KONGUNADU ARTS AND SCIENCE COLLEGE
(AUTONOMOUS)
COIMBATORE -641029

DEPARTMENT OF PHYSICS (UG)

CURRICULM AND SCHEME OF EXAMNINATIONS (CBCS)

(2019-2020 ONWARDS)

KONGUNADU ARTS AND SCIENCE COLLEGE (AUTONOMOUS)
COIMBATORE -641029

Vision:

- Developing the total personality of each and every student in a holistic way by adhering to the principles of Swami Vivekananda and Mahatma Gandhi**.**

Mission:

- Imparting holistic and man-making education with emphasis on character, culture and values - moral and ethical.
- Designing the curriculum and other courses that transform its students into value added and skilled human resources.
- Constantly updating academic and management practices towards total quality management and promotion of quality in all spheres.
- Extending the best student support services by making them comprehensive and by evolving a curriculum relevant to student community and society at large.
- Taking steps to make education affordable and accessible by extending scholarships to the meritorious and economically disadvantaged students.
- Motivating teachers in such a way that they become the role models in promoting Higher Education.

DEPARTMENT OF PHYSICS

Vision:

The goal of the Department of Physics is to bring eminence and excellence in teaching learning process and to fetch ours as one of the Benchmark Department with "Potential for Academic excellence"

Mission:

To execute the teaching profession to bring the students as an asset for a productive and fascinating career, successful in their life and to realize learning with real world experience.

PROGRAMME OUTCOME (PO)

Upon successful completion of the programme, the students will be able to

PO1: Gain basic ideas of various branches of Physics

PO2: Have the knowledge of theories involved in Physics

PO3: Understand the fundamental ideas of experimental Physics and inculcate strong laboratory skills

PO4: Understand the applications of basic concepts of Physics in Technology

PO5: Realize the role of Physics in day to day life

PO6: Be able to transfer their theoretical knowledge to experimental levels in laboratories

PO7: Develop written and oral communication skills

PO8: Acquire various technical skills

PROGRAMME SPECIFIC OUTCOME (PSO)

Students will

1. Understand the applications of basic concepts of Physics in Technology
2. Realize the role of Physics in day to day life
3. Be able to transfer their theoretical knowledge to experimental levels in laboratories
4. Develop written and oral communication skills
5. Acquire various technical skills

UPH1

KONGUNADU ARTS AND SCIENCE COLLEGE (AUTONOMOUS)

COIMBATORE–641 029

B.Sc. PHYSICS

Curriculum and Scheme of Examination under CBCS

(APPLICABLE TO STUDENTS ADMITTED DURING THE ACADEMIC YEAR **2019 –2020 ONWARDS**)

Semester	Part	Subject code	Title of the Paper	Instruction hours / cycle	Exam. Marks			Duration of Exam. Hrs.	Credit
					CIA	ESE	Total		
I	I	19TML101@	**Language I** @	6	25	75	100	3	3
	II	19ENG101	English I	6	25	75	100	3	3
	III	19UPH101	**C.P.1**– Properties of Matter and Sound	6	25	75	100	3	5
		19UPH2CL	**C.Pr.1-**Practical I	3	-	-	-	-	-
		19UMA1A1	**Allied Subject I** Mathematics – I	7	25	75	100	3	5
	IV	19EVS101	Environmental Studies**	2	-	50	50	3	2
				30	**100**	**350**	**450**		**19**
II	I	19TML202@	**Language II** @	6	25	75	100	3	3
	II	19ENG202	English II	6	25	75	100	3	3
	III	19UPH202	**C.P.2** – Heat and Thermodynamics	6	25	75	100	3	5
		19UPH2CL	**C.Pr.1-**Practical I	3	40	60	100	3	2
		19UMA2A2	**Allied Subject I** Mathematics –II	7	25	75	100	3	5
	IV	19VED201	**Value Education -** Moral and Ethics**	2	-	50	50	3	2
				30	**140**	**410**	**550**	**-**	**20**
III	I	19TML303@	**Language III** @	6	25	75	100	3	3
	II	19ENG303	English III	6	25	75	100	3	3
	III	19UPH303	**C.P.3** – Mechanics	4	25	75	100	3	5
		19UPH4CM	**C.Pr.2** Practical II	3	-	-	-	-	-

UPH 2

		19UCH3A3	**Allied Subject II** Chemistry –I	4	20	55	75	3	4
		19UCH4AL	**Allied Practical** Chemistry Practical	3	-	-	-	-	-
	IV	19UGA3S1	**Skill based Subject 1 –** General Awareness	2	25	75	100	3	3
	IV	19TBT301/ 19TAT301/ 19UHR3N1	Basic Tamil*/Advanced Tamil** / Non Major Elective-I**	2	-	75	75	3	2
				30	**120**	**430**	**550**	**-**	**20**

IV	I	19TML404@	**Language IV** @	6	25	75	100	3	3
	II	19ENG404	English IV	6	25	75	100	3	3
	III	19UPH404	**C.P.4 –** Electricity and Magnetism	4	25	75	100	3	5
		19UPH4CM	**C.Pr.2 –** Practical II	3	40	60	100	3	2
		19UCH4A4	**Allied Subject II** Chemistry –II	4	20	55	75	3	4
		19UCH4AL	**Allied Practical** Chemistry Practical	3	20	30	50	3	2
	IV	19UPH4S2	**Skill based Subject –2** Medical Instrumentation	2	25	75	100	3	3
		19TBT402/ 19TAT402/ 19UWR4N2	Basic Tamil* / Advanced Tamil** / Non Major Elective - II**	2	-	75	75	3	2
	-	19UPH5IT	Internship Training****	Grade					
				30	**190**	**520**	**700**		**24**
V	III	19UPH505	**C.P.5 –** Mathematical Physics	4	25	75	100	3	4
		19UPH506	**C.P.6 –** Optics	4	25	75	100	3	4
		19UPH507	**C.P.7 –** Principles of Electronic Devices and Circuits	4	25	75	100	3	4
		19UPH508	**C.P.8 –** Quantum Mechanics and Relativity	4	25	75	100	3	5
		19UPH5E1	**Major Elective Paper 1 –** Laser Physics & Fiber Optics	4	25	75	100	3	5
		19UPH6CN	**C.Pr.3–** Practical III - General	3	-	-	-	-	-

UPH 3

		19UPH6CO	**C.Pr.4–** Practical IV - Electronics	3	-	-	-	-	-
		19UPH6CP	**C.Pr.5–** Practical V - Digital Electronics and Microprocessors	2	-	-	-	-	-
	IV	19UPH5X1	**EDC**	2	25	75	100	3	3
				30	**150**	**450**	**600**		**25**
VI	III	19UPH609	**C.P.9 –** Atomic and Solid State Physics	5	25	75	100	3	4
		19UPH610	**C.P.10–** Fundamentals of Digital Electronics	4	25	75	100	3	4
		19UPH611	**C.P.11–** Nuclear Physics	5	25	75	100	3	5
		19UPH6E2	**Major Elective Paper 2 –** Measurements & Instrumentation	4	25	75	100	3	5
		19UPH6Z1	**Project*** **	2	20	80	100	-	5
		19UPH6CN	**C.Pr.3** Practical III - General	3	40	60	100	3	2
		19UPH6CO	**C.Pr.4–** Practical IV - Electronics	3	40	60	100	3	2
		19UPH6CP	**C.Pr.5–** Practical V – Digital Electronics and Microprocessors	2	40	60	100	3	2
	IV	**19UPH6S3**	**Skill Based Subject 3 –** Introduction to Microprocessor	2	25	75	100	3	3
	V	19NCC/NSS/YRC/PYE/ECC/RRC/WEC101 #101$$	**Extension Activities***	-	50	-	50	-	1
				30	**315**	**635**	**950**		**33**
			Total	**180**			**3800**		**140**

Note:

- CBCS - Choice Based Credit System
- CIA - Continuous Internal Assessment
- ESE - End of Semester Examination

@ Hindi/ Malayalam/ French/ Sanskrit – 19HIN/MLM/FRN/SAN 101 - 202

* No End of Semester Examinations (ESE), only Continuous Internal Assessment (CIA)

** No Continuous Internal Assessment (CIA), only End of Semester Examinations (ESE)

*** Project Report - 60 marks; Viva-voce – 20 marks; Internal – 20 marks.

****The students shall undergo Internship training / field work for a minimum period of 2 weeks at the end of the fourth semester during summer vacation and submit the report in the fifth semester. The report will be evaluated for 100 marks along with the internal viva voce by the respective Faculty. According to their marks, the grades will be awarded as given below.

Marks %	Grade
85 – 100	O
70 – 84	D
60 – 69	A
50 – 59	B
40 – 49	C
< 40	U (Reappear)

Major Elective Papers

(2 papers are to be chosen from the following 6 papers)

1. **Laser Physics and Fiber Optics**
2. **Measurements and Instrumentation**
3. Principles of Communication Systems
4. Renewable Energy Sources
5. Introduction to Biophysics
6. Materials Science

Non - Major Elective Papers

1. Human Rights
2. Women's Rights
3. Consumer Affairs

Sub.Code & Title of the Extra Departmental Course (EDC)

19UPH5X1 - Physics in Everyday life

Add on course

Job Oriented Course - Electrical Appliances: Maintenance and Servicing

Advanced Learners Course - Experimental Techniques & Data Analysis

 # List of Extension Activities:

1. National Cadet Crops (NCC)
2. National Service Scheme (NSS)
3. Youth Red Cross (YRC)
4. Physical Education (PYE)
5. Eco Club (ECC)
6. Red Ribbon Club (RRC)
7. Women Empowerment Cell (WEC)

Note:

In core/allied subjects no. of papers in both theory and practical are included wherever applicable. However the total credits and marks for core /allied subjects remain the same as stated below.

Tally Table:

S. No	Part	Subject	Marks	Credits
1	I	Language - Tamil/Hindi/Malayalam/French/Sanskrit	400	12
2	II	English	400	12
3	III	Core- Theory / Practical's	1600	60
		Allied	400	20
		Electives / Project	300	15
4	IV	Basic Tamil /Advanced Tamil /Non-Major Elective	150	4
		Skill Based Subjects	300	9
		EDC	100	3
		Environmental Studies	50	2
		Value Education	50	2
5	V	Extension Activities 1	50	1
Total			**3800**	**140**

- 25% of CIA is applicable to all subjects except JOC, COP and SWAYAM courses which are considered as extra credit courses.

- The students are advised to complete a **SWAYAM- MOOC** before the completion of the 5th semester and the course completed certificate should be submitted to the HOD. Two credits will be given to the candidates who have successfully completed.

- A **Field Trip** preferably relevant to the course should be undertaken every year.

Components of Continuous Internal Assessment

Components		Marks	Total
Theory			
CIA I	75	(75+75 = 150/10) 15	25
CIA II	75		
Assignment/Seminar		5	
Attendance		5	
Practical			
CIA Practical		25	40
Observation Notebook		10	
Attendance		5	
Project			
Review		15	20
Regularity		5	

BLOOM'S TAXONOMY BASED ASSESSMENT PATTERN

K1-Remembering; **K2**-Understanding; **K3**-Applying; **K4**-Analyzing; **K5**-Evaluating

1. Theory Examination – Part I, II & III

(i) CIA I & II and ESE: 75 Marks

Knowledge Level	Section	Marks	Description	Total
K1 Q1 to 10	A (Answer all)	10 x 1 = 10	MCQ	75
K2 Q11 to 15	B (Either or pattern)	5 x 5 = 25	Short Answers	
K3 & K4 Q16 to 20	C (Either or pattern)	5 x 8 = 40	Descriptive / Detailed	

(i) CIA I & II and ESE: 55 Marks

Knowledge Level	Section	Marks	Description	Total
K1 Q1 to 10	A (Answer all)	10 x 1 = 10	MCQ	55
K2 Q11 to 15	B (Either or pattern)	5 x 3 = 15	Short Answers	
K3 & K4 Q16 to 20	C (Either or pattern)	5 x 6 = 30	Descriptive / Detailed	

2. Practical Examination:

Knowledge Level	Section	Marks	Total
K3	Experiments	50	60
K4	Record Work	10	
K5			

3. Project Viva Voce:

Knowledge Level	Section	Marks	Total
K3	Project Report	60	80
K4	Viva voce	20	
K5			

4. JOC and ALC

Section A – Multiple Choice (10 × 1 = 10 marks)

Section B – Either or type (5 × 6 = 30 marks)

Section C – Either or type (5 × 12 = 60 marks)

UPH 8

Course Code: 19UPH101

Programme Code: 03		B.Sc Physics		
Course Code: 19UPH101		Core Paper – 1: Properties of Matter and Sound		
Batch 2019-2020	Semester I	Hours/Week 6	Total Hours 90	Credits 5

Course Objective

To enable the learners to

1. Understand the basic concepts of gravitation.
2. Get exposure to the properties of liquids & solids.
3. Understand the properties of sound and applications.

Course Outcome (CO)

K1	**CO1**	Understand the action of gravitational fields and potentials on different objects
K2	**CO2**	Gain knowledge on elastic behavior of beams, rods and wires through the bending and torsional behaviors of the objects
K3	**CO3**	Compare the properties of liquids by surface tension and viscosity experiments
K4	**CO4**	Production and application of ultrasonics and acoustics in different types of buildings.

UNIT I **18 hrs**

Gravitation fields and potentials

Nature of motion under central forces - Kepler's law - Newton's law of gravitation - Gravitational potential and field - Gravitational potential and field due to i) spherical shell, ii) solid sphere and iii) hollow sphere - Boy's Method and Heyl's Method of determining 'G'. Gravitational field of Erath – equation of motion of elementary volume – escape velocity.

UNIT II **18 hrs**

Elasticity

Elastic constants – Relations connecting them – Poisson's ratio - Bending of beams - uniform and non - uniform bending – Cantilever – static and dynamic methods - Torsion in a wire – Rigidity modulus - determination by static and dynamic methods.

UNIT III **18 hrs**

Surface Tension

Surface tension and Surface energy– pressure in a curved surface of a liquid–Shape of Liquid Meniscus in a Capillary tube – Angle of contact – Measurement of angle of contact – Rise of a liquid in a capillary tube – Experimental determination of Surface Tension: Searle's Torsion Balance Method, drop-weight method, Quincke's method – Variation of surface tension with temperature – Jaeger's method.

UPH 9

Course Code: 19UPH101

UNIT IV **18 hrs**

Viscosity

Streamline flow, Turbulent flow – Energy of a liquid – Bernoulli's theorem and its applications – Coefficient of viscosity – Poiseuille's formula to find η of low viscous liquid – Stoke's method, Searle's viscometer method to find η of a high viscous liquid – Comparison of viscosities – Ostwald Viscometer – Viscosity of Gas – Meyer's formula – Rankine's method – Searle's method.

UNIT V **18 hrs**

Acoustics and Ultrasound

Acoustics–Basic principle–Reverberation– Sabine's reverberation formula – Determination of absorption coefficient– Factors affecting the acoustics of buildings– Sound distribution in an auditorium– Requisites for good acoustics.

Ultrasonics – Production of ultrasonic waves: Magnetostriction oscillator and piezo-electric oscillator– Detection of ultrasonic waves – **Application of ultrasonics***.

*** Self study**

Teaching methods: Seminar, Assignment, Google Classroom, Discussion and PPT

Books for study:

1. Elements of Properties of Matter — D. S. Mathur, Shyamlal Charitable Trust, New Delhi (2010).
2. Properties of Matter — N. Subramaniyam and Brijlal, S.Chand & Co (2005).
3. A textbook of Sound — R. L. Saihgal, S.Chand & Co (1982).

