number and its significance - variation of viscosity with temperature and pressure – Difference between friction and lubrication coefficient of viscosity of highly viscous liquid by Searle's viscometer – Meyer's modification of Poiseuille's formula – Rankine's method.

UNIT IV : SURFACE TENSION AND OSMOSIS

Surface tension- Excess of pressure inside spherical and cylindrical drops and bubbles -– Jaeger's method – Angle of contact – Variation of surface tension with temperature- Surface tension and interfacial surface tension by method of drops- Quinke's method for mercury(with and without angle of contact).

Osmosis – Laws of Osmotic pressure – Experimental determination of Osmotic pressure – Osmosis and vapour pressure of a solution

.UNIT –V : SOUND

Intensity of sound – Decibel – Intensity level Phon – Laws of transverse vibrations – Melde's string method – Acoustics of buildings – Sabine's formula – Doppler effect – Derivation for change in frequency – Lissajous figures – Uses – Ultrasonics – Properties - Production by Piezoelectric and Magnetostriction methods – Applications.

Expected Course outcomes:

After completion of this course students will be able to

1.analyze the principles behind the gravitational forces and its variation at different places.
2.explore the basic concepts of elastic properties of materials and importance of elasticity in beams.
3.the viscous properties of fluids provides knowledge in industrial product development.
4.explain the different molecular forces existing in liquids.
5.acquire the idea of applications of ultrasonic waves in diverse fields.

Books for study:

1. D.S. Mathur- Properties of Matter,S.Chand&Co,Delhi-2004
2. R.Murugesan- Properties of matter, S.Chand&Co, Delhi-2004
3. RL.Saihgal,S.Chand&Co-1998
4. Brijal&Subramanyam- Properties of matter,S.Chand&Co-2004
5. C.L. Arora- Waves and oscillations,S.Chand&Co- 2002
6. Brijal & Subramanyam , Text Book of Sound

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc   .
1.https://www.physicstutoronline.co.uk/alevelphysicsnotes/
2 https://latestcontents.com/bsc-physics-mechanics-notes/
3.www.khanacademy.org/science/physics/elasticity/surface tension
4.https://sites.google.com/brown.edu/lecture-demonstrations/home?authuser=0
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Mapping with programme outcomes 18UPH1							
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
CO1	9	9	6	9	6	9	9
CO2	9	9	9	6	9	9	3
CO3	9	9	9	3	9	3	9
CO4	9	9	3	9	6	9	9
CO5	9	9	9	9	9	9	6
Total	45	45	36	36	39	39	36
Weightage	**4.17**	**4.17**	**4.00**	**4.03**	**4.26**	**4.45**	**4.36**

 *S-Strong(9); M-Medium(6); L-Low(3).

CC02 : MAJOR PRACTICAL – I

SUB.CODE: 18UPH2P

Course Objectives:
The main objectives of this course are to
1.develop the experimental skills in Mechanics and Properties of matter
2.gain knowledge about the experiments based on Electricity and Magnetism
3.motivate the students to apply the experimental techniques in Optics
4.develop the experimental techniques in Sound
5.motivate the students to apply the experimental techniques in Transmission of   heat.

LIST OF EXPERIMENTS
Any 15 Experiments

1.Determination of g and k using compound pendulum
2.Determination of Young's modulus by nonuniform bending(pin and microscope)
3.Determination of Young's modulus by uniform bending(scale and telescope)
4.Determination of Rigidity modulus by static torsion apparatus
5.Determination of surface tension and interfacial surface tension by drop weight method
6.Verification of laws of transverse vibrations in a stretched string using sonometer.
7.Determination of frequency of the vibrator by Melde's string apparatus
8.Determination of viscosity by graduated burrette method
9.Determination of specific heat capacity of liquid by Newton's cooling method
10.Determination of thermal conductivity of a bad conductor by Lee's disc method
12.Determination of focal length of a long focus convex lens by auxiliary lens method
13.Determination of focal length of a concave lens by auxiliary lens method
14.Determination of temperature coefficient of resistance using Post Office box
15.Determination of internal resistance of a cell using potentiometer
16.Determination of refractive index of the material of the prism by spectrometer
17.Study of V-I characteristics of a junction diode and zener diode.
18.Determination of thickness of a wire by forming Air wedge

Expected Course outcomes:
After completion of this course students will be able to,
1.analyze the concepts of Viscosity,Surface tension,Youngs modulus of different substances
2.realize principles and applications of spectrometer and other optical instruments
3.realize principles and applications of Potentiometer,Sonameter,Magnetometer
4.acquire the knowledge of the characteristics of an PN junction diode and Zener diode
5.realize principles and applications of Transmission of heat

Reference Books
1 A text book of practical Physics, M.N.Srinivasan, S.Balasubramanian, R.Ranganathan, Sultan Chand&Sons(2017)
2 Practical Physics and Electronics, C.C.Ouseph, U.J.Rao, V.Vijayendran, S.Viswanathan Publishers(2007)
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]
1 https://nptel.ac.in/course.html/physics/experimental physics I, II and III
2 https://nptel.ac.in/courses/115/105/115105110/
3 https://www.youtube.com/playlist?list=PLuiPz6iU5SQ8-rZn_LgLofRX7n8z4tHYK

Mapping with programme outcomes 18UPH2P							
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	6	9	6	9
CO2	9	9	9	9	9	9	3
CO3	9	9	6	9	6	3	9
CO4	9	9	9	9	9	9	9
CO5	9	9	6	3	9	9	6
Total	45	45	39	36	42	36	36
Weightage	4.17	4.17	4.33	4.03	4.59	4.11	4.36

*S-Strong(9); M-Medium(6); L-Low(3).

CC03 : MECHANICS AND RELATIVITY

Course Objectives: **SUB.CODE: 18UPH3**

The main objectives of this course are:
1.To have a knowledge in the field of statics.
2.To improve the knowledge about impulsive force and impact of interacting bodies.
3.To learn the basics of moment of inertia and centre of mass.
4 To understand the concepts of hydrostatics and hydrodynamics.
5.To learn the basic principles of classical mechanics.

UNIT - I : STATICS

Centre of gravity: Center of Gravity of a solid hemisphere, hollow hemisphere, tetrahedron and solid cone – Friction: Laws of friction – Coefficient of friction –Angle of friction- Cone of friction – Equilibrium of a body on a rough inclined plane – Applications of friction: friction clutch.

UNIT - II PROJECTILE, IMPULSE AND IMPACT

Projectile – Path of a projectile –Range on an inclined plane – Impulse –Impact – Impulsive force –Laws of impact – Impact of a smooth sphere on a horizontal plane-Direct and Oblique impact between two smooth spheres -Loss of Kinetic energy – Motion of two interacting bodies –Reduced mass.

UNIT - III DYNAMICS OF RIGID BODIES

Moment of Inertia – Angular momentum – Torque – Conservation of linear and angular momentum –Kinetic energy of rotating body –Theory of Compound Pendulum – Determination of g and k – Centre of Mass –Velocity and acceleration centre of mass.

UNIT - IV HYDROSTATICS AND HYDRODYNAMICS

Centre of Pressure – Centre of Pressure of a rectangular lamina and triangular lamina – Atmospheric Pressure – Variation of atmospheric pressure with altitude height of homogeneous atmosphere –Equation of Continuity – Energy of liquid in motion – Euler's equation – Bernoulli's theorem – Pitot tube –Venturimeter.

UNIT- V : LAGRANGIAN MECHANICS AND RELATIVITY

Mechanics of a system of particles – Constraints – Generalized co-ordinates – Principle of virtual work – D'Alembert's principle – Lagrange's equation from D'Alembert's principle – Application to Simple pendulum – Atwood's machine.

Special Theory of Relativity – Inertial frames – Galilean and Lorentz transformations – Length contraction and time dilation – Addition of Velocities – Mass energy equivalence.

Course outcomes:

After completion of this course students will be able to,
1.know the concepts of gravity, friction and its applications.
2.apply the knowledge of impulse and collisions in day to day life.
3.find out the usage of rigid body dynamics in terms of moment of inertia,
momentum and energy in several of types of bodies.
4.understand the concept of hydrostatics and hydrodynamics in day to day applications such
as pumps and hydraulic press.
5.explore the understanding of mechanics and theory of relativity in various fields.

Books for study:
Narayanamoorthy –Mechanics Part I and II, National Publishing Company
D.S. Mathur – Mechanics II Edition, S.Chand and Co,- 2001.
R.Murugeshan Mechanics and Mathematical Methods, S.Chand and Co,- 2002.
R.Murugeshan, Modern Physics, S. Chand & Co
.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]
1 Static and dynamic measurement https://youtu.be/DFdTRPUwK_I
2 Pressure measurement https://youtu.be/sHmjE21Fp9w
3.. https://youtu.be/As5kzxkyT24 4 NPTEL
.4.https://www.youtube.com/watch?v=3eYmFjHnQjY&list=PLbRMhDVUMngcoKrA4sHzvbN
5.https: //www.askiitians.com/revision-notes/physics/special-theory-of-relativity

Mapping with programme outcomes 18UPH3							
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
CO1	9	9	9	9	3	9	3
CO2	9	9	3	6	9	9	9
CO3	9	9	9	9	9	6	6
CO4	9	9	9	9	9	9	9
CO5	9	9	6	9	6	9	6
Total	45	45	36	42	36	42	33
Weightage	**4.17**	**4.17**	**4.00**	**4.70**	**3.93**	**4.79**	**4.00**

*S-Strong(9); M-Medium(6); L-Low(3).

CC04:THERMAL AND STATISTICAL PHYSICS

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SUB.CODE: 18UPH4

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Course Objectives:
The main objectives of this course are to,
1. explain basic thermodynamic properties and units.
2. explain various types of transmission of heat and the measurement of various constants related to it tools for the arrangement of microscopic particles.
3. teaches first and second laws of thermodynamics, perfect gas law, properties of real gases, and the   energy equation for closed and open systems.
4. know the concept of entropy and Maxwell's thermodynamic equations.
5. know the different forms of distribution of sub atomic particles in the system using statistical methods.

UNIT - I SPECIFIC HEAT

Specific heat capacity of solid and liquids – Dulong and Pettit's law – Variation of specific heat and atomic heat with temperature – Newton's laws of cooling – Specific heat capacity of liquids by cooling –Two specific heat capacity of gases –Mayer's relation –Determination of specific heat at constant volume by Joly's method and specific heat capacity at constant pressure by Reynold's method.