Books for reference:

1. A Textbook of Sound — N.Subrahmanyan and Brijlal, Vikas House Pvt.Ltd.Publishing (1980).
2. Mechanics — D.S.Mathur, S.Chand & Co (1996).
3. Properties of Matter — R. Murugesan, S.Chand & Co (1995).
4. Principles of the Gravitational Method — Alex A. Kaufman, Elsevier (2007).

Mapping					
	PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO 1	**S**	**H**	**S**	**H**	**H**
CO 2	**H**	**S**	**H**	**S**	**S**
CO 3	**S**	**S**	**H**	**H**	**S**
CO 4	**H**	**H**	**S**	**S**	**S**
S- Strong	**H-High**		**M-Medium**		**L - Low**

UPH 10

Course Code: 19UPH202

Programme Code: 03		B.Sc Physics		
Course Code: 19UPH202		Core Paper – 2 : Heat and Thermodynamics		
Batch 2019-2020	Semester II	Hours/Week 6	Total Hours 90	Credits 5

Course Objective

To enable the learners to understand

1. Equation of states of a real gas, quantum theory of specific heat and basic theory of entropy.
2. Principle and different methods of production of low temperature and liquefaction of He.
3. Quantum theory of radiation and three types of thermodynamical statistics.

Course Outcome (CO)

K1	**CO1**	Understand gas laws and its behavior. Understand the model system of an ideal gas and the principles of kinetic theory, Einstein's theory and Debye's theory.
K2	**CO2**	Gain knowledge on entropy of a system in reversible and irreversible process. Understand significance of thermodynamic properties and internal energy.
K3	**CO3**	Compare the various methods of production of low temperature and liquefaction of gases. Will understand radiative heat transfer and radiation laws.
K4	**CO4**	Analyze the concepts of microstate and macrostate of a model system. Understand the classical statistics and quantum mechanics.

UNIT I **15 hrs**

Equation of states of a real gas

Van der waals equation of state– critical constants.

Quantum theory of specific heat

Dulong and Petit's law and the deduction; failure of Dulong and Petit's law – Einstein's theory and its limitation – Debye's theory – **Specific heat of diatomic gases***.

UNIT II **15 hrs**

Entropy

Principle of increase of entropy; temperature entropy diagram; entropy of a perfect gas.

Thermodynamic potentials– internal energy (U) – Helmholtz function(F) – Gibb's function (G) and enthalpy (H); Maxwell's thermodynamic relations – the (T-dS) equation– Clausius-Clapeyron's latent heat equation from Maxwell's thermodynamic relation.

UNIT III **15 hrs**

Production of low temperature and liquefaction of gases

Methods of production of low temperature – Joule Thomson effect; porous plug experiment, it's theory and results; liquefaction of Air by Linde's process, Oxygen by cascade process, Hydrogen, Helium by Onne's method, Helium I and Helium II - Lamda point – Adiabatic demagnetization, Measurement of very low temperature.

Course Code: 19UPH202

UNIT IV **15 hrs**

Thermal radiation

Quantum theory of radiation; Planck's hypothesis – average energy of Planck's oscillator– Planck's radiation law and its experimental verification – Wien's law and Rayleigh – Jean's law in relation to Planck's law– Stefan's constant and Wien's constant from Planck's law

UNIT V **15 hrs**

Statistical Thermodynamics

Statistical equilibrium– probability theorem in statistical thermodynamics; Maxwell - Boltzmann distribution law ; Maxwell – Boltzmann distribution in terms of temperature – Maxwell's quantum statistics – phase space – Fermi- Dirac distribution law – Bose-Einstein distribution law (Qualitative study only) – **comparison of three statistics***

***Self-study**

Teaching methods: Seminar, Assignment, Google Classroom, Discussion and PPT

Books for study:

1. Heat, Thermodynamics and Statistical Physics	Brij Lal and N. Subrahmanyam, S. Chand (2008).
2. Heat and Thermodynamics	Brijlal and Subramanian, S.Chand & Company, New Delhi (2002).
3. Text Book of Heat	M. Narayanamurthi, K. Ramamoorthi and S. Devanathan, Triveni Publishers, Chennai (1972).

Books for reference:

1. Thermal Physics	R. Murugeshan and K. Sivaprasath, S.Chand & Company, New Delhi (2004).

Mapping					
	PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO 1	**S**	**S**	**H**	**S**	**H**
CO 2	**H**	**H**	**S**	**S**	**S**
CO 3	**S**	**S**	**H**	**H**	**H**
CO 4	**H**	**S**	**S**	**H**	**S**
S- Strong		**H-High**	**M-Medium**		**L - Low**

UPH 12

Course Code: 19UPH2CL

Programme Code: 03		B.Sc Physics		
Course Code: 19UPH2CL		Core Practical - I		
Batch	**Semester**	**Hours/Week**	**Total Hours**	**Credits**
2019-2020	**I & II**	**3**	**90**	**2**

Course Objective

To enable the learners to:

1. Understand the Physical Phenomena and fundamentals of general physics.
2. Perform experiments in the field of general physics and gaining understanding of the results.
3. Interpret the practical result to support the theory

Course Outcome (CO)

K5	**CO1**	Provide hands on experiences in conducting scientific investigations and laboratory experiments.
K5	**CO2**	Develop the ability to analyse basic experiments and analyze the relationship between theory and experimental results. Take measurements to compare experimental results in the laboratory with the theoretical analysis.
K5	**CO3**	Will be familiar to conduct experimental investigations of simple mechanical, heat and optical physics.
K5	**CO4**	Practice record keeping of experimental work and data graphing

List of experiments (Any Fifteen)

1. Young's Modulus – Non-uniform bending – Optic lever
2. Young's Modulus – Cantilever – Static method
3. Rigidity Modulus – Static Torsion
4. A.C. frequency – Sonometer
5. Acceleration due to Gravity – Compound pendulum
6. Co-efficient of Thermal conductivity – Lee's disc method
7. Specific heat capacity of a liquid – Newton's cooling method
8. Refractive index of a liquid prism – Spectrometer
9. Refractive index of a solid prism – Spectrometer
10. Refractive index of a solid prism (i-d) curve – Spectrometer
11. Wavelength of spectral lines – Grating – Normal incidence method – Spectrometer

Course Code: 19UPH2CL

12. Wavelength of spectral lines – Grating – minimum deviation – Spectrometer
13. Calibration of low range voltmeter – Potentiometer
14. Calibration of low range ammeter – Potentiometer
15. Specific Resistance of a wire – Meter bridge
16. Temperature co-efficient of resistance of a thermistor – Post office box.
17. Rigidity modulus and moment of inertia – Torsional Pendulum
18. Determination of pole strength – Tan C position
19. Determination of frequency – Melde's method
20. Characteristic of a PN junction diode

Mapping					
	PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO 1	**S**	**H**	**H**	**S**	**S**
CO 2	**H**	**H**	**S**	**S**	**H**
CO 3	**S**	**S**	**S**	**H**	**H**
CO 4	**H**	**H**	**S**	**H**	**H**
S- Strong	**H-High**		**M-Medium**		**L - Low**

UPH 14

Course Code: 19UPH303

Programme Code: 03		B.Sc Physics		
Course Code: 19UPH303		Core Paper - 3: Mechanics		
Batch	**Semester**	**Hours/Week**	**Total Hours**	**Credits**
2019-2020	**III**	**4**	**60**	**5**

Course Objective

To enable the learners to

1. Understand the principles of rigid body dynamics
2. Understand the fundamental ideas of Projectile motions
3. Understand the statics, hydrostatics and hydrodynamics

Course Outcome (CO)

K1	**CO1**	Rigid body dynamics will help the students to understand the behaviour of various bodies due to kinematic and dynamic forces acting on the body.
K2	**CO2**	The study of projectiles enables the students to apply the knowledge of mathematics, fundamental sciences to obtain solution of complex mechanical problems.
K3	**CO3**	Study of statics promotes analysis and interpretation of numerical problems.
K4	**CO4**	Students will gain knowledge on fundamental laws of floatation and hydrostatics.

UNIT I **12 hrs**

Rigid body dynamics

Rigid body–rotational and vibrational motion –Torque–moment of inertia – radius of gyration – kinetic energy of rotation – M.I. of a fly wheel– experimental determination–precession– **gyrostat–gyrostatic application *** – M.I. of a diatomic molecule–its rotational energy states.

UNIT II **12 hrs**

Projectiles

Projectiles – Range – Expression for the range of projectile on the inclined plane – path of a projectile – Impulse – Direct and oblique impact – Expression for velocity after direct impact – Loss of energy during direct and oblique impact.

UNIT III **12 hrs**

Statics

Centre of gravity – Position of G for simple rigid bodies – rigid solid cone – thin hollow hemisphere – solid hemisphere – Centre of gravity of a body composed of two parts – Equilibrium of bodies – suspended and supported – types of equilibrium.

Force of friction –Limiting friction – Laws of friction – Angle of friction and resultant reaction – Cone of friction.

Course Code: 19UPH303

UNIT IV **12 hrs**

Hydrostatics

Fluid thrust

Thrust on a plane surface – the centre of pressure – position of the centre of pressure – Rectangular lamina – Triangular lamina – Thrust on curved surfaces.

Flotation

Laws of flotation – Metacentre – Metacentric height – the metacentric height of a ship.

UNIT V **12 hrs**

Hydrodynamics

Fluids in Motion – Steady or stream line flow- Equation of continuity of flow – Energy of liquids - Bernoulli's theorem – Euler's equation and Bernoulli's equation – verification – practical applications – Ventury meter – the pitot tube.

*** Self study**

Teaching Methods: Seminar, Discussion Assignment and Google Classroom.

Books for study:

1. Mechanics	D.S.Mathur, S.Chand & Co (2006).
2. Mechanics	Subramaniam Jayarama, Rangarajan, SV Publishers Pvt Ltd.

Books for reference:

1. Statics, Hydrostatics and Hydrodynamics	M.Narayanamurthy, N.Nagarathianam, The National Publishing Company.
2. Fundamentals of Physics	D.Halliday, R.Resnick and J.Walker, John Wiley & Sons (2010).

Mapping					
	PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO 1	**S**	**H**	**S**	**H**	**H**
CO 2	**H**	**S**	**H**	**S**	**S**
CO 3	**S**	**S**	**H**	**H**	**S**
CO 4	**H**	**H**	**S**	**S**	**S**
S- Strong	**H-High**		**M-Medium**		**L - Low**

Course Code: 19UPH404

Programme Code: 03		B.Sc Physics		
Course Code: 19UPH404		Core Paper - 4: Electricity and Magnetism		
Batch 2019-2020	Semester IV	Hours/Week 4	Total Hours 60	Credits 5

Course Objective

To enable the learners to

1. Acquire basic knowledge of electrostatics and thermoelectricity
2. Study about magnetic properties of materials
3. Learn motion of charges and alternating current and its circuits

Course Outcome (CO)

K1	**CO1**	Acquire knowledge about electrostatics, magnetic and thermoelectric properties of materials
K2	**CO2**	Understand the motion of charges in ac circuits and magnetic effect of electric current
K3	**CO3**	Apply knowledge on fabrication of different types of capacitors, transformer, choke coil and thermoelectric power generators.
K4	**CO4**	Analyze the trouble shooting of ac circuits (LCR series and LCR parallel mode) and also analyze the thermoelectric diagrams

UNIT I **12 hrs**

Electrostatics:

Gauss theorem and its applications

Gauss theorem, application of Gauss theorem – Electric intensity at a point immediately adjacent to a charged conductor –energy stored in unit volume of an electric field.

Capacitance and capacitors

Spherical capacitor – cylindrical capacitor – force of attraction between charged plates of a capacitor –change in the energy of a parallel plate capacitor when the distance between the plates is altered and when a dielectric slab is introduced between the plates – types of capacitors – Guard ring capacitor –electrolytic capacitor – variable capacitor

Dielectrics

Polarization in dielectric material – parallel plate capacitor and dielectric slab – boundary condition – depolarization factor.

UNIT II **12 hrs**

Magnetic properties of materials

Magnetic vector potential – electron theory of magnetism – Dia, Para and Ferromagnetism– magnetic field (B) – magnetization (M) – magnetic field intensity (H) – magnetic susceptibility and magnetic permeability – magnetic materials and magnetization – magnetic hysteresis – area of the hysteresis loop – Ferro magnets, determination of susceptibility – curie balance method – **Guoy's method* .**

Course Code: 19UPH404

Magnetic effect of electric current

Moving coil Ballistic Galvanometer – Figure of merit of B.G. – Absolute capacitance of a capacitor.

UNIT III **12 hrs**

Thermoelectricity:

Seebeck effect – Laws of thermo e.m.f – Peltier effect – Peltier co-efficient, determination of Peltier co- efficient at a junction – thermo dynamical consideration of Peltier effect – Thomson effect – Thomson co – efficient – e.m.f. generated in a thermocouple taking both Peltier effect at the junctions and Thomson effect in the metals – thermoelectric power – application of thermodynamics to thermocouple – thermoelectric diagrams and their uses.

UNIT IV **12 hrs**

Alternating Current:

EMF induced in a coil rotating in a magnetic field – AC circuits containing resistance, inductance and capacitance in series – series resonant circuit – acceptor circuit – voltage magnification – the Q-factor – Parallel resonant circuit – Power in AC circuit containing resistance, capacitance and inductance – wattless current – choke coil – the transformer.

UNIT V **12 hrs**

Transient currents:

Growth and decay of current in an inductance – resistance circuit – charging and discharging of a capacitance through a resistance – Measurement of resistance by leakage – charging and discharging of a capacitance through an inductance and a resistor

Motion of charged particles in Electric and Magnetic fields*

Motion of charged particles in uniform longitudinal and transverse Electric field – Motion of charged particles in a uniform constant magnetic field – Motion of charged particles in a crossed electric and magnetic fields

*** Self study**

Teaching Methods: PowerPoint presentation / Seminar / Discussion / Assignment / Google Classroom.

Books for study:

1. Electricity and magnetism Brijlal and Subramaniam, Ratan PrakashanMandir (2000).

2. Electricity and magnetism R. Murugesan, S.Chand & Co (2004).

Books for reference:

1. Electricity and magnetism with electronics — K.K. Tewari, S.Chand & Co (2003).

2. Mechanics — D. S. Mathur, S. Chand & Company publishers, New Delhi (2003).

3. Fundamentals of Electricity and magnetism — D. N. Vasudeva, McGraw Hill Publishers (1998).

Mapping					
	PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO 1	**S**	**H**	**S**	**H**	**H**
CO 2	**H**	**S**	**H**	**S**	**S**
CO 3	**S**	**S**	**H**	**H**	**S**
CO 4	**H**	**H**	**S**	**S**	**S**
S- Strong	**H-High**		**M-Medium**		**L - Low**

UPH 19

Course Code: 19UPH4CM

Programme Code: 03		B.Sc Physics		
Course Code: 19UPH4CM		**Core Practical - II**		
Batch 2019-2020	**Semester III & IV**	**Hours/Week 3**	**Total Hours 90**	**Credits 2**

Course Objective

To enable the learners to:

1. Understand the Physical Phenomena and fundamentals of general physics.
2. Perform experiments in the field of general physics and gaining understanding of the results.
3. Interpret the practical result to support the theory

Course Outcome (CO)

K5	**CO1**	Provide hands on experiences in conducting scientific investigations and laboratory experiments.
K5	**CO2**	Develop the ability to analyse basic experiments and analyze the relationship between theory and experimental results. Take measurements to compare experimental results in the laboratory with the theoretical analysis.
K5	**CO3**	Will be familiar to conduct experimental investigations of simple mechanical, heat and optical physics.
K5	**CO4**	Practice record keeping of experimental work and data graphing

List of experiments (Any Fifteen)

1. Young's modulus – Uniform bending – Pin and microscope
2. Young's modulus – Cantilever – Dynamic method
3. Wavelength of mercury spectral lines – grating – minimum deviation – Spectrometer
4. Series Resonance Circuit
5. Parallel Resonance Circuit
6. Refractive index of a prism (i-i') – Spectrometer
7. Thickness of a thin wire – Air wedge method
8. Solar spectrum – Spectrometer
9. Calibration of high range voltmeter – Potentiometer
10. Temperature co-efficient of resistance – Carey Foster's Bridge
11. EMF of a thermocouple – Potentiometer
12. Specific Resistance of a wire – Potentiometer.