UNIT - II TRANSMISSION OF HEAT

Stefan's law - Coefficient of thermal conductivity –Rectilinear flow of heat along a bar – Forbe's method to find K –Lee's method for bad conductors –Thermal conductivity of glass – Heat flow through a compound wall –Statement and derivation of Stefan's law – Determination of Stefan's constant (Laboratory method) –Distribution of energy in the spectrum of a black body –Derivation of Planck's law

UNIT - III   NATURE OF HEAT AND THERMODYNAMICS

Intermolecular force of attraction – Porous plug –Theory and experiment – Joule –Kelvin effect –Temperature of inversion –Zeroth law of thermodynamics – Heat and work – a path function – First law thermodynamics for change in the state of a closed system – Specific heat capacity of gas – Derivation of adiabatic gas equation – Derivation for efficiency of a Carnot's engine in terms of temperature – Clausius inequality – Entropy and Second law – Change in entropy for an irreversible process

UNIT - IV MAXWELL'S THERMO DYNAMICAL RELATIONS

Concept of entropy – T-S diagram – Entropy of a perfect gas – Derivation of Maxwell's thermodynamics relations –Applications – TdS equations –Clapeyron's latent heat equation – Specific heat relation – Helmholtz function – Gibb's function –Enthalpy

UNIT - V STATISTICAL THERMODYNAMICS

Phase space – Statistical equilibrium – Microstates and macro states – Maxwell – Boltzmann distribution law - Ensembles (Concept only)- Quantum statistics – Fermi Dirac distribution law – Applications to electron gas – Bose Einstein distribution law – Application to photon gas – Radiation laws(Planck, Rayleigh Jeans and Wien) .

Course Outcomes:
After successful completion of the course, the student is expected to
1.become familiar with various thermodynamic process and work done in the process.
2.derive expressions and find experimental verifications for the laws studied.
3. have a clear understanding about the working of a carnot engine, and knowledge of calculating   change in entropy for various process.
4 realize the importance of Thermo dynamical functions and applications of Maxwell's   relations.
5.familiarize about statistical distribution and have basic Ideas about   Maxwell Boltzman, Bose-Einstein and Fermi Dirac Statistics and their applications.

Books for study:
Heat and thermodynamics – Brijilal and Subramaiyan, S.Chand & co., New Delhi -2000.
Heat and Thermodynamics – Mathur, D.S.Sultan Chand & Sons, New Delhi – 1978.
A. Textbook of Heat and Thermodynamics –Rajam.J.B and Arora, C.L., S.Chand & co Ltd , New Delhi – 1979.
Thermal Physics – P.Thangaraj and D.Jayaraman.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]
1 https://www.askiitians.com/revision-notes/physics/heat-transfer/
2 https://www.askiitians.com/revision-notes/physics/kinetic-theory-of-gases/
3 https://www.askiitians.com/revision-notes/physics/heat-phenomena/
4 https://www.askiitians.com/revision-notes/physics/thermodynamics/

Mapping with programme outcomes **18UPH4**							
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
CO1	9	9	6	9	3	9	9
CO2	9	9	9	6	9	9	3
CO3	9	9	9	3	9	3	3
CO4	9	9	9	9	6	9	9
CO5	9	9	6	9	9	9	6
Total	45	45	39	36	36	39	30
Weightage	**4.17**	**4.17**	**4.33**	**4.03**	**3.93**	**4.45**	**3.64**

*S-Strong(9); M-Medium(6); L-Low(3).

CC05: MAJOR PRACTICAL – II

SUB.CODE: 18UPH5P

Course Objectives:
The main objectives of this course are to:
1.develop the experimental skills in Mechanics and Properties of matter
2.gain knowledge about the experiments based on Electricity and Magnetism
3.motivate the students to apply the experimental techniques in Spectrometer
4.develop the experimental techniques in Potentiometer and Magnetometer
5.motivate the students to apply the experimental techniques in Transmission of heat.

LIST OF EXPERIMENTS
Any 15 Experiments

1. Determination of Young's modulus by cantilever depression (scale and telescope)
2. Determination of Rigidity modulus using Torsion pendulum
3. Determination of surface tension by capillary rise method
4. Determinaton of viscosity by Searle's viscometer
5. Determination of viscosity by Stoke's method
6. Determination of specific heat capacity of liquid by Joule's calorimeter method
7. Determinaiton of refractive index of the material of the prism by i-d curve method using spectrometer
8. Determinaiton of wavelength of prominent lines of mercury spectrum by Normal incidence method using spectrometer and grating
9. Determination of specific resistance of given material of wire using Carey Foster's bridge
10. Determinaiton of figure of merit of a mirror galvanometer
11. Determination of emf of a thermocouple by direct deflection method using mirror galvanometer
12. Determination of temperature coefficient of resistance using Potentiometer
13. Determination of M and H using deflection and vibration magnetometers
14. Determinaiton of impedance and power factor of a coil
15. Construction of full wave rectifier with filter.
16. Determination of emissive power of a surface by spherical calorimeter
17. Laser- Wavelength determination

 Expected Course outcomes:
 After completion of this course students will be able to,
1.analyze the concepts of Viscosity,Surface tension,Youngs modulus of different substances
2.realize principles and applications of spectrometer and other optical instruments
3..realize principles and applications of Potentiometer,and Magnetometer
 4.realize principles and applications of Full wave rectifier with filter
 5.realize principles and applications of Transmission of heat
Reference Books:
1. A text book of Practical Physics,M.N.Srinivasan,S.Balasubramanian,R.Ranganathan,
Sultan Chand&Sons(2017).
2. Practical Physics and Electronics,C.C.Ouseph,U.J.Rao,V.Vijayendran,S.Viswanathan
Publishers(2007)
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]
1 https://nptel.ac.in/course.html/physics/experimental physics I, II and III
2 https://nptel.ac.in/courses/115/105/115105110/
3 https://www.youtube.com/playlist?list=PLuiPz6iU5SQ8-rZn_LgLofRX7n8z4tHYK
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Mapping with programme outcomes 18UPH5P							
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	9	6	6
CO2	9	9	6	9	6	9	9
CO3	9	9	9	6	3	3	9
CO4	9	9	9	9	9	9	3
CO5	9	9	6	9	6	9	9
Total	45	45	39	42	33	36	36
Weightage	4.17	4.17	4.33	4.70	3.61	4.11	4.36

*S-Strong(9); M-Medium(6); L-Low(3).

CC06 : OPTICS AND SPECTROSCOPY

SUB.CODE: 18UPH6

Course Objectives:
The main objectives of this course are to,
1.To familiarize the fundamental laws concerning aberrations.
2.provide basic concepts and applications of phenomena like interference and their related optical techniques.
3.give a hands-on experience to study diffraction of different optical phenomena by performing experiments.
4.To understand the phenomena of polarization.
5.To perceive the basic concept of spectroscopy.

UNIT - I   ABERRATIONS

Aberrations – Chromatic aberrations - – Spherical aberration – Methods of reducing spherical aberration – Coma – Aplanative surfaces – Astigmatism – Distortion – Curvature chromatic aberration – Condition for achromatism of two lenses in contact and out of contact – Optical instruments – Eye pieces - Ramsden's eyepiece – Huygen's eyepiece – Its comparison – Gauss eyepiece.

UNIT II – INTERFERENCE

Interference of light – Coherent sources – Phase difference – Path difference – Fresnel's mirror – Fresnel's Biprism – Determination of wavelength of light, distance between two virtual sources – Lloyd's single mirror – Interference in thin films – Interference due to reflected beam – air wedge – Newton's Rings- Determination of R and µ – Michelson's Interferometer

UNIT - III DIFFRACTION

Fresnel's and Fraunhofer diffraction – Fresnel's diffraction at a straight edge and circular aperature – Zone plate – Difference between zone plate and convex lens – Fraunhofer diffraction at a single slit, double slit and Nslits- theory of plane transmission grating – Dispersive power of a grating – Resolving power of a telescope, microscope , prism and grating – Comparison of grating and prism.

UNIT - IV POLARIZATION

Double refraction – Optics axis – Ordinary and extradinary rays- Huygen's explanation of double refraction in uniaxial crystals – Nicol prism – quarter wave plate – Half wave plate – Production and detection of plane, circularly and elliptically polarized light – Optical activity – Fresnel's explanation with analytical treatment – Specific rotatory power – determination by half shade and biquartz polarimeter.

UNIT - V SPECTROSCOPY

Types of Spectra – IR spectroscopy – UV spectroscopy – Rayleigh scattering - Raman effect – experimental study – Quantum theory of Raman effect – Application of Raman effect in molecular spectra – Nuclear magnetic resonance - Nuclear Quadrupole resonance – Electron spin resonance spectroscopy.

Course Outcomes:

Upon completion of this course, student must be able to
1.distinguish the different types of aberrations.
2.discuss the nature of light, its propagation and interaction with matter.

3.explain fundamental limits in imaging and resolution of optical system due to diffraction.

4.explain the phenomena of light ,polarization and their applications.

5.become familiar with molecular spectroscopy and have gained basic ideas regarding
UV,infrared and Raman Spectroscopy.

Books for study and reference:

1. A text book of optics   - Brijilal Subramanian
2. Optics – Second edition   - Ajoy ghatak
3. Spectroscopy   - Gurdeep Chatwal and Sham Anand
4. Fundamentals of Molecular spectroscopy - CN.Banwell
5 Optics and spectroscopy   - R.Murugesan

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]
1 https://www.youtube.com/watch?v=ML7HcZo6IaE
2 https://www.khanacademy.org/science/physics/light-waves/introduction-to-
 lightwaves/v/polarization-of-light-linear-and-circular
3 https://nptel.ac.in/courses/104/104/104104085/

Mapping with programme outcomes 18UPH6							
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	6	9	6	3
CO2	9	9	9	9	9	9	9
CO3	9	9	6	9	6	3	3
CO4	9	9	9	3	6	9	9
CO5	9	9	6	9	9	9	6
Total	45	45	39	36	39	36	30
Weightage	**4.17**	**4.17**	**4.33**	**4.03**	**4.26**	**4.11**	**3.64**

*S-Strong(9); M-Medium(6); L-Low(3).

CC07 : ELECTRICITY, MAGNETISM AND ELECTROMAGNETISM

SUB.CODE: 18UPH7

Course Objectives:
The main objectives of this course are to.
1 understand the laws of electrostatics and their applications.
2.make the students familiar with the physical quantities of magnetism and the properties of magnetic materials.
3.acquire the skills to know about the current electricity mechanism
4. understand the basis of AC and DC Circuits and also about their sensitiveness.
5. understand the laws of eddy current principle based on the electromagnetic inductions

UNIT- I : ELECTROSTATICS

Gauss theorem – Applications, Charged sphere, charged cylinder and infinite plane – Coloumb's theorem – Mechanical force on unit area of charged sphere – Energy stored in electrostatic medium – Electrified soap bubble – Cloud formation – Capacitors – Principles – Capacity of a spherical and cylindrical capacitor

UNIT – II : MAGNETIC PROPERTIES OF MATERIALS

Definitions of magnetic physical quantities – Cycle of magnetization and hysterisis loss - IH Curve – BH Curve – Magneto meter method – BG method –– Area of BH loop – Applications of BH curve – Properties of para, dia, and ferro magnetic materials - Curie's laws and curie point – Applications of magnetic materials

UNIT - III CURRENT ELECTRICITY AND MAGNETIC EFFECTS OF CURRENT

Carey –Foster bridge –Determination of resistance and temperature coefficient of resistance of a coil.
Magnetic field at a point a long the axis of a solenoid – Ampere's theorem and its proof – Application – Field along the axis of a circular coil.
Ballistic galvanometer –Theory – Determination of quantity sensitiveness – Damping correction – Current and voltage sensitivity galvanometer

UNIT - IV DC AND AC CIRCUITS
Growth and decay of charge in LR, CR and LCR circuits – Condition for discharge to be oscillatory –High resistance – Determination by leakage method.

AC circuits containing double components LC,LR,CR –LCR circuit – Series and parallel resonance circuits – Q.factor –Wattless current – Choke – Power factor –Skin effect –Tesla coil.

UNIT V ELECTRO MAGNETIC INDUCTION

Laws of electromagnetic induction – Self induction –Mutual induction –Expression for both – Determination of L by Rayleigh's and Anderson's methods – Energy stored in magnetic field - Eddy current –Application.
Rotating magnetic field –Principle of induction motor –Couple acting on a coil placed in a rotating magnetic field.

Course Outcomes:
After completion of this course students will be able to,
1. define and derive the laws of electrostatics.
2 .relate the properties of magnetic materials and intended applications.
3. expertise the skills to develop the magnetic effects of current.
4. know the derivatives of growth and decayed components of LCR series based on AC &DC Circuits
5.understand the concepts of electromagnetic induction and ideas about induced emf.

Books for study:
 1.Electricity and Magnetism: Brijlal Subramaniyam – 1996,
 2. Electricity and Magnetism:Dr.D.N.Vasudeva – 1996, S.Chand&Co Delhi
 3. Electricity and Magnetism: R.Murugesan,S.Chand &Co,   Delhi

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]
1 https://www.askiitians.com/revision-notes/physics/current-electricity.html
2 https://www.askiitians.com/revision-notes/physics/electromagnetic-induction-andalternating-current/

Mapping with programme outcomes 18UPH7							
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	9	9	6
CO2	9	9	9	9	6	9	9
CO3	9	9	3	9	9	6	9
CO4	9	9	9	6	9	9	9
CO5	9	9	6	9	3	9	6
Total	45	45	36	42	36	42	39
Weightage	**4.17**	**4.17**	**4.00**	**4.70**	**3.93**	**4.79**	**4.73**

*S-Strong(9); M-Medium(6); L-Low(3).

CC08: ATOMIC PHYSICS

SUB.CODE: 18UPH8

Course Objectives:
The main objectives of this course are to,
1.To learn the properties of positive rays and its determination.
2.To understand the concept of photo electric cells.
3.To learn the atom models.
4.To learn the impact of electric and magnetic field on spectra.
5.To understand the concept of origin of X-rays.

UNIT – I   : POSITIVE RAYS

Properties – e/m of Positive rays – Thomson's Parabola method – Aston's Bain bridge Dempster's mass spectrographs – Determination of critical potential – Franck and Hertz's experiment – Davis and Gouchers method

UNIT – II   PHOTO ELECTRICITY

Photo Electric emission – Laws – Lenard's experiment – Richardson and Compton experiment – Einstein's photoelectric equations – Experimental verification of Einstein's photoelectric equation by Millikan's experiments – Types of photoelectric cell

UNIT – III   ATOM MODELS

Bohr – Sommerfeld relativistic atom model – Vector atom model – Quantum numbers associated with vector atom model – Coupling Schemes – Pauli's exclusion principle – Magnetic dipole moment due to orbital rotation and spin of electron – Bohr magneton – Stern Gerlach experiment.

UNIT – IV   FINE STRUCTURE OF SPECTRAL LINES

Optical spectra – Spectral terms and notations – Selection rules – Intensity rule – Fine structure of sodium D lines Zeeman effect – Lorentz classical theory of normal Zeeman effect and expression for Zeeman shift – Debye's quantum mechanical explanation of normal Zeeman effect – Larmor's theorem – Anomalous Zeeman effect – Land's 'g' factor – Lorentz unit – Paschen-Back effect – Stark effect.

UNIT – V   X- RAYS

Bragg's law – Bragg's X- ray spectrometer – Origin and analysis of continuous X- ray spectrum and characteristic X-ray spectrum – Moseley's law and its importance – Compton effect – Derivation of expression for change in wavelength its experimental verification – Polarisation of Xrays

Course Outcomes:
After completion of this course students will be able to,
1.know about the experimental determination of positive rays.
2.learned the experiments related to photo electricity.
3.know about the various atom models and coupling schemes.
4.understand the concept ofZeeman effect and stark effect.
5.explain the phenomena of the origin of x- ray and its experimental verification.
Books for study:
Modern Physics – R.Murugesan – S.Chand & Co., New Delhi
Concepts of Modern Physis --Arthur Beiser -- TMH II edition
Atomic Physics – J. B. Rajam – S. Chand & Co. New Delhi

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]
1 https://www.askiitians.com/revision-notes/physics/atomic-physics/
2 https://nptel.ac.in/courses/115/101/115101003/
3 https://www2.physics.ox.ac.uk/sites/default/files/2011-10-19/atomic_physics_lectures_1_8_09_pdf_pdf_18283.pdf

Mapping with programme outcomes 18UPH8							
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	6	9	9	6
CO2	9	9	6	9	3	9	9
CO3	9	9	9	9	9	3	9
CO4	9	9	9	9	9	9	9
CO5	9	9	6	9	6	9	6
Total	45	45	39	42	36	39	39
Weightage	**4.17**	**4.17**	**4.33**	**4.70**	**3.93**	**4.45**	**4.73**

*S-Strong(9); M-Medium(6); L-Low(3).

CC09 : BASIC ELECTRONICS

Course Objectives:
The main objectives of this course are to,
1.To study the basics of semiconductors.
2.To study the components like transistor, FET, MOSFET and UJT.
3.To study the classification of amplifiers.
4.To empower students to understand the design and working of oscillators.
5.To develop the students in designing realistic circuits to perform specified operations using op-amp

UNIT-I   SEMICONDUCTOR DIODES

P-N Junction diodes – Characteristics – Crystal diode rectifiers – Half wave rectifiers – efficiency of half wave rectifier- Full wave rectifier – Full wave bridege rectifier – efficiency of full wave rectifier – ripple factor – filter circuits – capacitor filter – choke input filter –π filter. Zener diode – Avalanche breakdown – LED – Photo diode – Varactor diode – Schottky diode – Tunnel diode – Applications – Rectifier – Half wave, full wave and bridge rectifiers – Filters – Clipping – Clamping – Voltage regulation using Zener diode

UNIT-II   TRANSISTORS

CB and CE configurations – Characteristics – h parameters – Transistor biasing – Method of biasing – Transistor as an amplifier – AC and DC Equivalent circuits.
FET, JFET and MOSFET – Characteristics and Parameters of FET - FET amplifier – UJT – Characteristics

UNIT – III   AMPLIFIERS

Voltage and Power amplifier – Amplifier, Classification – RC Single stage amplifiers – RC coupled amplifiers, Power amplifier, Class A, Class B and Class C amplifier – Push pull amplifier - Negative feed back amplifier – Emitter follower.

UNIT – IV   OSCILLATORS

Positive feed back in amplifiers – Principles of positive feed back oscillators – LC Oscillators (Tuned base, tuned collector, Hartley and Colpitt's oscillator) – RC oscillators (Phase Shift Oscillator) – Crystal oscillators – Monostable, Bistable and Astable Multivibrators – Relaxation oscillator.

UNIT – V   OPERATIONAL AMPLIFIER

Difference amplifier – Ideal operational amplifier – Characteristics – CMRR-Inverting and non-inverting Op-Amp – Parameters of Op-Amp – Applications of Op-Amp – Comparator, scale changer – Adder and subtractor– Integrator – Differentiator –Solving simultaneous equations.

Course Outcomes:
After completion of this course students will be able to
1. apply the basics of semiconductor and its applications in different areas.
2.acquire knowledge about transistor, FET and UJT and its application Learn how to construct a
3.transistor amplifier and how its gain varies with frequencyObserve the effect of positive feedback
4.able to design working of different   Oscillators using Transistor.
5. prepare the students for getting the knowledge about Operational Amplifier working as adder,
subtractor, differentiators, integrator etc.,

Books for Study and Reference:

1. Principles of Electronics by V.K.Metha, Rohith Metha, S.Chand & Company,
     New Delhi
2.Integrated Electronics by Milman and Halkias , TMH
3.Basic Electronics – B.L. Theraja

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]
1 https://nptel.ac.in/course.html/Electronics/Basic electrnics
2 https://www.askiitians.com/revision-notes/physics/solid-and-electronic-device/
3 https://nptel.ac.in/course.html/electronics/operational amplifier

Mapping with programme outcomes 18UPH9							
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
CO1	9	9	9	6	9	9	6
CO2	9	9	6	9	3	9	9
CO3	9	9	9	9	9	3	9
CO4	9	9	9	9	9	9	3
CO5	9	9	6	9	6	9	9
Total	45	45	39	42	36	39	36
Weightage	**4.17**	**4.17**	**4.33**	**4.70**	**3.93**	**4.45**	**4.36**

*S-Strong(9); M-Medium(6); L-Low(3).

CC10 : MAJOR PRACTICAL- III

SUB.CODE: 18UPH10P

Course Objectives:
The main objectives of this course are to:
1.develop the experimental skills in working with different laboratory instruments.
2.gain knowledge about the experiments based on Electricity and Magnetism.
3.motivate the students to apply the experimental techniques in Spectrometer.
4.develop the experimental techniques in Potentiometer and Magnetometer.
5.understand how C Programming language improves with object oriented features.