Course Code: 19UPH4CM

13. Figure of merit - B.G.
14. Capacity of a condenser – B.G.
15. Field intensity circular coil – Vibrational magnetometer
16. Characteristics of Zener diode
17. Moment of a magnet – Circular coil – Deflection magnetometer
18. Determination of specific gravity of liquid – Joule's Calorimeter
19. Verification of NAND and NOR gate as Universal gate
20. Multimeter Principle – Ammeter, Voltmeter and Ohm meter

Mapping					
	PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO 1	**S**	**H**	**H**	**S**	**S**
CO 2	**H**	**H**	**S**	**S**	**H**
CO 3	**S**	**S**	**S**	**H**	**H**
CO 4	**H**	**H**	**S**	**H**	**H**
S- Strong	**H-High**		**M-Medium**		**L - Low**

Course Code: 19UPH505

Programme code: 03		B.Sc., Physics		
Course Code: 19UPH505		Core Paper - 5 : Mathematical Physics		
Batch 2019-2020	Semester V	Hours/Week 4	Total Hours 60	Credits 4

Course Objective

To enable the learners to

1. Know about applying Fourier series and vector analysis to physical problems
2. Know about differential operators in various coordinates systems
3. To apply Lagrangian formulation to physical bodies

Course Outcome (CO)

K1	**CO1**	To understand physical examples of Fourier series
K2	**CO2**	To understand co-ordinates of operators in vectors
K3	**CO3**	To apply the vectors for physical examples
K4	**CO4**	To solve the problems in Classical Mechanics and Lagrange's Equations

UNIT I **12 hrs**

Fourier series

Fourier series for function such as xsinx, $x+x^2$, e^x, x^2-Physical examples of Fourier series-Half wave rectifier-Full wave rectifier-Square wave-Saw tooth wave.

UNIT II

Differential operators in vectors **12 hrs**

Orthogonal Curvilinear Co-ordinates-Differential operators Gradient-divergence-Laplacian curl-Spherical polar Co-ordinates-Differential operator-Gradiant-divergence-Laplacian-Curl-Cylindrical Co-ordinates-Differential operations-Gradient-divergence.

UNIT III

Application of Vectors **12 hrs**

Hydrodynamics-Equation of Continuity-Cartesian form-Incompressible fluid –Euler's equation of motion-Bernoullis equation- Fourier's Heat flow equation (One dimension).

Course Code: 19UPH505

UNIT IV

Classical Mechanics **12 hrs**

Introduction-Review of Mechanics for a System of Particles-Basic concepts-Constraints-Generalized Coordinates-Transformation Equations-Configuration-Space-Generalized Notations -Principle of Virtual Work-D'Alembert's Principle-The Lagrangian Formulation-Lagrange's Equation from D'Alembert's Principle-Lagrange's Equation for systems containing dissipative.

UNIT V

Application of Lagrange's Equations **12 hrs**

Lagrangian for a simple pendulum-The Atwood's machine- Lagrangian for the Resulting motion of a bead sliding on uniformly rotating wire-Lagrangian for the motion of two particles under gravitational filed-Equation of motion of a spherical pendulum-Lagrangian formulation of conservation theorem-Generalized momentum-Conservation theorem for energy-**Conservation Theorem for Linear momentum*.**

*** Self study**

Teaching Methods: PowerPoint presentation / Seminar / Discussion / Assignment / Google Classroom.

Books for study:

1. Mathematical Physics — Satya Prakash, Sultan chand and Sons, New Delhi (2006).
2. Mathematical Physics — B D Gupta, Vikas publishing house (2001).
3. Classical Mechanics — S.I. Gupta, V.Kumar H.V.Sharma, Pragati (2010)

Books for reference:

1. Mathematical Physics — P. K. Chattopadhyay, New Age International, New Delhi (2001)
2. Engineering Mathematics — Kandasamy. P, Thilagavathy. K and Gunavathy. K, S. Chand and Co, New Delhi (2008).
3. Engineering Mathematics — Veerarajan.T, Fourth Edition TataMcGraw Hill (2004).
4. Engineering Mathematics — Venkataraman. M.K, Volume I & II Revised, The National Pub. Co (2004).

Mapping					
	PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO 1	**H**	**S**	**S**	**H**	**H**
CO 2	**S**	**H**	**H**	**H**	**S**
CO 3	**H**	**S**	**H**	**S**	**H**
CO 4	**S**	**H**	**H**	**S**	**H**
S- Strong		**H-High**	**M-Medium**		**L - Low**

UPH 23

Course Code: 19UPH506

Programme code: 03		B.Sc., Physics		
Course Code: 19UPH506		Core Paper - 6: Optics		
Batch 2019-2020	Semester V	Hours/Week 4	Total Hours 60	Credits 4

Course Objective

To enable the learners to

i. Acquire knowledge in ray optics
ii. Understand mechanism of energy transfer in the form of waves
iii. Basic principles of optical instruments
iv.

Course Outcome (CO)

K1	**CO1**	Learn to use geometric approximation, the ray equations, understand the aberrations with an emphasis on image forming systems and how they can be reduced
K2	**CO2**	To understand wave optics, interference, diffraction and polarization.
K3	**CO3**	Be acquainted with Fresnel and Fraunhofer diffraction.
K4	**CO4**	Be able to understand the principle, construction and working of optical instruments.

UNIT I **15 hrs**

Geometrical optics: Aberrations and dispersion

Aberrations –spherical aberrations in a lens– coma–aplanatic lens – astigmatism –curvature of the field – distortions – chromatic aberration– dispersion by a prism – irrational dispersion– angular and chromatic dispersions – Cauchy's dispersion formula– dispersive power, achromatism in prisms–dispersion without deviation –chromatic aberration in a lens– **circle of least confusion***, achromatic lenses –condition for achromatism of two thin lenses separated by a finite distance.

UNIT II **15 hrs**

Interference

Fresnel's bi prism– interference in thin films due to reflected and transmitted light – fringes due to wedge shaped thin film–Newton's rings–refractive index of a liquid– **Michelson's interferometer– determination of wavelength of monochromatic light*** – difference in wave length between two neighboring spectral lines – Fabry perot interferometer - visibility of fringes – sharpness of fringes–resolving power – Airy's formula.

UNIT III **15 hrs**

Diffraction

Fresnel's assumptions – rectilinear propagation of light – half period zone– zone plate –action and construction–comparison with the convex lens–Fresnel and Fraunhofer diffraction – Fraunhofer diffraction at a single slit – diffraction grating – resolving power and dispersive power of a grating.

Course Code: 19UPH506

UNIT IV **15 hrs**

Polarization

Double refraction – Huygen's explanation in uniaxial crystals – quarter wave plate – Half wave plate – Babinet's compensator - production and detection of plane, circularly and elliptically polarized light – optical activity–Fresnel's explanation–specific rotation –Laurentz's half shade Polarimeter.

UNIT V **15 hrs**

Optical Instrumentation

Objective lens and eye piece: Huygen's eyepiece – Ramsden eyepiece – compound microscope – astronomical telescope (refracting) – constant deviation spectrometer – instrumentation of Kerr cell method – instrumentation of Anderson's method.

*** Self study**

Teaching methods: Seminar, Assignment, Google Classroom, Discussion and PPT

Books for study:

1. A text book of optics — Brijlal, M.N.Avadhanulu and N. Subrahmanyam, 4th edition S. Chand & Co Publishers, New Delhi (2012).

Books for reference:

1. Optics and spectroscopy — R. Murugesan, S.Chand & Company Ltd, New Delhi (2003).
2. Optics — Sathyapraksh, Ratan Prakashan Mandir (2011).

Mapping					
	PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO 1	**S**	**S**	**H**	**H**	**S**
CO 2	**S**	**H**	**S**	**S**	**S**
CO 3	**S**	**S**	**H**	**S**	**H**
CO 4	**S**	**S**	**H**	**H**	**S**
S- Strong		**H-High**	**M-Medium**		**L - Low**

Course Code: 19UPH507

Programme code: 03		B.Sc., Physics		
Course Code: 19UPH507		Core Paper - 7 Principles of Electronic Devices and Circuits		
Batch 2019-2020	Semester V	Hours/Week 4	Total Hours 60	Credits 4

Course Objective

To enable the learners to

1. Understand the action of semiconductor devices and their applications.
2. Know the principle and working of oscillators.

Course Outcome (CO)

K1	**CO1**	Learn to use semiconductors and devices
K2	**CO2**	Be able to understand transistor biasing and stabilization
K3	**CO3**	Learned about the functioning of FET, MOSFET,UJT and SCR
K4	**CO4**	Have an understanding of the basic principles of Operational Amplifiers, Amplifiers and Oscillators

UNIT I **12 hrs**

Semiconductors

Semi-Conductor – commonly used semiconductors – energy band description of semiconductors – effect of temperature on semiconductors –n- type and p-type semiconductors – majority and minority carriers - p-n junction – volt ampere characteristics of p-n junction

Semiconductors devices

Special Diodes

Characteristics, equivalent circuits, applications of PN junction and Zener diode – Tunnel diode – Photodiode –Thermistors

Rectifiers and Filters

Rectifiers: Half wave – Full wave – Bridge rectifiers – Ripple factor.

Filters: Inductive and capacitive*.

UNIT II **12 hrs**

Transistor Biasing and Stabilization

Leakage currents and total output currents in a common emitter and common collector circuits – advantages of common emitter circuits.

Load line – Q – point and maximum undistorted output – factors affecting stability of Q-point– stability factor.

Transistor Equivalent Circuits and h- Parameters

AC – load resistance – current gain – voltage gain – h-parameter – The h- parameters of an ideal transistor.

Course Code: 19UPH507

UNIT III **12 hrs**

Field Effect Transistor

Junction Field Effect Transistor (JFET) – construction, operation and characteristics of JFET – Parameters of JFET – expression for transconductance – comparison between FET and bipolar junction transistor.

Metal Oxide Semiconductor FET (MOSFET)

Construction, working of drain and transfer characteristics of depletion type and enhancement type MOSFETs – advantages of MOSFETs over JFETs and N-channel MOSFETs over P-channel MOSFETs.

Uni-junction Transistor (UJT)

Construction, equivalent circuit, operation, characteristics and application of UJT

Silicon Controlled Rectifier

SCR - Working of SCR - V-I characteristics – SCR as a switch

UNIT IV **12 hrs**

Amplifiers – Single Stage & Multistage

Design of single stage transistor amplifier – RC coupled amplifier – multistage amplifier – transformer coupled amplifier

Operational Amplifiers

Circuit, symbol, polarity conventions and summing point (or virtual ground) of an operational amplifier – characteristics of an ideal operational amplifier*– operational amplifier as inverting and non- inverting amplifier – operational amplifier as an adder, subtractor, differentiator and integrator.

UNIT V **12 hrs**

Sinusoidal Oscillators

Principle of an Oscillator - Crystal Oscillators - Hartley and Colpitts oscillators with theory - Waveforms of astable, monostable and bistable multivibrator circuits – clipping circuits – Applications of clippers – clamping circuits.

*** Self study**

Teaching methods: Seminar, Assignment, Google Classroom, Discussion and PPT

Books for study:

1. Principles of Electronics	V. K. Metha, S.Chand & Company Ltd, New Delhi (1990).
2. A Text Book of Applied Electronics	R.S. Sedha, S.Chand & Company Ltd, New Delhi (1999).
3. Basic Electronics– Solid State	B. L. Theraja, S.Chand & Company Ltd, New Delhi (2002).

Book for reference:

1. Basic Electronics Bernod Grob, McHraw Hill, New Delhi (1992).

Mapping					
	PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO 1	**S**	**S**	**H**	**H**	**S**
CO 2	**S**	**H**	**S**	**S**	**S**
CO 3	**S**	**S**	**H**	**S**	**H**
CO 4	**S**	**S**	**H**	**H**	**S**
S- Strong		**H-High**		**M-Medium**	**L - Low**

UPH 28

Course Code: 19UPH508

Programme code: 03		B.Sc., Physics		
Course Code: 19UPH508		Core Paper – 8: Quantum Mechanics and Relativity		
Batch 2019-2020	Semester V	Hours/Week 4	Total Hours 60	Credits 5

Course Objective

To enable the learners to

1. Know about DeBroglie concept and the uncertainty relation.
2. Know about the applications of Schrodinger's equation
3. Know about the postulates constancy of light as well as the mass-energy relationship

Course Outcome (CO)

K1	**CO1**	Familiar with the main aspects of the historical development of Quantum Mechanics
K2	**CO2**	Discuss and interpret experimental results that reveal the wave properties of matter.
K3	**CO3**	Understand the basic principles in Quantum Mechanics such as the Schrodinger equation, the wave function, Uncertainty principle, elementary concepts in statistics such as expectation value.
K4	**CO4**	Understand the theory of relativity and to solve Schrodinger equation for simple systems in one to three dimensions

UNIT I **12 hrs**

Inadequacy of classical mechanics – Shortcomings of old quantum theory – Foundations of wave mechanics - Dual nature of light and matter – Experimental evidence for matter waves - Davisson and Germer's electron diffraction experiment – G.P.Thomson's experiment – DeBroglie concept of stationary orbits – DeBroglie wavelength associated with electron accelerated through a potential difference – Non relativistic expression – Relativistic expression.

UNIT II **12 hrs**

Wave (or Phase) velocity and group velocity – velocity of DeBroglie waves – relation between phase velocity and group velocity for a non-relativistic free particle - Equation of motion of matter waves – Physical interpretation of the wave function – Normalized and Orthogonal wave function – conditions satisfied by wave function – solution of the Schrödingers equation – Stationary state solution.

UPH 29

Course Code: 19UPH508

UNIT III **12 hrs**

Operators associated with different observables – Expectation values of dynamical quantities – probability current density – Ehrenfest theorem – related problems.

Uncertainty Principle - Heisenberg's gamma ray microscope – Diffraction of a beam of electrons by a slit – application of uncertainty principle – Nonexistence of electron in a nucleus – the radius of the first orbit.

UNIT IV **12 hrs**

Physical aapplications of Schrödinger's Equation - The Free particle - Particle in a box - Potential step – Reflectance and Transmittance for $E>V_0$ and $E<V_0$ - A particle in one dimensional infinitely deep potential well - A particle in three dimensional infinitely deep potential well - One dimensional linear harmonic oscillator.

UNIT V **12 hrs**

Relativity

Frames of reference – inertial frames of reference – Galilean transformation – Michelson-Morley experiment – explanation of negative results. Postulates of special theory of relativity – Lorenz's transformation equation – length contraction – time dilation – Meson decay – relativity of simultaneity – addition of velocities – variation of mass with velocity – **mass energy equivalence*** – General theory of relativity.

*** Self study**

Teaching methods: Seminar, Assignment, Google Classroom, Discussion and PPT

Books for study:

1. Quantum mechanics — Satya Prakash and Swati Saluja, Kedar Nath Ram Nath & Co (2004).
2. Modern physics — R. Murugeshan, S. Chand & Co (1992).
3. Modern physics — R. Murugeshan and Kiruthiga Sivaprasath, S. Chand & Co (2006).

Books for reference:

1. Quantum Mechanics — S.P.Singh and M.K.Bagde, S.Chand Co (1994).
2. Quantum Mechanics — V.Devanathan, Narosa Publishing House (2006).

Mapping					
	PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO 1	**S**	**S**	**H**	**H**	**H**
CO 2	**H**	**H**	**S**	**H**	**S**
CO 3	**H**	**H**	**S**	**S**	**H**
CO 4	**S**	**H**	**H**	**H**	**H**
S- Strong		**H-High**	**M-Medium**		**L - Low**

UPH 30

Course Code: 19UPH609

Programme code: 03		B.Sc., Physics		
Course Code: 19UPH609		Core Paper - 9: Atomic and Solid State Physics		
Batch 2019-2020	Semester VI	Hours/Week 4	Total Hours 60	Credits 4

Course Objective

To enable the learners to

1. Know about the X – rays, Photoelectric effect and their application
2. Know about different coupling schemes and the effect of magnetic and electric fields on the spectrum of an atom and molecule
3. Understand the different crystal structure and their bindings

Course Outcome (CO)

K1	**CO1**	To get knowledge about atoms in materials.
K2	**CO2**	Understand the crystal structure.
K3	**CO3**	Gain the knowledge about the X-rays and its applications.
K4	**CO4**	Understand the concept of electron theory of solids and behavior of superconductors.

UNIT I **12 hrs**

Atomic and Molecular Spectroscopy

The Vector atom model – Quantum number associated with the Vector atom model – Coupling schemes – Pauli's exclusion principle – Electronic configuration of some light elements – Normal and anomalous Zeeman effects. Expression for the Zeeman shift – Anomalous Zeeman effect – Paschen Back effect – Stark effect – Basic concepts of NMR, ESR, NQR – Raman effect – Raman shift – Stokes and Antistokes lines.

UNIT II **12 hrs**

Bonding in solids

Interatomic forces and types of bonding – Ionic bonds – Metallic bonds – Van der waal's bonds – Hydrogen bonds – Binding energy of ionic crystals – Evaluation of the Madelung constant – Determination of range – Binding energy of crystals of inert gases – Van der Waals' Interaction – Repulsive interaction.

UNIT III **12 hrs**

Crystal structure

Introduction – Crystal lattice – Unit cell – Lattice parameter – Primitive cell – Types of crystal system – Bravais lattices – BCC – FCC – HCP – Miller indices – Procedure for finding miller indices of crystal planes – Representation of crystal planes in cubic unit cell – Procedure for sketching the plane from the given miller indices – Common planes in a simple cubic, bcc and fcc structures -Crystal directions – Procedure for finding miller indices of crystal directions – Representation of crystal directions in a cubic units – Atomic radius in a cubic system – No of atoms in a cubic structures – Atomic packing factor

UPH 31

Course Code: 19UPH609

UNIT IV **12 hrs**

X-Rays

Productions of X-rays-Coolidge tube method – Spacing between three dimensional lattice planes – The absorptions of X – rays-Bragg's Law-The Bragg's X-ray Spectrometer - The powder crystal diffraction - *** The Compton Scattering.**

Photoelectric effect:

Einstein's photoelectric equation - Experimental verification - Applications of photoelectric effect - Millikan's experiment – Determination of Planck's constant

UNIT V **12 hrs**

Electron Theory of Metals

Drude – Lorentz theory and its applications – Somerfield theory – Fermi-Dirac distribution – Brillouin Zone theory – Relation between energy and wave number.

Superconductivity:

Superconductivity - Experimental facts of Superconductivity – Persistent currents – Effect of magnetic fields – Meissner effect – Type I and Type II superconductors – BCS theory of superconductivity.

*** Self study**

Teaching methods: Seminar, Assignment, Google Classroom, Discussion and PPT

Books of study

1. Material Science	R.S.Khurmi, R.S.Sedha, S.Chand and Company, New Delhi (2004).
2. Solid State Physics	R.K.Puri and V.K.Babbar, (2001) S.Chand and Co., New Delhi
3.Modern Physics	Murugesan Kiruthiga Sivaprasath, S Chand and Company (2006).

Books for reference:

1. Atomic and nuclear Physics	Brijlal and Subramaniam, S. Chand and Co (2010).
2. Fundamentals of Solid State Physics	Saxena, Gupta and Saxena, Pragati Prakashan, Meerut (2008).
3. Basic Solid State Physics	Dr. Arun Kumar, Roy Chaudhuri, Sarat Book House (2014).

Mapping					
	PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO 1	**S**	**H**	**H**	**H**	**S**
CO 2	**H**	**S**	**H**	**H**	**S**
CO 3	**S**	**H**	**H**	**S**	**H**
CO 4	**H**	**S**	**H**	**S**	**H**
S- Strong	**H-High**		**M-Medium**		**L - Low**

UPH 32

Course Code: 19UPH610

Programme code: 03		B.Sc., Physics		
Course Code: 19UPH610		Core Paper - 10: Fundamentals of Digital Electronics		
Batch 2019-2020	Semester VI	Hours/Week 4	Total Hours 60	Credits 4

Course Objective

To enable the learners to acquire knowledge about

1. Four different number systems & binary codes
2. Logic gates, Boolean algebra and Karnaugh map
3. Flip- flops, counters, arithmetic circuits, data processing circuits, shift registers, Semiconductor memories, D\A converters and A\D converters

Course Outcome (CO)

K1	**CO1**	Have the knowledge about number systems, binary arithmetic operations and binary codes
K2	**CO2**	Have an understanding of logic gates, Demorgan's theorems and Karnaugh maps and simplification of Boolean expressions
K3	**CO3**	Have the ability to apply the knowledge of logic gates to design flip-flops, counters, shift registers, arithmetic and data processing circuits
K4	**CO4**	Be familiar to analyze the semiconductor memories and some of the A/D and D/A converters

UNIT I **12 hrs**

Number System, Binary Arithmetic and Binary Codes

Decimal, Binary, Octal, Hexadecimal number systems – Conversion from one system to another system – Binary arithmetic operations – Representation of negative numbers – Binary subtraction using 1's and 2's compliments – weighted codes – non weighted codes – alpha numeric codes: ASCII codes and EBCDIC codes – Parity: even parity and odd parity method of single bit error detection.

UNIT II **12 hrs**

Logic gates, Boolean Algebra and Karnaugh map

Basic Logic gates (NOT,OR,AND) – Universal building blocks (NAND and NOR gates) – EX-OR and EX-NOR gates – construction of basic gates using discrete components – Laws of Boolean algebra – DeMorgan's theorems – Construction of Karnaugh maps – Simplification of Boolean expressions using laws of Boolean algebra, DeMorgan's theorems and Karnaugh maps.

UPH 33

Course Code: 19UPH610

UNIT III **12 hrs**

Flip-flops and Counters

R-S flip flop – D flip flop- JK flip flop – Master slave J-K flip flop – Edge triggered flip flops. Asynchronous counters: Ripple counter – Mod 3, Mod 5 counters and Decade counters, Ring counters – synchronous counters.

UNIT IV **12 hrs**

Arithmetic, Data processing circuits and Shift Register

Half and full adder – Half and full subtractor – Parallel binary adder and subtractor – Multiplexer-Demultiplexer – Encoder – Decoder – Serial in serial out shift registor – Parallel in parallel out shift registors.

UNIT V **12 hrs**

Semiconductor Memories, D\A Converters and A\D converters

Memory addressing – Volatile and Non-Volatile: ROM – PROM – EPROM – RAM - Static and dynamic RAM – Binary weighted register D\A converter – R-2R ladder D\A converter – Counter type A\D converter - **Successive approximation A\D converter*.**

*** Self study**

Teaching methods: Seminar, Assignment, Google Classroom, Discussion and PPT

Books for study::

1. Digital fundamentals	Thomos L. Floyd, , Tata McGraw Hill, New Delhi (1995).
2. Digital logic and computer design	M. Morris Mano, Prentice-Hall of India Pvt. Ltd, NewDelhi (2006).

Books for reference::

1.Introduction to Integrated electronics, digital and analog	V.Vijayendaran, S.Vishwanathan, Printers and Publishers Pvt.Ltd (reprint 2011).
2. Digital principles and applications	Albert Paul Malvino & Donald P Leach, Tata McGraw Hill, New Delhi (1999).

Mapping					
	PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO 1	**S**	**S**	**S**	**S**	**S**
CO 2	**S**	**S**	**S**	**H**	**S**
CO 3	**S**	**H**	**S**	**S**	**S**
CO 4	**S**	**S**	**S**	**H**	**S**
S- Strong	**H-High**		**M-Medium**		**L - Low**

UPH 34

Course Code: 19UPH611

Programme code: 03		B.Sc., Physics		
Course Code: 19UPH611		Core Paper - 11: Nuclear Physics		
Batch 2019-2020	Semester VI	Hours/Week 4	Total Hours 60	Credits 5

Course Objective

To enable the learner to know about
1. General properties of atomic nuclei, particle accelerators, Radioactivity,
2. Artificial transmutation of elements, nuclear transmutation,
3. Nuclear fission and fusion and (iv) Elementary particles.

Course Outcome (CO)

K1	**CO1**	The learners will know about basic nuclear properties and particle accelerators.
K2	**CO2**	The learners will have knowledge about the differences between various decay modes and radioactive dating.
K3	**CO3**	The learners will have knowledge about basic concepts and relations to calculate Q – values for nuclear reactions, production of radioisotopes and their uses.
K4	**CO4**	The learners will know about the nuclear fission, fusion and detection of nuclear radiations.

UNIT I **12 hrs**

General properties of atomic nuclei

Classification of nuclei- nuclear spin angular momentum – nuclear magnetic dipole moment – electric quadruple moment – nuclear size – nuclear stability – nuclear forces –Meson theory of nuclear forces- theories of nuclear composition- proton –electron hypothesis – models of nuclear structure – liquid drop model – shell model.

Particle accelerators:

Synchrocylotron – betatron – electron synchrotron and **proton synchrotron***.

UNIT II **12 hrs**

Radioactivity

Determination of e/m of alpha particles – determination of charge of alpha particles – experimental measure of range of alpha particles* – Geiger and Nuttal experiment – Geiger Nuttal law – alpha particle disintegration energy – determination of e/m of beta particles – origin of line and continuous spectrum – neutrino theory of beta decay- k- electron capture – origin of gamma rays – absorption of gamma rays – natural radioactive series – law of successive disintegration – radioactive equilibrium and radioactive dating.

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Course Code: 19UPH611

UNIT III **12 hrs**

Artificial transmutation of elements

Discovery of artificial transmutation – Rutherford experiment – Bohr's theory of nuclear disintegration – nuclear reaction – energy balance in nuclear reaction and the Q value

Nuclear transmutation:

Transmutation by a) alpha particles b) protons c) deuterons and d) neutrons. The scattering cross – section and its determination. Production of radioisotopes and their uses.

UNIT IV **12 hrs**

Nuclear fission and fusion

Nuclear fission – energy released in fission – Bohr and Wheeler's theory of nuclear fission – chain reaction- multiplication factor- natural uranium and chain reaction-design of nuclear reactor-breeder reactor - nuclear fusion-source of stellar energy-thermonuclear reactions-transuranic elements.

Detectors of nuclear radiations:

Ionization chamber-Geiger-Muller counter-proportional counter-Wilson's cloud chamber-bubble chamber-their principles and working.

UNIT V **12 hrs**

Elementary particles

Baryons – Leptons – Mesons – particles and antiparticles –concept of antimatter – strong interaction – electromagnetic interaction – weak interaction – gravitational interaction – elementary particle quantum numbers – conservation laws and symmetry – charge conjugation, parity and time reversal – CPT Quark model .

*** Self study**

Teaching Methods: PowerPoint presentation / Seminar / Discussion / Assignment / Google Classroom.

Books for study:

1. Modern physics	R.Murugesan, Kiruthiga Sivaprasath, S.Chand & Co (2010).
2. Atomic and nuclear physics	Brijlal and Subramaniam, S, Chand & Co (2000).
3. Modern Physics	B.C. Theraja, S. Chand & Co (1985).

Books for reference:

1. Nuclear physics	D.C. Tayal, Himalaya Publishing House, Bombay (2002).
2. Elements of Nuclear Physics	M.L.Pandya and R.P.S.Yadav, Kedar Nath RamNath Publishers, Meerut, New Delhi (2003).
3. Modern physics	Sehgal Chopra Sehgal, S, Chand & Co (2004).

UPH 36

Mapping					
	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO 1	**S**	**H**	**S**	**S**	**H**
CO 2	**S**	**S**	**H**	**H**	**S**
CO 3	**S**	**S**	**H**	**S**	**H**
CO 4	**S**	**H**	**S**	**H**	**S**
S- Strong		**H-High**	**M-Medium**		**L - Low**

UPH 37

Course Code: 19UPH6CN

Programme code: 03		B.Sc., Physics		
Course Code:19UPH6CN		Core Practical – III – General Experiments		
Batch	**Semester**	**Hours/Week**	**Total Hours**	**Credits**
2019-2020	**V & VI**	**3**	**90**	**2**

Course Objective

To enable the learners to:

1. Have a good foundation in the fundamentals and applications of general physics.
2. Acquire the skill of finding and developing practical scientific facts.
3. Employ the practical result to support the theory

Course Outcome (CO)

K5	**CO1**	Develop the ability to analyse basic experiments. Work and coordinate effectively in a group to accomplish laboratory based tasks.
K5	**CO2**	Take measurements to compare experimental results in the laboratory with the theoretical analysis.
K5	**CO3**	Will be familiar to conduct experimental investigations of simple electric, magnetic and optical phenomena.
K5	**CO4**	Practice record keeping of experimental work and data graphing

List of Experiments (Any Fifteen)

1. Young's modulus – Uniform bending – Koenig's method
2. Young's modulus – Non-uniform bending – Koenig's method
3. Dispersive power and resolving power of a Grating
4. Cauchy's constant and dispersive power of prism
5. Refractive index of a prism- Stoke's formula- spectrometer.
6. Determination of high resistance by charging – Ballistic Galvanometer
7. Determination of high resistance by leakage – Ballistic Galvanometer
8. Comparison of Mutual Inductance - Ballistic Galvanometer
9. Hartmann's interpolation formula – Determination of the wavelength of the arc spectrum – Spectrometer
10. Energy Gap Measurement of Semiconducting materials
11. Melting point of wax using Thermistor
12. Impedance and Power factor of an Inductive – Resistive circuit
13. Polarimeter – Rotation of plane of polarization
14. Fresnel's Biprism – Optic bench

Course Code:19UPH6CN

15. Anderson Bridge – Determination of Dielectric constant
16. Determination of capacitance using Schering Bridge
17. Comparison of capacitance using DeSauty Bridge
18. Measurement of Inductance using Owen's Bridge
19. Rydberg's Constant – Scale and Telescope
20. Determination of refractive index –Newton's rings.