LIST OF EXPERIMENTS
Any 15 Experiments

Section A: General Physics Experiments (Any 12)

1.Determination of refractive index of the material of the prism by i-i' method using spectrometer.
2.Determination of dispersive power of a prism using spectrometer.
3.Determination of wavelength of mercury lines by minimum deviation method using spectrometer and grating.
4.Determination of Cauchy's constant using spectrometer.
5.Determination of refractive index of a lens by forming Newton's rings.
6.Determination of angle of a small angled prism using spectrometer.
7.Determination of quantity sensitivity of a ballistic galvanometer.
8.Determination of absolute capacity of a condenser using ballistic galvanometer.
9.Determination of self inductance of a coil by Anderson's method using ballistic galvanometer.
10.Determination of mutual inductance between pair of coils using ballistic galvanometer.
11.Comparision of mutual inductances between pairs of coils using ballistic galvanometer.
12.Determination of moment of a magnet by nullifying the field produced along the axis of a circular coil .
13.Determination of Young's modulus by Koenig's method.
14.Calibration of high range voltmeter using potentiometer.
15.Determination of emf of a thermocouple using potentiometer.

Section B: C Programming (Any 3)

1.Arranging words in alphabetical order.
2.Sorting of numbers in ascending and descending order.
3.Addition and subtraction of square matrices.
4.Conversion of Farenheit temperature into Celsius temperature.
5.Solving quadratic equation.

Expected Course outcomes:
After completion of this course students will be able to,
1.analyze the concepts of Viscosity,Surface tension,Youngs modulus of different substances
2.realize principles and applications of spectrometer and other optical instruments
3.realize principles and applications of Potentiometer,and Magnetometer
4.analyze the programming concept for physics problem
5.write and excute programme in C and evaluate the solution for different Mathematical problem

Reference Books:
A text book of Practical Physics,M.N.Srinivasan,S.Balasubramanian,R.Ranganathan,

Sultan Chand&Sons(2017).
Practical Physics and Electronics,C.C.Ouseph,U.J.Rao,V.Vijayendran,S.Viswanathan
Publishers(2007).
Programming in ANSI C by E.Balagurusamy,Tata Mc Graw Hill,Sixth Edision(2013

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]
1 https://nptel.ac.in/course.html/physics/experimental physics I, II and III
2 https://nptel.ac.in/courses/115/105/115105110/
3 https://www.youtube.com/playlist?list=PLuiPz6iU5SQ8-rZn_LgLofRX7n8z4tHYK
https://www.geeksforgeeks.org/introduction-to-c-programming-language/

Mapping with programme outcomes 18UPH10P							
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	6	9	6	6
CO2	9	9	6	9	9	9	9
CO3	9	9	9	9	6	9	3
CO4	9	9	9	3	9	9	3
CO5	9	9	9	6	9	9	9
Total	45	45	42	33	42	42	30
Weightage	**4.17**	**4.17**	**4.67**	**3.69**	**4.59**	**4.79**	**3.64**

*S-Strong(9); M-Medium(6); L-Low(3).

CC11 : MAJOR PRACTICAL-IV

SUB.CODE: 18UPH11P

Course Objectives:
The main objectives of this course are to:
1.develop the experimental skills in working with different laboratory instruments
2.gain knowledge about the experiments based on Electricity and Magnetism
3.motivate the students to apply the principle of electronics in their day-to-day life
4.develop transforms the electronics into experimental techniques
5.gain knowledge about different intel 8085 microprocessor

LIST OF EXPERIMENTS
Any 15 Experiments

Section A: Electronics Experiments (Any 12)

1.Series and Parallel resonance circuits
2.Transistor Characteristics CE mode
3.Regulated power supply
4.Emitter follower amplifier
5.Tuned collector oscillator
6.Hartley oscillator
7.Colpitt's oscillator
8.Phase shift oscillator
9.Astable multivibrator
10.Monostable multivibrator

11.FET characteristics
12.Basic Logic gates – using ICs
13.NAND and NOR as universal gates
14.Opertional amplifier – adder and subtractor
15.Operational amplifier – integrator and differentiator
16.Half adder and Half subtractor
17.Boolean expression simplifications using ICs

Section B: Microprocessor (Any 3)

1.8 bit addition and subtraction
2.8 bit multiplication and division
3.Biggest number among a list
4.Smallest number among a list
5.Conversion from decimal to Hexadecimal and vice versa.
6.Square root of a number from look out table

Expected Course outcomes:
After completion of this course students will be able to,
1.design different types of power supplies,Amplifiers and Ocillators
2.to analyze the characteristics of various electronic devices like BJT and FET
3.realize principles and applications of Universal gates.
4.acquire the knowledge of the characteristics of an operational amplifier
5.write and excute the manipulating 8085 microprocessor programme

Reference Books:
1.A text book of Practical Physics,M.N.Srinivasan,S.Balasubramanian,R.Ranganathan,
Sultan Chand&Sons(2017).
2.Practical Physics and Electronics,C.C.Ouseph,U.J.Rao,V.Vijayendran,S.Viswanathan
Publishers(2007).

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]
https://www.slideshare.net/mobile/sunilrathore77398/basicanalogelectronics
https://www.slideshare.net/mobile/PatruniChidanandaSas/basics-of-electronics-53962342
http://www.sircrrengg.ac.in/images/Others/CSE/MP-LAB-MANUAL.pdf
https://www.youtube.com/playlist?list=PL_pGb42kre_QXwuaizYb21tSYpoHyXsCQ

Mapping with programme outcomes 18UPH11P							
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
CO1	9	9	9	6	9	9	6
CO2	9	9	6	9	6	9	9
CO3	9	9	9	9	9	3	9
CO4	9	9	9	9	9	9	6
CO5	9	9	6	9	6	3	9
Total	45	45	39	42	39	33	39
Weightage	**4.17**	**4.17**	**4.33**	**4.70**	**4.26**	**3.77**	**4.73**

*S-Strong(9); M-Medium(6); L-Low(3).

MAJOR ELECTIVE I: LASER PHYSICS & FIBRE OPTICS

Course Objectives;
The main objectives of this course are to

1.To learn and understand about the basic concepts of LASER and their types.
2.To learn and understand the different types of LASER and their experimental verification.
3.To know about the applications of LASER and the principle of holography.
4.To know the clear idea about the optical fiber communication system.
5.To understand the fundamental idea about the optical fiber and their postulates

UNIT - I   PHYSICS OF LASERS

Basic principle of Laser – Einstein coefficients – Condition for light amplification – Population inversion – Thresold condition – Line Shape function – Optical resonators(Qualitative only) – Three level and Four level systems.

UNIT – II   TYPES OF LASERS

Ruby Laser – Nd – YaG Laser – He-Ne Laser, Co_2 Laser – Dye Laser Semi Conductor Laser – Q Switching & mode locking (qualitative) – Experimental methods.

UNIT III   APPLICATION OF LASER

Application of Laser in industry – Cutting – Welding - Drilling – Surface hardening – Medical applications – Laser as diagnostic & therapeutic tool – Holography – Theory of recording & reconstruction – Applications of holography – Holographic interferometry in non destructive testing, Acoustic holography and Holographic microscopy – Lasers in compact disc players.

UNIT IV   THEORY OF OPTIC FIBRES

Basic structure of an optic fibre – Acceptance angle – Numerical aperture – Propagation of light through an optical fibre – Theory of modes formation – Classification of fibres – Step index & graded index fibres – Comparision of the two types – Single mode & multimode fibres – Losses in fibres – Dispersion in fibres – Fabrication of fibres.

UNIT - V   FIBRE OPTIC COMMUNICATION

Optical communication – Advantages – Light sources – Modulation methods – Photo detectors – Optical couplers – Splicing – Communication systems (Block diagram) – Repeaters – Fibre cables – Measurements of numerical aperture & optical time domain reflectometers.

Course Outcomes;

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

1. understand the concepts of LASER and to enhance their knowledge.
2. learn about the types of LASER and their applications.

3. learn and clear knowledge about the applications of LASER.
4. know about the concepts of theoretical part of optical fiber communication system.
5. learn and understand the postulates of optical fiber communication and their applications

Books for study:

1. K.Thyagarajan, A.K.Ghatak – Laser theory and applications, Cambridge university press.
2. Avadhanulu M.N; - An introduction to Lasers&Applications , S.Chand & Co, New Delhi.
3. Subir Kumar Sarkar – Optical Fibres & Fibre Optic communication system, S.Chand & Co ; New Delhi 2001.
4. R.K.Gaur&S.L.Gupta(eight edition) – Engineering Physics, Dhanpat Rai publications,New Delhi.
5. P.K.Palanisamy – Physics for Engineering, Scitech Publications private Ltd.

Some Free e-book URLs for Physics students
https://bookboon.com/physics-ebooks
https://www.pdfdrive.com/physics-books
https://houseofphy.blogspot.com/2018/02/free-pdf-physics-books

Mapping with programme outcomes 18UPHE1							
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
CO1	9	9	9	9	9	3	6
CO2	9	9	6	9	6	9	9
CO3	9	9	9	3	6	6	3
CO4	9	9	6	9	9	9	9
CO5	9	9	9	6	9	9	6
Total	45	45	39	36	39	36	33
Weightage	**4.17**	**4.17**	**4.33**	**4.03**	**4.26**	**4.11**	**4.00**

 *S-Strong(9); M-Medium(6); L-Low(3).

CC12 : SOLID STATE PHYSICS

SUB.CODE: 18UPH12

Course Objectives:
The main objectives of this course are
1. learn about the crystal structure and their packing parameters.
2. know about carrier concentration in metals and semiconductors.
3. gain the knowledge of magnetic and superconducting materials and their applications.
4. understand the dielectric material and their properties.
5. acquire the skill to fabricate new materials and nano phase materials.

UNIT - I: ELEMENTARY CRYSTALLOGRAPHY

Definition-Lattice parameters of an unit cell-Atomic radius-density of packing-SC-BCC-FCC-HCP structures-Diamond cubic structures- Zinc blende structure Miller Indices- -structure determination: Bragg's law- Laue method, Powder and rotating crystal method.

UNIT - II: CONDUCTING AND SEMICONDUCTING MATERIALS

Band theory of solids - classical free electron theory of metals - electrical conductivity- thermal conductivity – Wiedmann – Franz law – Lorentz number-Fermi distribution function - Density of energy states- Carrier concentration in metals- Intrinsic semiconductor-carrier concentration derivation - extrinsic semiconductorsm – carrier concentration derivation in n-type and p-type semiconductors.

UNIT III : MAGNETIC MATERIALS AND SUPERCONDUCTING MATERIALS

Definitions- different types of magnetic materials-Langevin's theory of dia and para magnetism- Ferromagnetism - Domain theory of ferromagnetism- Superconductivity- properties – Types of Superconductors- BCS theory of superconductivity (quantative)- High Temperature superconductors-Apllication of Superconductors.