Mapping					
	PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO 1	**S**	**S**	**H**	**H**	**H**
CO 2	**H**	**H**	**S**	**H**	**S**
CO 3	**H**	**H**	**S**	**S**	**H**
CO 4	**S**	**H**	**H**	**H**	**H**
S- Strong		**H-High**	**M-Medium**		**L – Low**

UPH 39

Course Code: 19UPH6CO

Programme code: 03		B.Sc., Physics		
Course Code: 19UPH6CO		Core Practical IV - Electronics		
Batch 2019-2020	Semester V & VI	Hours/Week 2	Total Hours 60	Credits 2

Course Objective

To enable the learners to

1. To design and construct small electronic circuits
2. To develop experimental skills and understand relation between experimental data and theoretical analysis.
3. Have a good foundation in the fundamentals and applications of experimental physics

Course Outcome (CO)

K5	**CO1**	Acquire a basic knowledge in solid state electronics.
K5	**CO2**	Develop the ability to analyse and design analog electronic circuits using discrete components.
K5	**CO3**	To acquire knowledge in basic electronics by constructing electronic circuits and devices.
K5	**CO4**	Take measurements to compare experimental results in the laboratory with the theoretical analysis

LIST OF EXPERIMENTS (Any Fifteen)

1. Construction and study of IC regulated power supply
2. Voltage doubler
3. Transistor characteristics – CE configuration
4. R-C coupled amplifier – Single stage
5. Feedback amplifier
6. Hartley oscillator
7. Mono stable multivibrator using transistor
8. FET characteristics
9. Characteristics of PN junction diode and zener diode
10. Construction and study of bridge rectifier
11. UJT characteristics
12. Characteristics of inverting and non-inverting operational amplifier

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Course Code: 19UPH6CO

13. Operational amplifier – Adder, subtractor and scalar
14. Operational amplifier – Integrator and differentiator
15. Colpitt's oscillator
16. V-I characteristics of SCR
17. Characteristics of Tunnel diode
18. Characteristics of MOSFET

Mapping					
	PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO 1	**S**	**H**	**H**	**H**	**H**
CO 2	**H**	**S**	**S**	**S**	**S**
CO 3	**H**	**H**	**S**	**S**	**H**
CO 4	**S**	**H**	**H**	**H**	**S**
S- Strong		**H-High**		**M-Medium**	**L - Low**

UPH 41

Course Code: 19UPH6CP

Programme code: 03		B.Sc., Physics		
Course Code: 19UPH6CP		Core Practical - V : Digital Electronics & Microprocessor		
Batch 2019-2020	Semester VI	Hours/Week 2	Total Hours 60	Credits 2

Course objective

To enable the learners to:

1. Have good foundations in the fundamentals of digital Electronics.
2. Acquire the skill of writing and executing assembly language programming using 8085 microprocessors
3. Employ the practical results for controlling mechanical and electrical and electronic devices.

Course Outcome (CO)

K5	**CO1**	Develop the ability to construct basic logic gates and other digital electronics devices.
K5	**CO2**	Get familiarized for developing microprocessor based programming.
K5	**CO3**	Gain expertise and will be able to work in multi-disciplinary groups
K5	**CO4**	Coordinate effectively in a group to accomplish computer based tasks.

LIST OF EXPERIMENTS (Any fifteen)

1. Construction of logic gates using discrete components
2. Verification of truth tables of logic gates using IC's
3. NOR and NAND – Universal building blocks
4. Half adder and full adder
5. Half subtractor and full subtractor
6. Verifications of Demorgan's theorems
7. Construction and study of J.K flip flops
8. Study of Multiplexor and Demultiplexor
9. Construction and study of Ring counter
10. 8085 - ALP for 8-bit addition and subtraction
11. 8085 - ALP for 8-bit multiplication and division
12. 8085 - ALP for sorting the array in descending and ascending order
13. 8085 - ALP for matrix addition
14. 8085 - ALP for matrix multiplication
15. 8085 - ALP for matrix subtraction

Course Code: 19UPH6CP

16. 8085 - ALP for Hexadecimal to decimal and binary conversion
17. 8085 - ALP for ASCII to decimal conversion and BCD to Hexadecimal conversion
18. 8085 - ALP for 16-bit Addition and Subtraction
19. 8085 - ALP to find square root of a number

Mapping					
	PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO 1	**S**	**H**	**H**	**H**	**H**
CO 2	**H**	**S**	**S**	**S**	**S**
CO 3	**H**	**H**	**S**	**S**	**H**
CO 4	**S**	**H**	**H**	**H**	**S**
S- Strong		**H-High**		**M-Medium**	**L – Low**

Major Elective Papers

(2 papers are to be chosen from the following 6 papers)

1. Laser Physics and Fiber Optics

2. Measurements and Instrumentation

3. Principles of Communication Systems

4. Renewable Energy Sources

5. Introduction to Biophysics

6. Materials Science

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Course Code: 19UPH5E1

Programme Code: 03		B.Sc Physics		
Course Code: 19UPH5E1		Major Elective Paper 1: Laser Physics and Fiber Optics		
Batch 2019-2020	Semester V	Hours/Week 4	Total Hours 60	Credits 5

Course Objectives

To enable the learners to

1. Acquire basic knowledge about lasing action, types of lasers and the applications of lasers.
2. Understand about fabrication of optical fibers, fiber optic sensors and their applications in medical fields.

Course outcome (CO)

K1	**CO1**	**Will be able to understand the basic theory of laser action and apply them to classify and explain the fundamentals of laser.**
K2	**CO2**	**Will be able to explain the concept of Q-switching and illustrate the working of various advanced lasers available.**
K3	**CO3**	**Will be able to illustrate the application of lasers in various fields.**
K4	**CO4**	**Would have learnt the fabrication of different types of optical fibers, different types of loss, sensor types and applications of optical fibers.**

UNIT I **12 hrs**

Conventional laser

Spontaneous and stimulated emission - Einstein coefficients A & B - laser action - Types of lasers - Solid state lasers: Ruby laser and Nd:YAG laser - Gas lasers : He-Ne laser and CO_2 laser – Liquid laser : Dye laser – Liquid Eu^{3+} laser – Semiconductor laser.

UNIT II **12 hrs**

Advanced lasers

General description of Q-switching – Production of Q-switching : Electro-optic shutter (Kerr effect and pockels effect)- Mechanical and Saturable absorber shutters – Peak power emitted during the pulse – Theory of Giant pulse dynamics – Laser amplifiers – Mode locking – Ultrafast lasers – fiber optic lasers.

UNIT III **12 hrs**

Applications of Lasers

Materials processing with lasers : Drilling, Cutting and Welding - Nuclear fusion with lasers - Communication by lasers – Large range finders - Laser Gyro – LASIK – Optical computing - Principle of holography - Recording and reconstruction – Classification of hologram – Holographic interferometry in nondestructive testing – Lasers in compact disc players.

Course Code: 19UPH5E1

UNIT IV **12 hrs**

Optical Fibers and its attenuation

Basic structure of an optical fiber - Advantages of optical fibers –Propagation of light waves in an optical fiber- Types of fibers: step index single mode fiber, step index multimode fiber and graded index fiber – Acceptance angle and acceptance cone of a fiber – Numerical aperture of a step index fiber and graded index fiber. Attenuation in optical fibers: Material losses – Rayleigh scattering loss – Absorption losses – Bending losses – Radiation induced losses – Inherent defect losses.

UNIT V **12 hrs**

Fiber fabrication and communication

Classification of fiber fabrication techniques : External chemical vapour deposition , Internal chemical vapour deposition, Multielement glasses and Phasil system - Mechanism of refractive index variation – Fiber strength – Mechanical strength measurement of fibers.

Fiber communication

Light sources and detectors- optical connectors and couplers-transmitter for fiber optic communication-high performance circuit (LED digital transmitter) – fiber optic receiver-high performance receiver-**repeators***

*** Self study**

Teaching methods: Seminar, Assignment, Google Classroom, Discussion and PPT

Books for study:

1. Lasers : Principles, Types and Applications — K.R. Nambiar, New Age International Publishers Ltd, New Delhi (2014).
2. Lasers and Nonlinear Optics — B.B Laud, 3rd Edn., New Age International Publishers Ltd. New Delhi (2011).
3. Optical fibers and fibers optic communication systems — Subir Kumar Sarkar, S. Chand Publishers (2010).

UPH 46

Books for reference:

1. Laser theory and applications — K. Thiyagarajan, A.K.Ghatak, Cambridge University press.
2. An introduction to lasers, theory and applications — M. N.Avadhanalu, S.Chand & Co, New Delhi (2001).
3. Laser Fundamentals — W.T. Silfvast, Cambridge University Press, Cambridge (2003).
4. Fiber optics technology and applications — Stewart D. Perstinick, Khanna Publishers (2009).

Mapping					
	PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO 1	**S**	**H**	**S**	**H**	**H**
CO 2	**H**	**S**	**H**	**S**	**S**
CO 3	**S**	**S**	**H**	**H**	**S**
CO 4	**H**	**H**	**S**	**S**	**S**
S- Strong	**H-High**		**M-Medium**		**L - Low**

UPH 47

Course Code: 19UPH6E2

Programme code: 03		B.Sc., Physics		
Course Code: 19UPH6E2		Major Elective Paper 2-Measurement and Instrumentation		
Batch 2019-2020	Semester VI	Hours/Week 4	Total Hours 60	Credits 5

Course Objectives

i. To impart knowledge on various measurement parameters
ii. To understand the working of electronic instruments
iii. To impart knowledge on transducers

Course outcome (CO)

K1	**CO1**	Able to identify the different type of measurement parameters
K2	**CO2**	Able to describe the working of analog instruments
K3	**CO3**	Able to design the circuits using Wattmeter
K4	**CO4**	Able to apply the knowledge of different electronic instruments using CRO and to demonstrate the types of transducers.

UNIT I **12 hrs**

Measurement – methods of measurement – Direct methods – indirect methods. Instrumentation – phases of instruments: mechanical, electrical and electronic instruments. Classification of instruments – Analog and digital modes of operations.

Static characteristics of the measurement. True value, static error – static correction – scale range and scale span – Repeatability – Noise.

UNIT II **12 hrs**

Accuracy and precision – Indication of precision – Significant figures. Linearity – Hysteresis – Threshold – Dead time, Dead zone. Resolution or discrimination. Loading efforts: Loading effort due to shunt connected instruments and series connected instruments Impedance matching and maximum power transfer. Dynamic characteristics speed of response, measuring lag – Fidelity – dynamic error – overshoot.

UNIT III **12 hrs**

Classification of analog instruments – principles of operation – operating forces.

Construction details: Moving system – control system – Damping system.

Watt meters: Electrodynamic wattmeter – Introduction Wattmeter – Electrostatic Wattmeter – Energy meter: Single phase introduction type energy meter.

UNIT IV **12 hrs**

Transducers: **Classification of transducers*** – classification based on electrical principle involved – Resistive position Transducers – Resistive pressure transducer – self generating inductive transducer. **Linear Variable Differential Transducer [LVDT]*,** Piezo - **electric transducer*** – strain gauge transducer.

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Course Code: 19UPH6E2

Basic Meter Movement – characteristics of BMM – conversion of BMM into a DC single range ammeter – multirange ammeter – DC single range voltmeter – multirange voltmeter – ohmmeter – Rectifier type of AC meters.

UNIT V **12 hrs**

Direct current VTVM. Comparison of VOM with VTVM. Electronic voltmeter for alternating currents – Cathode Ray oscilloscope (CRO) Cathode Ray tube (CRT). Deflection sensitivity of a CRT – normal operation of a CRO – Triggered and Non-triggered scopes. Determinations with Lissajous figures, Q meter.

Teaching Methods: PowerPoint presentation / Seminar / Discussion / Assignment / Google Classroom.

*** Self study**

Books for Study:

1. A course in electric and electronic instruments instrumentation — A. K. Sawhney, Dhanpat Rai and Publishing Co Pvt Ltd (1985)
2. Basic electronics – Solid state — B.L. Theraja S Chand & Co Ltd (2006)

Books for Reference:

1. Electrical and Electronics measurement and instrumentations — Umesh Sinha, Satyaprakashan, New Delhi (2017).
2. Electrical measurements and measuring instruments — J.B. Gupta, S.K. Kataria & Sons (1969).
3. Electrical measurement and measuring instruments — Rajendra Prasad, Khanna Publishers, (1997).
4. Electrical measurement and measuring instruments — Golding E.Widdis, Reem Publications (P) Limited (1968).
5. Principles of electronics — V. K. Metha, S Chand & Company, (1997).

Mapping					
	PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO 1	**S**	**H**	**H**	**S**	**H**
CO 2	**H**	**H**	**H**	**S**	**S**
CO 3	**S**	**S**	**H**	**H**	**H**
CO 4	**H**	**S**	**S**	**H**	**S**
S- Strong		**H-High**	**M-Medium**		**L - Low**

UPH 49

Programme code: 03		B.Sc., Physics		
Major Elective Paper 3 - Principles of Communication Systems				
Batch 2019-2020	**Semester**	**Hours/Week 4**	**Total Hours 60**	**Credits 5**

Course Objective

To enable the learners

1. To understand the basics idea about Modulation, demodulation
2. To gain knowledge on transmission lines and antennas
3. To know about the functioning of Radio, cellular, fiber optic, television and satellite communications

Course Outcome (CO)

K1	**CO1**	Get knowledge about wireless and fiber optic communication systems
K2	**CO2**	Understand the working principles of Radio, Cellular, Television and Ssatellite communications
K3	**CO3**	Apply knowledge on manufacturing of Radio, TV and antennas
K4	**CO4**	Trouble shoot the different sections of a Radio, TV and transmission lines

UNIT I **12 hrs**

Modulation and Demodulation

Amplitude modulation- Theory of AM- modulation index – Single side band generation – Suppression of carrier-Frequency modulation–Expression for FM wave - PM definition- Comparative advantages and disadvantages of AM, FM and PM – Basic principles of demodulation - AM diode detector – FM Ratio detector.

UNIT II **12 hrs**

Transmission Lines and Antennas

Line equations of transmission lines- Short circuited and open ended lines – Standing wave ratio- relation between SWR and reflection coefficient - Types of transmission lines - Properties of transmission lines - Mechanism of electromagnetic radiation from resonant circuit - Elementary dipole antenna-current and voltage distribution in a half-wave dipole antenna – Principle of radiation of a half-wave dipole antenna-directional pattern- Derivation of E and H in principle of radiation of half-wave.

UNIT III **12 hrs**

Radio and Cellular Communications

Classification of Radio Transmitters -AM radio transmitter stages – note on AM radio broadcast transmitters - Principle of superheterodyne receiver - Block diagram of the stages of superhet - AM receiver - Block diagram of stages of a FM radio receiver – difference between AM and FM receivers – Cellular communications (Elementary ideas).

UNIT IV **12 hrs**

Fiber Optic Communications

Fiber cable construction - Fiber optic cable applications – Acceptance angle and numerical aperture – Propagation of light through an optical fiber (Single mode, Multimode, Step index, Graded index) – Fiber configuration (Single mode step index, Multimode step index and Multimode graded index fibers) - Light sources and detectors – Optical connectors and couplers – Transmitter for fiber optic communication – High performance circuit(LED digital transmitter) – Fiber optic receiver – High performance receiver – Repeaters – Fiber optic based modems : Transreceivers.

UNIT V **12 hrs**

Television and Satellite Communications

Principle of picture transmission and reception – gross structure of a television – Picture elements – Scanning, image continuity and persistence of vision – Horizontal and vertical blanking pulses- TV camera tubes: image orthicon – Vidicon – The block diagram of a basic TV transmitter – Block diagram of a monochrome TV receiver. Introduction on satellite communications – **Satellite links and Satellite construction*** – Différent domestic satellites.