UNIT IV: DIELECTRIC MATERIALS AND SUPERCONDUCTIVITY

Definitions – polarizations-different types- electronic and ionic, orientation and space charge polarization- Frequency and temperature dependence of polarization – Internal field Claussius-Mossotti relation (no derivation)-dielectric loss- local field-. Ferroelectricity and applications

Superconductivity - transition temperature – Meissner effect- London equation – Type I and Type II superconductors- BCS theory – high T_c superconductor – applications.

UNIT V : NEW MATERIALS

Metallic glasses- preparation, properties, applications - Shape Memory Alloys- Characteristics – Properties of NiTi alloy – applications- advantages and disadvantages of SMA – Nano materials – synthesis – chemical vapour deposition - Sol-gels – ball milling – properties of nano materials and applications.

Course Outcomes:
 On the successful completion of the course Student will be able to;

1.have a clear picture of crystal structures and a clear understanding about their packing parameters.
2.know the application of conducting and semiconducting materials.
3. expected to gain knowledge of superconductivity,,its underlying principles and its applications in modern world.
4.update the knowledge of various types of dielectric materials and its applications.
5 design the structure of new materials and their applications of Nano phase materials
Books for study and reference:

1.Solid state Physics by M.Arumugam Anuradha Agencies First edition 2004
2.Engineering Physics by P.K.Palanisamy Scitech Publications (India) Pvt. Ltd.,
3.Solid State Physics – Charles Kittel (for refence)

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]
1 https://youtu.be/RImqF8z91fU
2 https://nptel.ac.in/courses/115/105/115105099/

Mapping with programme outcomes 18UPH12							
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	6	9	9	6
CO2	9	9	9	9	9	9	3
CO3	9	9	3	6	6	3	9
CO4	9	9	9	9	9	9	3
CO5	9	9	6	3	9	6	9
Total	45	45	36	33	42	36	30
Weightage	**4.17**	**4.17**	**4.00**	**3.69**	**4.59**	**4.11**	**3.64**

*S-Strong(9); M-Medium(6); L-Low(3).

CC13 : DIGITAL ELECTRONICS & MICROPROCESSOR

SUB.CODE: 18UPH13

Course Objectives:
The main objectives of this course are
1. To acquire the basic knowledge of digital logic levels.
2. To learn the functions of an encoder and decoder.
3. To learn a sequential circuits such as Flip - Flop, Register, Counter.
4. To equip about the A/ D and D/A conversion and semiconductor memories.
5. Understand the basic concept of microprocessor, its architecture, addressing modes and its instruction set.

UNIT - I   BOOLEAN ALGEBRA AND LOGIC GATES

Binary number system – Weighted binary codes – ASCII code – Binary arithmetic – 1's, 2's complement addition – Boolean algebra – Basic logic gates – Laws of Boolean algebra NAND,NOR universal logic gates – Exclusive OR gate – Half adder – Full adder – Half subtractor – full subtractor – 1's,2's complement adder – BCD adder.

UNIT -II   KARNAUGH MAP, LOGIC FAMILIES AND COMBINATIONAL SYSTEM

K map – 2,3and 4 variable K map – Reduction of Boolean expressions – SOP and POS expression – Reduction using K map – Characteristics of logic families – RTL,DTL and TTL family – Multiplexer – Demultiplexer – Decoder – BCD to 7 segment decoder – Encoder – Decimal to BCD encoder.

UNIT -III   SEQUENTIAL SYSTEMS

Basic flip flop – RS flipflop – Clocked RS flip flop – D flip flop – Triggering of flip flop – Edge triggered JK flip flop – Master slave JK flip flop.

Ripple counter – Up and down ripple counter – Modul counter – Decade counter – Divide by N counter.

Shift register- Types of Registers – Serial in, serial out shift register – serial in parallel out shift register.

UNIT IV   D/A AND A/D CONVERSION

Digital to analog conversion – Binary weighted resistor conversion – Binary ladder conversion – Analog to Digital conversion – Counter type conversion – Continuous conversion – Successive approximation conversion – Semi conductor memories – RAM – ROM memories – Magnetic memories – magnetic bubble memory – Magnetic disc, magnetic tape memories – Floppy diskettes.

UNIT - V   MICROPROCESSOR

Major functions of Microprocessor – Timing and control section – Arithmetic logic unit – Microprocessor architecture – 8085 microprocessor – characteristics – Instruction set – Microprocessor organization – Bus organization – Microprocessor assembly language – Simple programs for addition, subtraction, choosing biggest number and writing numbers in descending and ascending orders – Basics of a Microcontroller .

Course Outcomes:
On the successful completion of the course Student will be able to;
1.understand the concepts of Binary codes.
2.understand the operation of basic digital electronic devices
3.have foundation in the techniques and designing of flipflops, counters and registers
.4.apply the gained knowledge of semiconductor memories in their day–to–day life.
5.apply the functions of microprocessor for practical purposes.

Books for study and reference:
1. Digital Fundamentals, B.Basavaraj – Vikas publishing House private limited – 1998.
2. Digital principles and application – Malvino,Leach – TMH – 1994.
3. Digital Computer Electronics -   Albert P.Malvino – TMH – 1995.
4. Microprocessor Architecture, Programming and Applications – Gaonker – Wiley
    Eastern – 1995.
5. Microprocessor - B.Ram
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]
 1.https://www.askiitians.com/revision-notes/physics/solid-and-electronic-device/
 2 https://www.tutorialspoint.com/microprocessor/microprocessor_overview.html
 3.https://www.geeksforgeeks.org/introduction-of-microprocessor/

Mapping with programme outcomes 18UPH13							
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	6	9	3	6
CO2	9	9	9	9	6	9	9
CO3	9	9	6	9	9	6	9
CO4	9	9	9	9	9	9	3
CO5	9	9	3	9	3	6	9
Total	45	45	36	42	36	33	36
Weightage	4.17	4.17	4.00	4.70	3.93	3.77	4.36

*S-Strong(9); M-Medium(6); L-Low(3).

CC14 : WAVE MECHANICS AND NUCLEAR PHYSICS

SUB.CODE: 18UPH14

Course Objectives;
The main objectives of this course are
1.understand the dual nature of light and matter.
2.acquire the knowledge of wave mechanics and its applications.
3.acquire the knowledge to understand about nucleus and nuclear structure.
4.familiarize with radiation detectors and particle accelerators
5.basic knowledge on fundamental particles.

UNIT - I DUAL NATURE OF MATTER

Introduction of matter waves – Wave velocity and group velocity - group velocity for de Broglie waves –relation between particle velocity and group velocity – de Broglie wavelength of electron –Davisson and Germer experiment –G.P. Thomson's experiment –Heisenberg's uncertainity principle – Applications of uncertainty principle

UNIT - II WAVE MECHANICS

Basic postulates of wave mechanics – Derivation of time dependent Schrodinger wave equation – Properties of the wave function –Orthogonal and normalized wave functions – Eigen functions and eigen values –Application of Schrodinger wave equation – Particle in a box –Barrier penetration problem - Simple harmonic oscillator

UNIT - III NUCLEAR PROPERTIES AND NUCLEAR SPECTROSCOPY

Properties of nuclei – Nuclear spin – Nuclear magnetic moment – Nuclear quadrupole moment.

Introduction to NMR – Quantum description of NMR –Instrumentation –Chemical shift – Spin – Spin coupling – Introduction to NQR spectroscopy – Theory of NQR –Instrumentation –Sample requirements –Applications of NQR.

UNIT - IV ACCELERATORS, DETECTORS AND NUCLEAR REACTIONS

Betatron – Proton synchrotron – Ionisation chamber –Wilson cloud chamber –Bubble chamber –Spark chamber –Phtographic emulsion technique – Scintillation counter.

Nuclear reactions –Main type of Nuclear reaction –Energy balance in nuclear reactions and the Q value –Examples – Threshold energy of an endogeric reaction – Nuclear transmutations – Transmutations by alpha particles , protons , deutrons and neutrons.

UNIT - V NUCLEAR FORCES AND ELEMENTARY PARTICLES

Introduction to nucleus – Nuclear forces –Meson theory of nuclear forces – Nuclear models – Shell model and liquid drop model – collective model.

Comparison between fission and fusion – Nuclear fusion –Source of stellar energy – Thermo nuclear reaction – Plasma –Magnetic bottle and uses.

Introduction to elementary particles –Antiparticles –Conservation laws and symmetry – Conservation of parity –Charge conjugation symmetry –Time reversal symmetry –Lee –Young experiment –The Quark model - CPT theorem.

Books for study and reference:

1. Modern Physics   **:** R.Murugesan – S. Chand
2. Modern Physics   **:** N.K.Seighal Chopra.
3. Nuclear Physics   **:** SB Patel – New Age International, 2006
4. Concept of Modern Physics   **:** Arthur Beiser - TMH
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]
1.https://nptel.ac.in/courses/115/104/115104043/
2.https://nptel.ac.in/courses/115/103/115103101/
 3.https://www.youtube.com/watch?v=xrk7Mt2fx6Y

Mapping with programme outcomes 18UPH14							
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
CO1	9	9	9	9	9	9	3
CO2	9	9	6	9	3	9	9
CO3	9	9	9	6	6	9	9
CO4	9	9	9	9	9	6	3
CO5	9	9	6	9	6	9	9
Total	45	45	39	42	33	42	33
Weightage	**4.17**	**4.17**	**4.33**	**4.70**	**3.61**	**4.79**	**4.00**

 *S-Strong(9); M-Medium(6); L-Low(3).

MAJOR ELECTIVE II : COMPUTATIONAL PHYSICS

SUB.CODE: 18UPHE2

Course Objectives:

The main objectives of this course are to,

1. To get basic knowledge on the fundamental concepts of C Program
2. To exploit the appropriate decision making statements for the given program
3. To inscribe C programs by applying the concepts of functions and strings
4. To implement user defined data types like unions in C program
5. To gain basic knowledge on pointers and file operation in C

UNIT – I : DATA TYPES, OPERATORS AND EXPRESSIONS IN C

Introduction to C – Structure of a C Program – Character Set – Keywords and identifiers – Data Types – constants and variables – declaration – symbolic constants – operators – expressions – hierarchy of operators – i/o statements – formtted i/o- simple C programs : g for simple pendulum – focal length of a lens by uv method – decimal to binary and octal conversions

UNIT – II : INPUT, OUTPUT AND CONTROL STATEMENTS IN C

If and if else statements – nesting if..else statements – switch and break statements –goto statements – while, do-while statements – for statements – C programs to calculate Young's modulus and Rigidity modulus, frequency of an oscillator and transistor parameters

UNIT – III : FUNCTIONS AND STRINGS IN C

Functions – library functions- passing arguments of a function – recursion –strings – string functions – storage classes – automatic variables – global and external variables – static variables – C programs for field along the axis, projectiles, center of gravity of different objects

UNIT – IV : ARRAYS, STRUCTURES AND UNIONS IN C

Defining arrays of one and two dimensions – multidimensional arrays- structures – definition and manipulation – user defined structures – unions – definition – C programs for matrix addition, subtraction and multiplication – sorting of a data list in ascending and descending order – searching.