*** Self study**

Teaching Methods: Power Point presentation / Seminar / Discussion / Assignment / Google Classroom.

Books for study:

1. Communication Electronics	Deshpande N.D, Deshpande D.A and Rangole P.K, Tata McGraw Hill Publishers Ltd (1996).
2. Optical Fibers and Fiber Optic Communication	Subir.Kumar. Sarkar, S.Chand & Co, New Delhi (2001).
3. Basic Television and Video Systems	Bernard Grob, McGraw Hill, New York (1997).

Book for reference:

1. Electronic Communication Systems	George Kennedy, Tata McGraw Hill Publishers Ltd (2008).
2. Electronics Communication Systems	Sanjeeva Gupta, Khanna Publications, Salem (1992).

Mapping					
	PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO 1	**S**	**S**	**H**	**H**	**H**
CO 2	**H**	**H**	**S**	**H**	**S**
CO 3	**H**	**H**	**S**	**S**	**H**
CO 4	**S**	**H**	**H**	**H**	**H**
S- Strong	**H-High**		**M-Medium**		**L - Low**

UPH 51

Programme code: 03		B.Sc., Physics		
Major Elective Paper 4 - Renewable Energy Sources				
Batch 2019-2020	Semester	Hours/Week 4	Total Hours 60	Credits 5

Course Objectives

To enable the learner to

1. Know about the conventional energy sources and its impact on the environment.
2. Know about renewable energy sources, its availability, technology and advantages.

Course outcome (CO)

K1	**CO1**	Will be able to understand the commercial energy sources, its availability, merits and demerits
K2	**CO2**	Study various renewable energy sources, its principle and applications
K3	**CO3**	Will be familiar with the various methods of production and storage of energy for nation development
K4	**CO4**	Develop the ability to analyze the effects of conventional energy sources in the environment and how to preserve the resources for future generation.

UNIT I **12 hrs**

Introduction to Conventional Energy Sources

Conservation and various forms of energy - Conventional Energy sources – Coal, Oil and Natural gas - Hydro energy and Nuclear Energy – Merits and Demerits.

Atmospheric pollution – Thermal pollution – Hydroelectric projects – Nuclear power generation and environment – Global Environmental Awareness (Kyoto Protocol).

UNIT II **12 hrs**

Introduction to Renewable energy Sources

Impact of renewable energy generation on environment – solar energy – wind energy – biomass energy – geothermal energy –ocean thermal energy- GHG emissions from various energy sources – ecological cost – advantages of renewable energy – obstacles to the implementation of renewable energy system.

UNIT III **12hrs**

Solar Energy

Renewable energy sources – solar energy – solar constant - nature and solar radiation – solar heaters – crop dryers – solar cookers –solar cooking – solar production of Hydrogen - photovoltaic generation – merits and demerits.

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UNIT IV **12hrs**

Biomass Energy

Biomass energy - photosynthesis - biomass conversion technologies (wet processes, dry processes) - biodiesel - biofuel petrol – environmental benefits.

Wind Energy

Principles of wind energy conversion – the nature of the wind – power in the wind- forces on the blades and thrust on turbines – site selection consideration.

UNIT V **12 hrs**

Geothermal energy

Structure of the earth's interior - Nature of Geothermal fields - Geothermal sources – Utilization of Geothermal energy.

Ocean thermal energy

An introduction to energy from the Oceans **- Ocean thermal electric conversion***- Site selection – Energy utilization – Introduction to energy from waves and tides.

*** Self study**

Teaching Methods: Seminar / Discussion / Assignment/ Google Classroom/ PPT

Books for study:

1. Renewable energy sources and emerging Technologies — D.P. Kothari, K.C. Singal & Rakesh Ranjan, Prentice Hall of India Pvt. Ltd., New Delhi (2008).
2. Non-Conventional Energy Sources — G.D.Rai, Khanna Publishers (12th reprint 2014),

Book for Reference:

1. Renewable Energy sources and their Environmental impact — S.A. Abbasi and Nasema Abbasi PHI Learning Pvt. Ltd., New Delhi (2008).
2. Non-Conventional Energy Resources, — D.S.Chauhan & S.K.Srivastava, International Publishers. New Age (2004).

Mapping					
	PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO 1	**S**	**H**	**H**	**S**	**H**
CO 2	**H**	**S**	**S**	**S**	**S**
CO 3	**S**	**S**	**S**	**H**	**S**
CO 4	**S**	**H**	**S**	**H**	**S**
CO 5	**H**	**S**	**S**	**S**	**H**
S- Strong	**H-High**		**M-Medium**		**L - Low**

UPH 53

Programme code: 03		B.Sc., Physics		
Major Elective Paper 5 : Introduction to Biophysics				
Batch 2019-2020	**Semester**	**Hours/Week** 4	**Total Hours** 60	**Credits** 5

Course Objective

To enable the learners

1. to understand the concept of physics principles and apply it to biological sciences
2. to know about audition of Human Ear and Physics of Vision

Course Outcome (CO)

K1	**CO1**	To enable the learners to apply key principles of physics toward evaluating and analyzing the biological phenomenon.
K2	**CO2**	To enable the learners to explain the principles that governs biophysics.
K3	**CO3**	To enable the learners to apply their physics knowledge to analyze biomechanics and biophysics concepts.
K4	**CO4**	To explain the techniques and underlying concept of physics of audition and physics of vision.

Unit – I Biomechanics 12 hrs

Biostatics - Forces and Torguess - Biophysics of Muscle –Muscle Power –Mass Specific Muscle Power - Strength of Bones - Biodynamics – Newton's law Frictional forces and stokes law – Frictional forces and Stokes Law - Locomotion of Land - Walking - Jamping - Propelling - Locomotion in Air - Locomotion in Water - Role of Gravity.

Unit – II Biophysics and Fluid run 12 hrs

Steady Laminar Flow - Co-efficient of viscosity - Temperature dependence Newtonian Fluid - Pioseuille's Formula - Energetics of Fluid Flow – Turbulence – Reynolds's Number - Hemodynamics - Plasma Skimming – Turbulence - Pressure Flow Relation - Fluid Flow in Plants

Unit – III Biophysics and Gas Transport 12 hrs

The Ideal Gas – Dalton's law of Partial Pressure – Vapour Pressure – Solutions and Henry's Law - Convective Transport of Gases – Airway Resistance – Transport of O_2 in blood – Transport of CO_2 in Blood - Diffusion of Gases - Fick's Laws – Gas Exchange in Lungs – Gas Exchange in Tissues – Physiology of Respiration – Physics of Alveoli – Work of Breathing.

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Unit – IV Physics of Audition 12 hrs

Transverse and Longitudinal Waves - Physiological Characteristics of Sound - Human Ear - Phase Sensitivity and Determination of Direction - Doppler Effect

UPH 54

Unit – V Physics of Vision **12 hrs**

Retina and Photo receptors _ Photo – Chemistry of receptor cells – Intensity sensitivity – Spectral Sensitivity – Resolving Power of Eye – Diffraction – Polarization and Vision – Optical rotation – Bire fringence and dichroism - **Retain and Photoreceptors*** - Photoreceptors and Fiber optics - Resolving Power of Eye - Polarization and Vision

*** Self Study**

Teaching Methods: PowerPoint presentation / Seminar / Discussion / Assignment / Google Classroom.

Books for study:

1. Elementary Biophysics an Introduction — P. K. Srivastava, Narosa Publishing House (2011).

Books for reference:

1. Biophysics — Vasantha pattabhi and N.Gautham, Narosa Publishing House (reprint 2015).
2. Basic Biophysics — M.Daniel, Student Edition Jodhpur (2004).

Mapping					
	PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO 1	**S**	**H**	**H**	**H**	**H**
CO 2	**S**	**S**	**S**	**S**	**S**
CO 3	**H**	**S**	**S**	**S**	**H**
CO 4	**S**	**H**	**H**	**H**	**S**
S- Strong		**H-High**	**M-Medium**		**L - Low**

UPH 55

Programme code: 03		B.Sc., Physics		
Major Elective Paper 6 - Materials Science				
Batch 2019-2020	**Semester**	**Hours/Week 4**	**Total Hours 60**	**Credits 5**

Course Objective

The aim of this course is to introduce the students to electron theory of solids and different types of materials based on their properties.

Course Outcome (CO)

K1	**CO1**	List the basic concepts of conductors ,dielectric and Understand the basic laws of magnetism
K2	**CO2**	Provide the students with an idea of dielectric and magnetism which are essential tools in problem solving.
K3	**CO3**	Solve problems based on electron theory of solids and for different materials
K4	**CO4**	Find applications of the superconductors.

Unit I **12 hrs**

Electron Theory of Solids

Introduction-the classical free electron theory and the quantum free electron theory- Electron energy in metals and Fermi energy- density of states- anti-symmetric nature of the wave functions of the Fermi system – explanation of covalent bonding in crystals- electron in a periodic potential- energy bands in solids- Brillouin zones – distinction between metals, insulators and semiconductors- effect mass of electron and concept of hole –Hall effect.

Unit II **12 hrs**

Conducting Properties of materials

Introduction- atomic interpretation of ohms law- relaxation time and electrical conductivity – relaxation time – collision time- mean free path- heat developed in a current carrying conductor- sources of resistivity of metals and alloys- thermal conductivity- Wiedemann Franz law- thermal expansion- electrical conductivity at high frequencies- geometrical and magnetic field effects on electrical conductivity- variation of electrical resistivity due to mechanical stress (strain gauge)- different types of conducting materials.

Unit III **12 hrs**

Dielectric Properties of materials

Introduction- fundamental definition in dielectric – different types of electric polarization- frequency and temperature effects on polarization- dielectric loss- local field or internal field – **Clausius- Mossotti relation – determination of dielectric constant*** – dielectric break down- properties and different types on insulating materials – Ferro electric materials

Unit IV **12 hrs**

Magnetic Properties of materials

Introduction- different type soft magnetic materials – classical theory of dia magnetism (Langevin theory)- Langevin theory of para magnetism- Weiss theory of para magnetism- Weiss of Ferro magnetism (molecular field theory on field magnetism) – Heisenberg interpretation on internal field and quantum theory of ferromagnetism- domain theory of Ferro magnetism- hard and soft materials

Unit V **12 hrs**

Superconducting materials

Introduction- explanation for the occurrence of super conductivity – general properties of super conductors- other general observations- types of superconductors- applications of superconductors.

*** Self study**

Teaching methods: Seminar, Assignment, Google Classroom, Discussion and PPT

Books of study

1.Material Science	M. Arumugam, Anuradha agencies, Kumbakonam (Revised 1990 1st edition)

Books for reference:

1. Materials and Engineering	Raghavan, Prentice Hall of India (1990 3rd edition)
2. Materials Science	Vijaya & Rangarajan, Tata McGraw Hill Publishing Company Ltd (2005 1st edition)
3. Materials Science	Raghavan, Prentice Hall (1990 13th edition)

Mapping					
	PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO 1	**S**	**H**	**H**	**H**	**S**
CO 2	**H**	**S**	**H**	**H**	**S**
CO 3	**S**	**H**	**H**	**S**	**H**
CO 4	**H**	**S**	**H**	**S**	**H**
S- Strong		**H-High**	**M-Medium**		**L - Low**

Skill based Subjects

1. General Awareness
2. Medical Instrumentation

UPH 58

SEMESTER III **19UGA3S1**

PART IV - SKILL BASED SUBJECT 1

GENERAL AWARNESS (ONLINE)

Total Credits: 3 **Total Hours : 30**

Objective:

- To acquire knowledge in relation to various competitive examinations.
- To create awareness about an online examination which is being followed in competitive examinations.

UNIT I **6 hrs**

1. **Tamil and other Literatures**
   Tamil, English, Christian and Muslim Literatures – Ancient Literature – Bakthi Literature – Epics – Medieval Literature – Modern Literature (Novel, Dramas, Short Stories, Modern Poetry).

2. **Economics and Commerce**
   Basic Economics – Auditing – Management – Capital Market – Foreign Trade – Companies – Banking.

3. **Social studies**
   Indian History – Inventions – Indian Poetry – Constitution - Judiciary – Languages – Literacy – Indian Geography – Lithosphere – Climate – Soil – Agriculture – Population.

UNIT II **6 hrs**

4. **Numerical Aptitude**
   Objective Arithmetic : Number systems – probability – **HCF and LCM of numbers*** - decimal fractions – simplification – squareroots and cuberoots – average – percentage – profit and loss – ratio and proportion – time and work – simple interest – area, **volume and surface area*.**

5. **Verbal Aptitude**
   Spot the odd one out – correct form of verb – preposition – find out the rightly spelt word – choose the correct meaning of idioms – synonyms and antonyms.

6. **Abstract Reasoning**
   Logic Reasoning : Logic – statement – arguments – statement assumptions – Statement course of action – theme detection – deriving conclusion from passages.
   Non – verbal Reasoning : Series – analogy – classification – analytical reasoning – mirror images – water images – paper folding – paper cutting – rule detection – grouping of identical figures.

UNIT III **6 hrs**

7. **General Science and Technology**
   SCIENCE- Basic principles and concepts in Physics, Chemistry, Botany and Zoology.
   TECHNOLOGY - Metallurgy, instrumentation, discoveries and inventions of techniques.

8. Computer Science

Historical evolution of computers – Computer applications – Data processing concepts – Computer codes and arithmetic – Hardware components – Data Structures.

9. Education

Development process of the learner – Principles of development (physical, social, emotional and intellectual) – Learning process – Teaching and teacher behaviour – Interaction analysis – Microteaching – Teacher as a leader – Motivation – Personality dimension – concept of mental health – Counseling.

UNIT IV **6 hrs**

10. Library and Information Science

Library and Information Science – Basics, Computer, Library Network and others like Research, Reprography etc.

11. Sports and Games

Athletics – Track Events – Field Events – Games – Indoor Games – Outdoor Games – General knowledge – Sport and Olympics – First Aid.

12. Current Affairs

State, Central and International affairs: Budgets – Politics – Sports – Education – Commerce and Industry – Inventions – Science and Technology – Currency – Agriculture – Movies – Guinness records – Awards – IT Industry – Space Research – Defence etc.

UNIT V **6 hrs**

13. National Cadet Corps (NCC)

Introduction to the Armed Forces (Army, Navy, Air Force) – Dril – Weapon Training – Map Reading – Civil Defence.

14. National Service Scheme (NSS)

History of NSS – History of Motto, Symbol, Badge – Aims and Objective– Duties and Total Hours – Organisational and Administrational setup – History of voluntary organization – Regular activities – Special camp activities – Special programmes – awards – Important days.

15. Youth Red Cross (YRC)

History of International Red Cross – History of Indian Red Cross – History of Youth Red Cross – Main Objectiveof YRC – Emblem – Fundamental principles of Red Cross – Organizational Setup – Activities of Youth Red Cross – Role of different functionaries – Training programmes for YRC Program Officers – Training programme for YRC Volunteers – YRC Song – Working Hours – General orientation – Special orientation – Program skill learning.