UNIT – V : POINTERS AND FILES

Pointers – definition – declarations – operation on pointers – files – opening and closing a data file – creating a data file – processing a data file- simple file manipulation programs.

Course Outcomes:

Upon completion of the course, students will have,

1. basic knowledge on the fundamental concepts of C Program
2. an ability to exploit the appropriate decision making statements for the given program
3. an ability to inscribe C programs by applying the concepts of functions and strings

4. an ability to implement user defined data types like unions in C program
5. basic knowledge on pointers and file operation in C

Books for Study :

1. E. Balagursamy, Programming in ANSI C, Tata McGraw Hill, New Delhi, 2002

2. Schaum's outline of theory and problems of Programming with C

3. Byron's Gottfried –Programming with C - TMH – New Delhi – 2003.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]
     1.https://nptel.ac.in/course.html/computerscience and engineering//C,
     programming
.   2.https://www.geeksforgeeks.org/introduction-to-c-programming-language/

Mapping with programme outcomes 18UPHE2							
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
CO1	9	9	6	9	3	3	9
CO2	9	9	9	9	9	9	6
CO3	9	9	6	6	9	6	9
CO4	9	9	9	9	6	9	9
CO5	9	9	3	3	9	9	3
Total	45	45	33	36	36	36	36
Weightage	**4.17**	**4.17**	**3.67**	**4.03**	**3.93**	**4.11**	**4.36**

*S-Strong(9); M-Medium(6); L-Low(3).

Major Elective III: COMMUNICATION SYSTEMS

SUB.CODE: 18UPHE3

Course Objectives:

The main objectives of this course are to,

     1.To impart knowledge on modulation and Demodulation
     2. To understand the concepts of television and antenna parameters
     3. To acquire knowledge on radar communication
     4. To understand the basic concepts of satellite communication system
     5. To gain knowledge on GSM, GPRS, and VSAT

UNIT I Radio Transmission and Reception

     Transmitter-modulation - types of modulation – amplitude, frequency and phase modulation – modulation factor –side band frequencies in AM wave-limitations of amplitude modulation – frequency modulation – block diagram of AM and FM transmitter.

Receiver: Demodulation – AM and FM radio receivers – super heterodyne radio receiver.

UNIT II Television Communication

Television – scanning – synchronization – Three color theory – color TV – transmission and reception - Antennas – equivalent circuit - effective parameters of antenna – dipole arrayed antennas –VHF, UHF and microwave antennas.

UNIT III Radar Communication

Basic radar system – radar range – antenna scanning – pulsed radar system- A Scope – plane position indicator – Tracking radar –moving target indicator – Doppler effect – MTI principle – CW Doppler radar – frequency modulator CW radar.

UNIT IV Satellite Communication

Satellite communication system- satellite orbits – types of satellites – basic components of satellite communication –construction- features of satellites – multiple access- communication packages – antenna – power source – satellite foot points – satellite communication in India.

UNIT V Telecommunication system

GSM- mobile services- system architecture- radio interface – logical channels and frame hierarchy – protocols- localization and calling Handover – authentication – encryption – GPRS – system architecture.

Course Outcomes:

On the successful completion of the course, the student shouldbe able to
1. impart knowledge on modulation and Demodulation
2. understand the concepts of television and antenna parameters
3. acquire knowledge on radar communication
4. understand the basic concepts of satellite communication system
5. gain knowledge on GSM, GPRS, and VSAT

Books for study:

1. Electronics Communication - Dennis Reddy & John Coolean
2. Principles of Communication Engineering - Anokh Singh
3. Communication Electronics – Louis Frenzel
4. Basic Radio and Television – S.P.Sharma
5. Mobile Communication – Jochen schiller

Books for Reference:
1. Principles of Electronics – V.K.Metha
2. Satellite Communication – PoornimaThangam
3. Electronic communication system – George Kennedy, Bernard Davis , S.R.M.Prasanna

Some Free e-book URLs for Physics students

www.openculture.com\free-physics-textbooks

Mapping with programme outcomes 18UPHE3							
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	6	9	3	3	9
CO2	9	9	9	6	9	9	9
CO3	9	9	9	3	6	6	6
CO4	9	9	6	9	9	9	9
CO5	9	9	9	9	3	9	3
Total	45	45	39	36	30	36	36
Weightage	**4.17**	**4.17**	**4.33**	**4.03**	**3.28**	**4.11**	**4.36**

*S-Strong(9); M-Medium(6); L-Low(3).

PAPER I –ALLIED PHYSICS
(For B.Sc Mathematics and Chemistry)

SUB.CODE: 18UPHYC4

Course Objectives:

The main objectives of this course are to,
1.To learn and understand about the basic idea of dynamics and properties of matter and their theory.
2.To know about the fundamentals of sound and heat principles and their postulates.
3.To understand and clear idea of electrostatics and current electricity and their applications.
4.To learn about the postulates of atomic theory and nuclear atom model and their characteristics.
5.To know about the basic concepts of analog and digital electronics and their characterization.

UNIT - I   DYNAMICS AND PROPERTIES OF MATTER

Impact – Direct and oblique impact of two spheres – Moment of Inertia of a solid sphere and solid cylinder – Gravitation – Determination of G by Boy's method.

Elasticity – Three modulii of Elasticity – Poisson's ratio – Relation between three modulii – Surface tension – Excess of pressure inside a bubble and drop weight method – Coefficient of viscosity – Determination of viscosity by variable pressure head method.

UNIT - II   SOUND AND HEAT

Laws of vibration in stretched strings – Sono meter – Verification of laws – Acoustics of buildings – Reverberation – Sabine formula – Ultrasonics – Production and applications.

Newton's law of cooling – Specific heat capacity of a liquid – Thermal conductivity – Coefficient of thermal conductivity of bad conductor by Lee's disc method.

UNIT - III   OPTICS, ELECTRO STATICS AND CURRENT ELECTRICITY

Aberration – Spherical aberration, chromatic aberration – Interference of light in thin films – Air wedge – Newton's rings – Diffraction of single slit – Grating – Determination of wave length of spectral lines – Normal incidence method.

Gauss theorem – Applications – Intensity of field at a point due to a line charge, charged sphere – Capacitor – Capacity of spherical and cylindrical capacitor – Effect of dielectrics – Energy of charged conductor – Sharing of charges between two charged conductor – Potentiometer – Measurement of current, calibration of low range voltmeter and low range ammeter.

UNIT - IV   ATOMIC PHYSICS AND NUCLEAR PHYSICS

Atom models – Vector atom model – Pauli's exclusion principle – quantum numbers and quantization of orbits – Stern and Gerlach experiment – X-rays – continuous and characteristics X-rays – Continuous and characteristics X-rays – Mosley's law and its importance.

Binding energy – General properties of nucleus – Nuclear forces and their characteristics – Nuclear models – liquid drop model – Shell model - Nuclear fission – fusion reactions – Nuclear reactors.

UNIT - V   ANALOG AND DIGITAL ELECTRONICS

P.N.Junction diode – Characteristics – Zener diode – Characteristics – Rectifiers – using junction diodes (Half,Full and bridge rectifiers) – Zener diode as voltage regulator – Transistors – Characteristics in CE mode – Common emitter single stage amplifier – Frequency response.

Binary arithmetics – Basic logic gates – Boolean algebra – Demorgan's theorem – Verification using truth tables.

Course Outcomes:

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

1. enhance their knowledge about properties of matter.
2. learn and understand the fundamentals of production of sound and heat postulates.
3. understand the clear idea of current electricity and it may improve their knowledge.
4. learn about the atomic and nuclear physics and may able to know their applications.
5. know the fundamentals of analog and digital electronics and their applications.

Books for Study and Refence:

1. A text book of sound – Brijlal and Subramanian,vikas publishing house New Delhi.
2. Heat and thermodynamics – Brijlal and Subramanian S.K.chandand Co New Delhi.
3. Optics – Brijlal and Subramanian,S.Chand and Co New Delhi.
4. Allied physics – A. Sundaravelusamy, Priya publications , Karur.
5. Modern Physics – R.Muruguesan, S.Chand & Co.
6. Electricity and Magnetism - Brijlal and Subramanian S.K.chand and Co New Delhi.
7. Digital Principles and Applications – Malvino , Leech, TMH -1994
8. 8. Allied Physics – R. Murugeshan – S. Chand & Co.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]
1.https://nptel.ac.in/courses/115/104/115104043/
2.https://nptel.ac.in/courses/115/103/115103101/
 3.https://www.youtube.com/watch?v=xrk7Mt2fx6Y

Mapping with with programme outcomes 18UPHYC4							
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
CO1	9	9	6	9	9	3	6
CO2	9	9	9	9	6	9	9
CO3	9	9	6	6	9	6	3
CO4	9	9	9	9	9	9	6
CO5	9	9	9	3	6	9	3
Total	45	45	39	36	39	36	27
Weightage	**4.17**	**4.17**	**4.33**	**4.02**	**4.26**	**4.10**	**3.27**

 *S-Strong(9); M-Medium(6); L-Low(3).

ALLIED PHYSICS COURSE-II: PRACTICAL
(For B.sc Mathematics and Chemistry)
SUB.CODE: 18UPHYD4P

Course Objectives:
The main objectives of this course are to
1.develop the experimental skills in Mechanics and Properties of matter
2.gain knowledge about the experiments based on Electricity and Magnetism
3.motivate the students to apply the experimental techniques in Optics
4.develop the experimental techniques in Sound
5.motivate the students to apply the experimental techniques in Transmission

LIST OF EXPERIMENTS
(Any 15 Experiments)
 1.Determination of young's modulus by non uniform bending (pin and microscope
 2. Determination of surface tension and interfacial surface tension by drop weight method
 3. Verification of law of transverse vibrations in a stretched string using sonometer.
 4. Determination of viscosity by graduated burrette method.
 5.Determination of specific heat capacity of liquid by Newton's cooling method.
 6.Determination of thermal conductivity of bad conductor by Lee's disc method.
 7.Determination of refractive index of material of the prism by spectrometer.
 8.Study of VI characteristics of a junction diode.
 9.Determination of radius of curvature of a convex lens by forming Newton's ring.

10. Determine the resistance using potentiometer.
11. Determination of g and k using compound pendulum.
12. Construction of full wave rectifier with filters.
13. Determine the figure of merit of a mirror galvanometer.
14. Determine the emf of a thermocouple by the direct deflection method.
15. Determine the prominent lines mercury spectrum by placing a grating in normal incidence   position.
16. Determine the specific resistance of a wire using Carey Foster bridge.
17. Determine the focal length of a long focal convex lens.

Expected Course outcomes:
After completion of this course students will be able to,
1. analyze the concepts of Viscosity,Surface tension,Youngs modulus of different substances.
2. realize principles and applications of spectrometer and other optical instruments
3. realize principles and applications of Potentiometer,Sonameter,Magnetometer
4. acquire the knowledge of the characteristics of an PN junction diode and Zener diode
5. realize principles and applications of Transmission of heat
Reference Books
1 A text book of practical Physics, M.N.Srinivasan, S.Balasubramanian, R.Ranganathan, Sultan Chand&Sons(2017)
2 Practical Physics and Electronics, C.C.Ouseph, U.J.Rao, V.Vijayendran, S.Viswanathan Publishers(2007
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]
1 https://nptel.ac.in/course.html/physics/experimental physics I, II and III
2 https://nptel.ac.in/courses/115/105/115105110/
3.https://www.youtube.com/playlist?list=PLuiPz6iU5SQ8-rZn_LgLofRX7n8z4Thy

Mapping with with programme outcomes 18UPHYD4P							
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	6	6	9	6	9
CO2	9	9	9	9	9	9	3
CO3	9	9	9	9	6	3	9
CO4	9	9	6	6	9	9	9
CO5	9	9	3	9	9	9	3
Total	45	45	33	39	42	36	33
Weightage	**4.17**	**4.16**	**3.66**	**4.36**	**4.59**	**4.10**	**4**

*S-Strong(9); M-Medium(6); L-Low(3).

ALLIED PAPER 1: APPLIED PHYSICS

(For B.Sc Computer Science)

SUB.CODE: 18UPHCYC4

Course Objectives:

The main objectives of this course are to
1. To impart knowledge on the concepts of electric and magnetic materials
2. To develop knowledge on the fundamental laws of electromagnetism
3. To explain the theory of semiconductors and diodes
4. To understand the basic lasing action and types of lasers
5. To study the applications of operational amplifier and optoelectronic devices

UNIT - I   ELECTROSTATICS AND MAGNETOSTATICS

Electric potential – Potential at a point due to a point charge – Relation between potential and field – Equipotential surface – Action of points – Capacitors – Principle – Spherical and Cylindrical capacitors – types of capactor.

Magnetic potential at a point due to an isolated pole and potential due to a dipole – Radiation between magnetic potential and intensity – Magnetic shell – Potential at any point due to a magnetic shell – Dia ,para and ferro magnetic substances and their properties – Hysterisis.

UNIT - II   CURRENT ELECTRICITY & ELECTROMAGNETIC INDUCTION

Ohm's law – Kirchoff's law – Wheatstone's bridge - Condition for balance – Carey Foster's bridge and measurement of resistance – Potentiometer Measurement of current and resistance.

Laws of electromagnetic induction – Eddy currents and its application – Transformer theory and energy losses- AC circuit containing only R,only C – Ac circuit having L and R – AC circuit having C and R – Power in a pure resistive circuit – Power factor – Wattless currents - Choke - AC circuits having L,C and R in series and parallel.

UNIT -III SEMI CONDUCTOR PHYSICS

Theory of energy bands in crystals – Distinction between conductors, insulators and semiconductors – Intrinsic and extrinsic semiconductors – Junction Diode – Zener diode - Avalanche breakdown. PNP and NPN transistors – DC characteristics of CE and CB configurations – Hybrid parameters – Functions of a transistor as an amplifier and oscillator – FET – n channel and p channel FET – Performance and characteristics.

UNIT - IV   LASERS AND MASERS

Basic concepts of stimulated emission – Distinction between stimulated and induced emission – Population inversion and meta stable state – Ammonia maser – Ruby laser – He-Ne laser – Semi conductor laser and dye laser – Uses of laser.

UNIT - V   OPERATIONAL AMPLIFIERS AND OPTO ELECTRONIC DEVICES

The basic operational amplifier – Inverting and non inverting operational amplifier – Basic uses of operational amplifier as sign changer, differentiator, integrator, adder and sub tractor.

LED – Radiation transition – Emission spectra – Methods of excitation visible materials for LED – LED configuration and performance – photo conduction – Photo diode – Photo transistors – Seven segment displays – LCD.

Course Outcomes:
Upon completion of the course, the student will be able to
1. impart knowledge on the concepts of electric and magnetic materials
2. develop knowledge on the fundamental laws of electromagnetism
3. explain the theory of semiconductors and diodes
4. understand the basic lasing action and types of lasers
5. study the applications of operational amplifier and optoelectronic devices

Books for Study and Reference:

1. Electricity and Magnetism   -   Brijilal , Subramanian.
2. Electricity and Magnetism   -   D.N.Vasudeva.
3. Micro electronics   -Jacob Millman
4. The Fundamentals of Solid state physics -Theraja
5. Electronic devices and Circuits   -Millman,Halkias
6. Pulse and Digital Electronics   -G.K.Mithall.
7. K.Thyagarajan, A.K.Ghatak – Laser theory and applications, Cambridge university
    press.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]
1 https://nptel.ac.in/course.html/physics/experimental physics I, II and III
2 https://nptel.ac.in/courses/115/105/115105110/
3.https://www.youtube.com/playlist?list=PLuiPz6iU5SQ8-rZn_LgLofRX7n8z4tHYK

Mapping with with programme outcomes 18UPHCYC4							
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
CO1	9	9	6	6	6	3	6
CO2	9	9	9	9	9	9	9
CO3	9	9	9	9	9	6	6
CO4	9	9	6	9	6	9	9
CO5	9	9	9	3	9	3	3
Total	45	45	39	36	39	30	33
Weightage	**4.17**	**4.16**	**4.33**	**4.02**	**4.26**	**3.42**	**4**

 *S-Strong(9); M-Medium(6); L-Low(3).

ALLIED PHYSICS COURSE –II : APPLIED PHYSICS PRACTICAL

(For B.sc computer science)

SUB.CODE: 18UPHCYD4P

Course Objectives:
The main objectives of this course are to
1.develop the experimental skills in Mechanics and Properties of matter
2.gain knowledge about the experiments based on Electricity and Magnetism
3.motivate the students to apply the experimental techniques in Optics
4.develop the experimental techniques in Sound
5.motivate the students to apply the experimental techniques in Transmission

LIST OF EXPERIMENTS
(Any 15 Experiments)

1.Specific resistance by potentiometer
2.Calibration of ammeter using potentiometer
3.Specific resistance by Carey Foster bridge
4.Field along the axis of a coil-M
5.Figure of merit of a mirror galvanometer
6.Series resonance circuit
7.Characteristics of a junction diode
8.Characteristics of a zener diode
9.Transistor characteristics –CE configuration
10.Full wave rectifier construction with filters
11.Voltage regulator using zener diode
12.Transistor-single stage RC amplifier
13.Operational amplifier –adder and subtractor
14.Astable multivibrator using transistors
15.LDR characteristics
16.Hartley Oscillator
17.Characteristics of a photo voltaic cell.
18.FET characteristics

Expected Course outcomes:
 After completion of this course students will be able to,
 1.analyze the concepts of Viscosity,Surface tension,Youngs modulus of different substances
2.realize principles and applications of spectrometer and other optical instruments
 3.realize principles and applications of Potentiometer,Sonameter,Magnetometer
 4.acquire the knowledge of the characteristics of an PN junction diode and Zener diode
 5.realize principles and applications of Transmission of heat

Reference Books

1 A text book of practical Physics, M.N.Srinivasan, S.Balasubramanian, R.Ranganathan, Sultan Chand&Sons(2017)
2 Practical Physics and Electronics, C.C.Ouseph, U.J.Rao, V.Vijayendran, S.Viswanathan Publishers(2007

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]
1 https://nptel.ac.in/course.html/physics/experimental physics I, II and III
2 https://nptel.ac.in/courses/115/105/115105110/
3.https://www.youtube.com/playlist?list=PLuiPz6iU5SQ8-rZn_LgLofRX7n8z4tHYK

Mapping with with programme outcomes 18UPHCYD4P							
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	6	6	9	9	6
CO2	9	9	9	9	6	9	9
CO3	9	9	6	3	9	3	6
CO4	9	9	9	9	9	6	9
CO5	9	9	9	3	9	9	9
Total	45	45	39	30	42	36	39
Weightage	**4.17**	**4.16**	**4.33**	**3.35**	**4.59**	**4.10**	**4.72**

 *S-Strong(9); M-Medium(6); L-Low(3).

<u>Non Major Elective Course –I</u>

<u>ENERGY PHYSICS</u>

SUB.CODE: 18UNMPHEC1

Course Objectives:
The main objectives of this course are to,
      1.To develop knowledge and skills in the understanding of solar energy
      2. To acquire the basic knowledge on wind energy
      3. To gain knowledge on the fundamentals of Bio-mass energy
      4. To understand the concepts of fuel cells and their types
      5. To exploit ocean thermal and tidal energy

UNIT I Solar Energy

Solar constant-solar radiation measurements- physical principles of conversion of solar radiation into heat-flat plate collectors-solar air heaters-concentrating collectors- focusing type- advantages and disadvantages of concentrating collectors over flat plate collectors – solar pond- applications : solar water heating – solar photo voltaic- solar green houses.

UNIT II Wind Energy

Basic principles of wind energy conversion – site selection considerations – basic components of wind energy conversion system – types of wind machines- energy storage – applications: electric generation

UNIT III Bio-Mass Energy

Bio-mass –bio mass conversion technology- wet processes – dry processes – photo synthesis – bio gas generation – types of bio gas plants – Khadi and Village Industries-Pragati design –utilization of bio-gas.

UNIT IV Chemical Energy

Fuel cells- types of fuel cells-advantages and disadvantages of fuel cell-types of electrodes-applications of fuel cells- battery – different types of battery arrangement – classification of batteries – Lead acid battery – Nickel –iron cell.