*** Self Study (Questions may be asked from these topics also)**

Text Book

1. VBC 1 – General Awareness, Question Bank, Kongunadu Arts and Science College, Coimbatore – 29, (2006).

UPH 60

Course Code: 19UPH4S2

Programme Code: 03		B.Sc Physics		
Course Code: 19UPH4S2		Skill Based Subject- 2: Medical Instrumentation		
Batch	**Semester**	**Hours/Week**	**Total Hours**	**Credits**
2019-2020	**IV**	**2**	**30**	**3**

Course Objective

To enable the learners to

1. Understand about ECG, ERG etc
2. Understand the concepts of the pacemaker and the batteries used in it, kidney machine etc
3. Know the role of the LASER in the medical field
4. Know the determination of the frequency of interference

Course Outcome (CO)

K1	**CO1**	Will get knowledge about the origin of biopotentials, electrical activity of excitable cells, action potentials, and membrane models.
K2	**CO2**	Will be able to understand the application of Laser and the origin of biopotentials: ECG, ERG, MEG, etc
K3	**CO3**	Will apply knowledge on measurement of blood flow and pressure.
K4	**CO4**	Will be able to analyze the Clinical laboratory systems, Bio control and Electrical safety

UNIT I **6 hrs**

Design of medical instruments - Components of biomedical instrument systems-Electrodes and transducers - Recording system – ElectroCardiography (ECG) - Electroretinography (ERG) - Electromyography.

UNIT II **6 hrs**

Pacemakers - Pacemaker batteries - **Defibrillators*** - Nerve and muscle stimulators -Heart, lung machine - Kidney machine - Blood flow meter.

UNIT III **6 hrs**

LASERS in medicine – Endoscopes - Cryogenic surgery - Nuclear imaging technique-Thermography - Ultrasonic imaging systems - Magnetic resonance – Imaging -Angiography.

UNIT IV **6 hrs**

Measurement of blood pressure - Blood flow and cardiac output - Measurements of heart sounds - **Respiration rate** * – Temperature - Plethysmography.

UNIT V **6 hrs**

Radiation safety instrumentation: gamma ray spectrometer - physiological effects due to 50 Hz current passage- microshock and macroshock – electrical accidents in hospitals- devices to protect against electrical hazards.

UPH 61

*** Self study**

Teaching Methods: Power Point presentation / Seminar / Discussion / Assignment / Google Classroom.

Books for study:

1. Biomedical Instrumentation	K.Arumugham, Anuradha Agencies publishers (2002).
2. Handbook of Biomedical Instruments	R.S.Khandpur, Tata McGraw Hill Company (2003).
3. Introduction to Biomedical Electronics	Joseph Dubovy, Tata McGraw Hill Company (1978).

Book for reference:

1. Biomedical Instrumentation and Measurements	Leslie Crombwell, Fred.J.Weibell & Trich.A.Pfeiffer, Prentice Hall of India (1997).

Mapping					
	PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO 1	**S**	**H**	**S**	**H**	**H**
CO 2	**H**	**S**	**H**	**S**	**S**
CO 3	**S**	**S**	**H**	**H**	**S**
CO 4	**H**	**H**	**S**	**S**	**S**
S- Strong	**H-High**		**M-Medium**		**L - Low**

UPH 62

Course Code: 19UPH6S3

Programme code: 03		B.Sc., Physics		
Course Code:19UPH6S3		Skill Based Subject 3 - Introduction to Microprocessor		
Batch 2019-2020	Semester VI	Hours/Week 3	Total Hours 45	Credits 3

Course Objective

To study about the

1. History, Origin and Development of Microprocessor
2. Architecture, instruction set and programming of 8085 microprocessors
3. Interfacing

Course Outcome (CO)

K1	**CO1**	Able to know about introduction to microprocessor
K2	**CO2**	Able to understand architectural diagram
K3	**CO3**	acquire the knowledge about programming and interfacing
K4	**CO4**	Able to understand the concept of stack and subroutine in the programming

UNIT I **9 hrs**

Introduction

Microprocessor – Origin – History and Development – computer generations – Uses of Microprocessor

UNIT II **9 hrs**

Architecture

Pin diagram of 8085 – Architecture – Instruction Cycle – Timing Diagram- Timing diagram for opcode fetch cycle- memory read – memory write – I/O read- I/O write

UNIT III **9 hrs**

Instruction Set

Introduction- Instruction and data formats – addressing modes- INTEL 8085 instructions

UNIT IV **9 hrs**

Interfacing

Need for interfacing – Basic interfacing concepts – INTEL 8255 programmable peripheral interface.

UNIT V **9 hrs**

Applications

Stack, subroutine- simple programmes –addition- subtraction-multiplication-division-sorting arrays-**finding smallest and biggest number in an array***, etc..,

*** Self study**

Teaching Methods: PowerPoint presentation / Seminar / Discussion / Assignment / Google Classroom.

UPH 63

Books for study:

1. Introduction to microprocessors	A.P.Mathur, Tata McGraw Hill Publishers Ltd (2004).
2. Microprocessor Architecture and applications with 8085	Ramesh S.Gaonkar, Penram International Publishing India (2007).
3. Fundamentals of Microprocessor and Microcomputers	B.Ram, Dhanpat Rai Publication (P) Ltd, New Delhi (IV Ed) (2008).

Books for reference

1. The 8085 micro controller and embedded systems	Mohammad AliMazidi and Janice Gillespie Mazidi, Pearson Education Ltd, Delhi (2004).
2. Intel Manual Embedded Micro controller	Vol I and II, Intel Corporation, California (1988).
3. The 8085 micro controller Architecture programming and Applications	Ayala K.J Penram International. III rd Edition (1999).

Mapping					
	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO 1	**S**	**H**	**S**	**S**	**H**
CO 2	**S**	**S**	**H**	**H**	**S**
CO 3	**S**	**S**	**H**	**S**	**H**
CO 4	**S**	**H**	**S**	**H**	**S**
S- Strong	**H-High**		**M-Medium**		**L - Low**

Extra Departmental Course (EDC)

1.Physics in Everyday life

UPH 65

Course Code: 19UPH5X1

Programme Code: 03		**B.Sc Physics**		
Course Code: 19UPH5X1		**EDC - Physics in Everyday life**		
Batch	**Semester**	**Hours/Week**	**Total Hours**	**Credits**
2019-2020	**5**	**2**	**30**	**3**

1. Know about the principles advancements and applications of physics in various fields.
2. Know about of physics principles involved in the operation of common household appliances

Course outcome (CO)

K1	**CO1**	Will be able to understand various theories for origin of universe and study about planets.
K2	**CO2**	Study physics in Human anatomy.
K3	**CO3**	Will be familiar with the various physics principles behind the sports.
K4	**CO4**	Develop the ability to analyze the effects of physics in technology.

Unit I **6 hrs**

Physics of Universe and Solar system

Origin of the Universe - Big bang theory – Oscillating theory – Steady state theory – Sun – Solar system – Interior planets – exterior planets - Moon – Bode's law.

Unit II **6 hrs**

Physics in Human Body

Eyes as an optical instrument - Vision defects - Rayleigh criterion and resolving power, Sound waves and hearing - Sound intensity - Decibel scale - temperature control.

Unit III **6 hrs**

Physics in Sports

The sweet spot - Dynamics of rotating objects - Running, Jumping and pole vaulting - Motion of a spinning ball - Banana shot: Magnus force - Turbulence and drag.

Unit IV **6 hrs**

Physics in Technology

Microwave ovens - CCDs – Lasers – Displays - Optical recording **: CD, DVD Player - Tape recorder*** - Electric motors : Hybrid car - Telescope – Microscope - Projector.

Course Code: 19UPH5X1

Unit V **6 hrs**

Physics in Appliances

Pressure cooker - Automatic wrist watches - Air conditioner - Refrigerator - Television - Computer - Global Positioning System - Smoke Detectors - Polaroid Sunglasses

*** Self Study**

Teaching Methods: Seminar / Discussion / Assignment / PPT / Google Classroom.

Book for Study:

1. University Physics	F.W.Sears, M. Zemansky, R.A.Freedman, and H.D.Young, Pearson Education, (11th edition, 2004).
2. Fundamentals of Physics	D. Halliday, R. Resnick, J. Walker, John Wiley & Sons (Extended, 8th edition, 2008).

Book for reference:

1. College Physics	Hugh D. Young, Pearson Education (9th edition, 2012).
2. The Hindu Speaks on Scientific facts	Kasturi & Sons Ltd, Chennai (Vol I ,II & III)

Mapping					
	PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO 1	**S**	**H**	**S**	**S**	**H**
CO 2	**H**	**S**	**S**	**S**	**S**
CO 3	**S**	**S**	**S**	**H**	**S**
CO 4	**S**	**H**	**S**	**S**	**S**
CO 5	**H**	**S**	**S**	**S**	**H**
S- Strong	**H-High**		**M-Medium**		**L - Low**

Non- Major Elective Papers

1. Human Rights

2. Women's Rights

UPH 68

SEMESTER - III **19UHR3N1**

PART IV – NON MAJOR ELECTIVE – I HUMAN RIGHTS

Total Hours of Teaching: 2/week **Total Credits: 2**

Objective:

1. To prepare for responsible citizenship with awareness of the relationship between Human Rights, democracy and development.
2. To impart education on national and international regime of Human Rights.
3. To sensitize students to human suffering and promotion of human life with dignity.
4. To develop skills on human rights advocacy.
5. To appreciate the relationship between rights and duties.
6. To foster respect for tolerance and compassion for all living creatures.

UNIT I **6 hrs**

1.1.Definition, Meaning, Concept, Theories and Kinds of Human Rights.
1.2.Evolution and Protection of Human Rights in India.
1.3.Development of Human Rights under the United Nations.

UNIT II **6 hrs**

1.1 United Nations Charter and Human Rights
1.2 U.N. Commission on Human Rights
1.3 Universal Declaration of Human Rights
1.4 International Covenant on

- Civil & Political Rights
- Economic, Social and Cultural Rights

UNIT III **6 hrs**

3.1 Human Rights and Fundamentals Rights (Constitution)
3.2 Enactments regarding Human Rights Laws in India
3.3 National Human Rights Commission and State Human Rights Commission

UNIT IV **6 hrs**

4.1 Aged persons and their Human Rights
4.2 Human Rights of Persons with Disabilities
4.3 Tribal Human Rights in India
4.4 The Three Generation Human Rights

UNIT V **6 hrs**

5.1 Rights of Woman, Child, Refugees and Minorities
5.2 Media and Human Rights
5.3 NGO's in protection of Human Rights
5.4 Right to Election

Books for Study:

Human Rights Compiled by Dr.V.Sugantha, Dean (Unaided), Kongunadu Arts and Science College, Coimbatore-29

Books for Reference:

Human Rights, Humanitarian Law and Refugee Law, P.Jaganathan, MA., MBA., MMM., ML., ML., J.P.Arjun Proprietor, Usha Jaganath law series, 1st floor, Narmatha Nathi Street, Magathma Gandhi Nagar, Madurai – 625014.

Question paper pattern

Duration: 3 hrs Max: 75 Marks

Section A (5 x 5 = 25)

Short notes

Either – Or/ Type – Question from each unit.

Section B (5 x 10 = 50)

Essay type

Either – Or/ Type – Question from each unit.

UPH 70

SEMESTER - IV **19UWR4N2**

NON MAJOR ELECTIVE – II WOMEN'S RIGHTS

Total Hours of Teaching: 30

Total Credits: 2

UNIT I **6 hrs**

Laws, Legal systems & Change

Definition–constitutional law, CEDAW and international human rights –Laws and norms –Laws and social context– constitutional and legal frame work.

UNIT II **6 hrs**

Politics of land and gender in India

Introduction – Faces of poverty – Land as productive resources – Locating identities – Women's claims to land – Right of properties – case studies.

UNIT III **6 hrs**

Women's Rights: Access to Justice

Introduction–Criminal Law– Crime Against women – domestic violence–Dowry Related Harassment and dowry deaths – Molestation –Sexual Abuse and rape – Loopholes in practice – Law Enforcement Agency.

UNIT IV **6 hrs**

Women's Right

Violence Against – women – Domestic violence – The protection of Women from Domestic Violence Act, 2005– the Marriage Validation Act, 1982– The Hindu Widow Re-marriage Act, 1856– The dowry prohibition Act 1961.

UNIT V **6 hrs**

Special women welfare Laws

Sexual Harassment at work places – Rape and indecent Representation – The indecent representation (Prohibition) Act, 1986 – Immoral Trafficking – The Immoral Traffic (Prevention) Act, 1956 – Acts Enacted for women development and empowerment – role of rape crisis centers.

Books for reference:

1. Good Women do not Inherit Land	Nitya Rao, Social Science Press and Orient Blackswan (2008).
2. Knowing Our Rights	An imprint of Kali for Women (2006). International Solidarity network
3. Women Rights	P.D.Kaushik, Bookwell Publication (2007).
4. Violence Protective Measures for Women Development and Empowerment	Aruna Goal, Deep and Deep Publications Pvt. (2004).
5. Gender Justice	Monika Chawla, Deep and Deep Publications Pvt.(2006).
6. Domestic Violence against Women	Preeti Mishra, Deep and Deep Publications Pvt. (2007)
7. Violence against Women	Clair M. Renzetti, Jeffrey L. Edleson, Raquel Kennedy Bergen, Sage Publications (2001).

UPH 71

SEMESTER I **19EVS101**

PART IV– ENVIRONMENTAL STUDIES

Total Credits: 2 **Total Hours : 30**

Objective:

- To inculcate knowledge and create awareness about ecological and environmental concepts, issues and solutions to environmental problems.
- To shape students into good "ecocitizens", thereby catering to global environmental needs.

UNIT I MULTIDISCIPLINARY NATURE OF ENVIRONMENT (6 hrs)

1.1 Definition : scope and importance
1.2 **Need for public awareness***
1.3 Natural resources
1.3.1 Types of resources
Forest Resources – Water Resources – Mineral Resources – Food Resources – Energy Resources – Land Resources.

UNIT II ECOSYSTEMS (6 hours)

2.1 Concept of an ecosystem
2.2 Structure and functions of an ecosystem
2.3 Producers, consumers and decomposers
2.4 Energy flow in the ecosystem
2.5 Ecological succession
2.6 Food chains, food web and ecological pyramids
2.7 Structure and function of the following ecosystem*
Forest Ecosystem – Grassland Ecosystem – Desert Ecosystem – Aquatic Ecosystem.

UNIT III BIODIVERSITY AND ITS CONSERVATION (6 hrs)

3.1 Introduction – Definition – Genetic – Species and ecosystem diversity
3.2 Biogeographical classification of India
3.3 Value of biodiversity*
3.4 Biodiversity at global, national and local levels
3.5 India as a mega – diversity Nation
3.6 Hot spot of biodiversity
3.7 Threats to biodiversity
3.8 Endangered and endemic species of India
3.9 Conservation of Biodiversity
insitu Conservation of Biodiversity – *exsitu* Conservation of Biodiversity

UPH 72

UNIT IV ENVIRONMENTAL POLLUTION (6 hrs)

4.1 Definition
4.2 Causes, effects and control measures of: Air Pollution – Water Pollution – Soil Pollution – Marine Pollution – Noise Pollution – Thermal Pollution – Nuclear Pollution.
4.3 Solid Waste Managements: causes, effects, control measures of urban and industrial wastes.
4.4 Role of individual in prevention of pollution*.
4.5 Pollution case studies – domestic waste water, effluent from paper mill and dyeing, cement pollution.
4.6 Disaster Management – Flood, Drought, Earthquake, Tsunami, Cyclone and Landslide.