UNIT V Ocean Thermal and Tidal Energy

Ocean Thermal Electric Conversion (OTEC)- open cycle OTEC – site selection – energy utilization – Tidal energy – basic principle of tidal power –operation methods of utilization of tidal energy – single basin and double basin arrangement – storage – advantages and limitations of tidal power generation.

Course Outcomes:
On the successful completion of the course, the student will be able to
1. develop knowledge and skills in the understanding of solar energy
2. acquire the basic knowledge on wind energy
3. gain knowledge on the fundamentals of Bio-mass energy
4. understand the concepts of fuel cells and their types
5. exploit ocean thermal and tidal energy

Book for study:

1. Non-conventional energy sources – G.D.Rai

Book for Reference:

1. Solar energy utilization – G.D.Rai

Non Major Elective Course –II

COMMUNICATION ELECTRONICS

SUB.CODE: 18UNMPHEC2

Course Objectives:

1. To impart knowledge on the basic concepts of AM and FM
2. To enrich knowledge on color television
3. To analyze the performance of antenna parameters
4. To get thorough knowledge on optical fiber communication

5. To know the various types of telephone

UNIT I Radio Communication

Modulation – types of modulation – amplitude, frequency and phase modulation – ionosphere – radio transmitter – detector.

UNIT II Color Television

Television – basic principles – scanning – synchronization – Three color theory – color TV – transmission and reception.

UNIT III Antennas

Antenna – equivalent circuit – radiation fields – radiation resistance – effective parameters of antenna – dipole arrayed antennas –VHF, UHF and microwave antennas.

UNIT IV Optical Fiber Communication

Electromagnetic spectrum- visible region – total internal reflection - propagation of light through an optical fiber – types of optical fiber- fiber communication system – applications: endoscope – sensor – temperature sensor.

UNIT V Landline and Mobile Communication

Telephone – block diagram – telephone exchange – FAX – facsimile transmitter- receiver – mobile phone: cell phone architecture – cellular telephone unit – types of cellular telephones system- internet: function – application

Course Outcomes:
At the end of the course, the student will be able to
1.impart knowledge on the basic concepts of AM and FM
2.enrich knowledge on color television
3.analyze the performance of antenna parameters
4.get thorough knowledge on optical fiber communication
5.know the various types of telephone

Books for study:
1. Electronics Communication - Dennis Reddy & John Coolean
2. Principles of Communication Engineering - Anokh Singh
3. Communication Electronics – Louis Frenzel
4. Basic Radio and Television – S.P.Sharma
Books for Reference:
1. Optical fiber communication –Dr.M.Arumugam
2. Communication Electronics – Depande
3. Principles of Electronics – V.K.Metha

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ADD ON/ELECTIVE COURSES

MAJOR ELECTIVE I : ELECTRICAL APPLIANCES

SUB.CODE: 18UPHE1:1

Course Objectives:
The main objectives of this course are to,
To know the fundamentals parts of electric iron, mixer and grinder
To create the ability to arrange the parts of fan and fluorescent lamp
To educate and train to know the parts of Air Conditioner and Refrigerator
To understand the concepts and types of washing machines
To impart skills in the House wiring

UNIT I : AUTOMATIC ELECTRIC IRON, MIXER AND GRINDER

Parts of an automatic electric iron box - Heating arrangement – Thermostat – wiring requirements – nonsticking contact surface

Parts of a mixer – motor – RPM control – over load indicator

Parts of a grinder – motor – grinding arrangement – trouble shooting

UNIT – II : ELECTRIC FAN AND FLUORESCENT LAMP

Parts of a fan – motor – winding – rotor and stator – swing arrangement of a table fan – use of condenser and regulators

Parts – Choke – Starter – Bulb – wattage calculation – luminous efficacy - compact fluorescent lamps

UNIT – III : AIR CONDITIONERS AND REFRIGERATORS

Parts of an A/C and refrigerator – Power supply – compressor loads – tonnage calculation – location selection for installation

UNIIT - IV : WASHING MACHINES

Parts of a washing machine – supply load – water supply – earthing – automatic and semiautomatic type machines – motor speed control – over load indication

UNIT V : HOUSE WIRING

Single phase, two phase and three phase electrical supply – neutral and line – fuse wire and working of a fuse – tripper- switch installation – one way and two way switches – plugs – wiring for lamps and motors

Course Outcomes:

On the successful completion of the course, the student should be able to

1. know the fundamentals parts of electric iron, mixer and grinder
2. create the ability to arrange the parts of fan and fluorescent lamp
3. educate and train to know the parts of Air Conditioner and Refrigerator
4. understand the concepts and types of washing machines
5. impart skills in the House wiring

Books for study and reference :

1.L. R. Hans & M. L. Anwani, Basic shop practicals in Electrical Engineering, Dhanpat Rai, Delhi
2.Xavier and Radhakrishnan (Tamil Version)

Mapping with with programme outcomes 18UPHE1:1							
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	3	3	6	6	6
CO2	9	9	9	9	6	9	9
CO3	9	9	6	6	9	6	6
CO4	9	9	9	9	3	9	9
CO5	9	9	9	9	9	9	3
Total	45	45	36	36	33	39	33
Weightage	**4.17**	**4.16**	**4**	**4.02**	**3.60**	**4.45**	**4**

 *S-Strong(9); M-Medium(6); L-Low(3).

MAJOR ELECTIVE II : ELECTRIC GENERATORS AND ELECTRIC MOTORS

SUB.CODE: 18UPHE2:1

Course Objectives:

The main objectives of this course are to,

1. To acquire knowledge on working principle of DC generators
2. To give the basic ideas on various types of generators and their significance
3. To understand the fundamental principles of poly phase system
4. To analyze the characteristics of DC motors
5. To develop knowledge on starters and their types

UNIT I: DC-GENERATORS AND WINDING

Working Principles – AC to DC by Commutator – PARTS of DC Generator – Yoke – Field Pole – Armature core e and winding – Commutator – Brushes.

Types of winding – Loop and Wave winding – EMI equation of generator – Permanent magnet generator- Electromagnet generator.

UNIT II : TYPES OF GENERATORS AND TROUBLE SHOOTING

Series Generator – Shunt Generator – Compound Generator – Commutator .

Dc Generator – Losses in DC generator – Efficiency- Rating and trouble shooting

UNIT III : POLY PHASE SYSTEM

Different system of generation of AC supply – Two Phase system – Three phase system – Phase sequences – Three phase winding – Star and Delta – Power in a three Phase system.

UNIT IV : DC MOTOR AND CHARACTERISTICS

Motor – Working principle of DC motor – Terns used in DC motors – Armature torque – Shaft torque.

Characteristics – Torque and Armature characteristics – Speed and Armature – Current characteristics – Efficiency of DC motor – Rating of DC motor-DC Shunt characteristics – DC series – Characteristics – Compound motor – Differential –Cummulative – Compound motor.

UNIT IV APPLICATIONS AND GENERAL ASPECTS

Application - Necessity of starters- Types of Starters – Starting – Changing – Direction.

Speed variation of DC series voltage control method – Speed control of shunt voltage control method – Losses in DC motor.

Course Outcomes:
On the successful completion of the course, the student should be able to,
acquire knowledge on working principle of DC generators
give the basic ideas on various types of generators and their significance
understand the fundamental principles of poly phase system
1. analyze the characteristics of DC motors
2. develop knowledge on starters and their types

Books for study

1. S. Dhogal, Basic Electrical Engineering with numerical problems vol. I and II, TMH

** Mapping with with programme outcomes 18UPHE2:1							
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
CO1	9	9	3	6	6	3	6
CO2	9	9	6	9	3	9	9
CO3	9	9	9	6	9	6	9
CO4	9	9	9	9	3	9	9
CO5	9	9	6	3	9	9	3
Total	45	45	33	33	30	30	36
Weightage	**4.17**	**4.16**	**3.66**	**3.69**	**3.27**	**3.42**	**4.36**

*S-Strong(9); M-Medium(6); L-Low(3).

MAJOR ELECTIVE III – MOBILE COMMUNICATION

SUB.CODE: 18UPHE3:1

Course Objectives:

The main objectives of this course are to,

1. To learn the basic concepts of wireless transmission
2. To know the theoretical concepts of medium access control
3. To apply the concepts of GSM and GPRS
4. To gain knowledge about fundamentals of satellite channels
5. To acquire a thorough knowledge of digital audio broadcasting

UNIT – I : WIRELESS TRANSMISSION

Frequencies for radio transmission – signals – antennas – signal propagation – path loss of radio signals – multipath propagation – multiplexing – space division multiplexing – time division multiplexing – frequency division multiplexing – code division multiplexing – modulation and demodulation of digital data – amplitude, frequency and phase shift keying – cellular systems.

UNIT – II : MEDIUM ACCESS CONTROL

Hidden and exposed terminals – near and far terminals – concept of space division multiple access – time division multiple access – frequency division multiple access – code division multiple access – spread aloha multiple access

UNIT – III : TELECOMMUNICATION SYSTEMS

GSM – Mobile services – system architecture – radio subsystem – radio interface – logical channels and frame hierarchy – Protocols – Localisation and calling – Handover – authentication – encryption – GPRS – architecture

UNIT – IV : SATELLITE SYSTEMS

Fundamentals – satellite channels – uplink and downlink frequencies – earthstations – GEO – LEO and MEO – Routing, localization and hand over – applications

UNIT – V : BROADCAST SYSTEMS

Cyclic repetition of data – Digital audio broadcasting – multimedia object – transfer protocol – digital video broadcasting.

Course Outcomes:

At the end of the course, the student should be able to

1. learn the basic concepts of wireless transmission
2. know the theoretical concepts of medium access control
3. apply the concepts of GSM and GPRS

4. gain knowledge about fundamentals of satellite channels
5. acquire a thorough knowledge of digital audio broadcasting

Books for Study:
1. John Schiller, Mobile Communications,   Addisson Wesley
2. Frenzel, Communication Electronics Principles and Applications, TMH

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https://www.pdfdrive.com/physics-books

https://houseofphy.blogspot.com/2018/02/free-pdf-physics-books

Mapping with with programme outcomes 18UPHE3:1							
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
CO1	9	9	6	9	3	3	6
CO2	9	9	9	3	6	9	9
CO3	9	9	9	6	9	3	6
CO4	9	9	9	9	3	9	9
CO5	9	9	3	3	3	3	6
Total	45	45	36	30	24	27	36
Weightage	**4.17**	**4.16**	**4**	**3.35**	**2.62**	**3.08**	**4.36**

 S-Strong(9); M-Medium(6); L-Low(3).