UNIT V SOCIAL ISSUES AND THE ENVIRONMENT (6 hrs)

5.1 Sustainable Development
5.2 Urban problems related to energy
5.3 Water Conservation : Rain Water Harvesting and Watershed Management
5.4 Resettlement and rehabilitation of people, its problems and concerns, case studies – Narmatha Valley Project.
5.5 Environmental ethics, issues and possible solutions.
5.6 Climatic change, global warming, ozone layer depletion, acid rain, nuclear accidents and holocaust, case studies – Hiroshima and Nagasaki, Chernobyl.
5.7 Consumerism and waste products
5.8 Environmental Protection Act
5.9 Air Pollution Act (Prevention and Control)
5.10 Water Pollution Act (Prevention and Control)
5.11 Wild Life Protection Act
5.12 Forest Conservation Act
5.13 Issues involved in enforcement of environmental legislation
5.14 Public awareness*
5.15 Human population and the environment
5.15.1 Population Growth and Distribution
5.15.2 Population Explosion – Family Welfare Programme*
5.15.3 Environment and Human Health
5.15.4 Human Rights*
5.15.5 Value Education*
5.15.6 HIV / AIDS*
5.15.7 Women and Child Welfare
5.15.8 Role of Information Technology in Environment and Human Health*.

*** Self Study (Questions may be asked from these topics also)**

Text Book

1. P.Arul, Environmental Agency, No 27, Nattar street, Velacherry main road, Velacheery, Chennai – 42, First Edition, Nov. 2004.

References

1. A text Book of Environmental Sciences — Purohit Shammi Agarwal, Publisher Mrs. Saraswati Prohit, Student Edition, Behind Naswan Cinema Chopansi Road, Jodhpur.
2. Environmental Sciences and Engineering — Dr.Suresh and K.Dhameja, , Publisher S.K.Kataria & Sons, 424/6, Guru Nanak Street, Vaisarak, Delhi
3. Environmental Science and Engineering — J.Glynn Henry and Gary W Heinke, Prentice Hall of India Private Ltd., New Delhi

UPH 74

SEMESTER - II **19VED201**

PART IV – VALUE EDUCATION: MORAL AND ETHICS

Total hours: 30 **Total Credits: 2**

UNIT I : (6 hrs)
Introduction – Meaning of Moral and Ethics – Ethics and culture – Aim of Education.

UNIT II (6 hrs)
Swami Vivekananda – A biography.

UNIT III (6 hrs)
The Parliament of Religions – Teachings of Swami Vivekananda.

UNIT IV (6 hrs)
Steps for Human Excellence

UNIT V (6 hrs)
Meditation.

Text Book:
Value Based Education – Moral and Ethics – Published by Kongunadu Arts and Science College (Autonomous), First Edition (2015).

Reference Book:
Easy steps to Yoga Swami Sivananda, A divine Life Society Publication (2000).

Question Paper Pattern
(External only)

Duration: 3 hrs

Total Marks: 50

Answer all Questions ($5 \times 10 = 50$ Marks)

Essay type, either or type questions from each unit.

UPH 75

Allied Physics I & II

UPH 76

ALLIED PHYSICS PAPER FOR B.Sc., MATHEMATICS / CHEMISTRY

Course Code:19UPH63A1

Programme code: 03		For B.Sc Mathematics and B.Sc Chemistry		
Course Code:19UPH63A1		Allied Subject I -Physics–I (MECHANICS, HEAT, SOUND, MAGNETISM AND ELECTRICITY)		
Batch 2019-2020	Semester III	Hours/Week 4	Total Hours 60	Credits 4

Course Objective

To enable the learners to

1. know about mechanics, properties of matter and sound
2. understand thermal physics
3. know about the light, electricity and electromagnetism

Course Outcome (CO)

K1	**CO1**	Able to know about simple harmonic motion and projectile motion
K2	**CO2**	To understand about elasticity and propagation of sound waves
K3	**CO3**	To know about specific heat of solids and liquids
K4	**CO4**	To acquire the knowledge of Interference, Diffraction, current electricity and Electromagnetism.

UNIT I **12hrs**

Mechanics

Composition of two simple harmonic motions along a line and at right angles – Lissajou's figures, uniform circular motion - Acceleration of a particle in a circle - Centripetal and centrifugal forces - Banking on curved tracks. Projectile - Motion in horizontal plane - Maximum height – Time of flight – Range – to prove the path of the Projectile is a parabola – Range and time of flight in a horizontal plane.

UNIT II **12hrs**

Properties of Matter and Sound

Elasticity: Elastic constants – Bending of beams – Young's modulus by uniform and non uniform bending – Energy stored in a stretched wire – Torsion in a wire – **Determination of rigidify modulus – Torsional oscillation*** – Static torsion.

Sound: interference of sound waves – Beats – Doppler Effect –Applications – Ultrasonics – Piezoelectric method – Applications.

UNIT III **12hrs**

Thermal physics

Specific heat of solids and liquids – Dulong and Petit law – Newton's law of cooling – **Thermal conductivity – Lee's disc method** * – Variation of specific heat with temperature – Vanderwaal's equation of state – derivation of critical constants – Black body radiation – Stefan's law – Laws of thermodynamics – Change of entropy in reversible and irreversible processes.

Course Code:19UPH63A1

UNIT IV **12hrs**

Optics

Condition for interference – Young's double slit experiment – Interference due to transmitted light – Air wedge – Newton's rings – Determination of refractive index of a liquid – Diffraction - Diffraction at a single slit – Transmission grating – Polarization – Production and analysis of circularly and elliptically polarized light – Optical activity – Specific rotation – Half shade polarimeter.

UNIT V **12hrs**

Current Electricity and Electromagnetism

Kirchhoff's laws – Wheatstone's network – Condition for balance – Carey –Foster's bridge – measurement of resistance – Capacitor – Energy of charged capacitors – Loss of energy due to sharing of charges. Electromagnetic induction - Faraday's laws – AC circuits – Mean – rms – Peak values – LCR in series and in parallel – Sharpness of resonance – Ballistic Galvanometer – Theory – Measurement of capacitance – Transformer and its applications.

***Self study**

Teaching methods: Seminar, Assignment, Google Classroom and Discussion.

Books for study:

1. Allied Physics R. Murugeshan S.Chand & Co (2005).
2. Modern Physics R. Murugeshan, S.Chand & Co (2005).

Books for reference:

1. Properties of Matter D.S.Mathur, Shyamlal Charitable Trust, New Delhi (2010).
2. Heat and thermodynamics Brijlal and Subramaniam, S. Chand & Co (2005).
3. Electricity and Magnetism Brijlal and Subramaniam, Rathan Prakasam Mandir (2004).

Mapping					
	PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO 1	**S**	**H**	**S**	**S**	**H**
CO 2	**H**	**S**	**H**	**H**	**S**
CO 3	**H**	**S**	**H**	**H**	**S**
CO 4	**S**	**S**	**H**	**S**	**H**
S- Strong		**H-High**	**M-Medium**		**L - Low**

UPH 78

ALLIED PHYSICS PAPER FOR B.SC., MATHEMATICS / CHEMISTRY

Course Code: 19UPH4A2

Programme code: 03		For B.Sc Mathematics and B.Sc Chemistry		
Course Code: 19UPH4A2		Allied Subject II -Physics–II (MODERN PHYSICS, ELECTRONICS AND DIGITAL ELECTRONICS)		
Batch 2019-2020	Semester IV	Hours/Week 4	Total Hours 60	Credits 4

Course Objective

To enable the learners to

1. know about quantum Physics, nuclear & atomic Physics,
2. understand the concept of relativity
3. know the basics of electronics and communication Physics

Course Outcome (CO)

K1	**CO1**	Will understand the central concepts and principles in quantum physics. At the end of the module, students will be able to describe the properties and structure of stable nuclei.
K2	**CO2**	Able to understand the theory of atomic structure, importance of periodic table and familiar with the fundamentals principles of the general theory of relativity and inertial frames.
K3	**CO3**	Will understand the principles and design considerations of various LASERs , modes of their operation and areas of their applications
K4	**CO4**	Acquire a basic knowledge in solid state electronics including diodes, FET, UJT. Will understand number system, amplification circuits and communication physics.

UNIT I **12hrs**

Quantum Physics

Photoelectric effect - Laws of photoelectric effect – Millikan's experiment – Photoconductive and photovoltaic cells – **Photomultiplier** *– Applications of photo cells – Production and properties of X-rays – X – ray spectrum – Mosley's law – Compton effect – Relation for change in wavelength – X- ray diffraction – Bragg's law – Miller indices – Determination of h,k,l values of cubic crystals.

UNIT II **12hrs**

Nuclear Physics

Classification of nuclei – General properties of nuclei – Characteristics of nuclear forces – Nuclear structure – Liquid drop model – Shell model – Particle accelerators – Betatron – Electron synchrotron – Artificial Transmutations by α -particles – Photon particles Nuclear fission and fusion (Quantitative) -Elementary particles – Mesons – Baryons – Leptons.

Course Code: 19UPH4A2

UNIT III **12hrs**

Atomic Physics and Elements of Relativity

Atom model – Sommerfeld – Vector atom models –Periodic table – Pauli's exclusion principle – excitation and ionization potentials – Frank and Hertz method – Postulates of theory of relativity – Lorentz transformation equations – derivations – Length contraction – Time dilation – Mass-energy equivalence.

UNIT IV **12hrs**

Laser Physics

Purity of spectral lines – Coherence length and time – Spontaneous and induced emissions – population inversion – Meta stable state – Conditions for laser action – Ruby laser – He-Ne lasers – Applications of lasers – Raman effect – Raman shift – Stokes and antistokes lines – Laser Raman Spectrometer.

UNIT V **12hrs**

Electronics and Communication Physics

V – I Characteristics of p-n junction diode – Zenar diode – Uses of Zenar diode – Characteristics of FET – UJT- **Principles of LED***,LCD - Number systems – Conversion of Binary into Decimal – Decimal into Binary – Binary addition – Subtraction – Basic logic gates – Boolean algebra – Demorgan's theorem – Modulation – AM –FM – Basic principles of antenna and RADAR.

*** Self study**

Teaching methods: Seminar, Assignment, Google Classroom and Discussion**.**

Books for study:

1. Allied Physics R. Murugesan, S.Chand & Co (2005).
2. Modern Physics R. Murugesan, S.Chand & Co (2005).

Books for reference:

1. Basic Electronics B.L. Theraja, S.Chand & Co (2004)
2. Principles of Electronics V. K. Metha, S.Chand & Co (2005).
3. LASER Physics Thiagarajan, Mcmillan, New Delhi (1992).

Mapping					
	PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO 1	**S**	**H**	**S**	**S**	**H**
CO 2	**H**	**S**	**H**	**H**	**S**
CO 3	**H**	**S**	**H**	**H**	**S**
CO 4	**S**	**S**	**H**	**S**	**H**
S- Strong		**H-High**	**M-Medium**		**L – Low**

UPH 80

ALLIED PHYSICS PRACTICALS FOR B.SC., MATHEMATICS / CHEMISTRY

Course Code: 19UPH4AL

Programme code: 03		For B.Sc Mathematics and B.Sc Chemistry		
Course Code: 19UPH4AL		Allied Physics Practical		
Batch	**Semester**	**Hours/Week**	**Total Hours**	**Credits**
2019-2020	**III & IV**	**3**	**90**	**2**

Course Objective

To enable the learners to:

1. Understand the Physical Phenomena and fundamentals of general physics.
2. Perform experiments in the field of general physics and gaining physical understanding of the results.
3. Interpret the practical result to support the theory

Course Outcome (CO)

K5	**CO1**	Provide hands on experiences in conducting scientific investigations and laboratory experiments.
K5	**CO2**	Develop the ability to analyse basic experiments and analyze the relationship between theory and experimental results. Take measurements to compare experimental results in the laboratory with the theoretical analysis.
K5	**CO3**	Will be familiar to conduct experimental investigations of simple mechanical, heat and optical physics.
K5	**CO4**	Practice record keeping of experimental work and data graphing

List of Experiments (Any fifteen)

1. Young's Modulus – Uniform bending – Optic lever.
2. Young's modulus – Cantilever – Static method.
3. Rigidity Modulus – Static torsion.
4. Torsional pendulum – Moment of inertia and rigidity modulus.
5. Acceleration due to gravity – Compound pendulum.
6. Sonometer - AC frequency.
7. Thermal conductivity – Lee's disc.
8. Spectrometer – Refractive index of material of the prism– Solid prism.
9. Spectrometer – Grating – Wavelength determination – Minimum deviation method.

Course Code: 19UPH4AL

10. Newton's ring – Radius of curvature of lens surface.
11. Potentiometer – Low range Ammeter calibration.
12. Potentiometer – Specific Resistance.
13. Moment of a magnet – Tan C position.
14. Characteristics of PN - Junction diode.
15. Characteristics of a Zener diode.
16. Verification of the truth tables of OR, AND, NOR, NOT, NAND gates using IC'S.
17. Verification of De-Morgan's theorems.
18. Potentiometer – Low range Voltmeter calibration.
19. Determination of frequency – Melde's method
20. Measurement of Terminal velocity for different liquids by Stokes method

Mapping					
	PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO 1	**S**	**H**	**H**	**H**	**S**
CO 2	**H**	**S**	**H**	**H**	**S**
CO 3	**S**	**H**	**H**	**S**	**H**
CO 4	**H**	**S**	**H**	**S**	**H**
S- Strong		**H-High**		**M-Medium**	**L – Low**

Add on Courses

i) Job Oriented course

ii) Advanced Learning Course

UPH 83

JOB OREINTED COURSE

Credits : 2

ELECTRICAL APPLIANCES: MAINTENANCE AND SERVICING

Objective: To explain the operation and troubleshooting techniques of home appliances.

UNIT I

Fundamentals of electricity

Electrical charge – current – potential – units – Ohm's law – electrical energy – power – watt – kWh – consumption of electrical power –resistance – capacitance – inductance and its units – Meters: Galvanometer, ammeter, voltmeter, resistance and Megger, Measuring and Checking - Basics and usage of Multimeter. Checking transistors and diodes in circuit measurements.

Unit II

Electrical Connections and Wiring

Soldering Iron–Flux–lead–Zero defect soldering–Desoldering pump– soldering station– AC and DC – single phase and three phase connections. Switches – ceiling roze – lamp holders, sockets – Fuse base – Distribution box –MCB – Earthening Process. Electrical Wiring – Main board preparation – Distribution – Cut-out preparation – Switch board preparation – Safety precautions.

Unit III

Heating Appliances

Electromagnetic Relays, Heater types–working principle– Heating Rod–Iron Box–Iron box with steamer– Toasters– Geysers– Microwave Ovens– Oven Disassembling and assembling procedure– Fault indicator–Testing and Troubleshooting methods.

Unit IV

Motorized Appliances:

Stabilizers and its types, Types of Motors–DC and AC motor– Fans– mixers– blenders–wet grinders– circuit connection- testing methods. Washing machine–Electrical connections–assembly– Dish washer –Electrical connection–Testing and troubleshooting methods.

Unit V

Refrigeration Appliances

Fridge– Electrical connection– Compressor–coolants–Automatic defrost circuits –Testing and troubleshooting of refrigerators–Air coolers and Air conditioners– Mounting and fixing of Air Conditioners–testing and troubleshooting methods.

Text Books:

1. A text book in electric power	P. L. Soni, P.V. Gupta and V. S. Bhatnagar, Dhanpat rai sons.
2. Utilization of electrical energy	E. O. Taylor, Orient Longman.
3. Arts and Science of utilization of electrical energy	H. Partas, DhanpatRai& Sons, New Delhi.

4. An integrated course in electrical engineering	J. B. Gupta, S.K. Kataria& Sons (2013).
5. A Textbook of Electrical Technology	B. L. Teraja and A. K. Teraja, S. Chand & Co. New Delhi (2006).
6. Alternating current electrical engineering	Philip Kemp, Mcmillan (1963)
7. Electrical Wiring, Department of Physics	Prof. B. Kanickairaj, SJC
8. Troubleshooting and Repairing major appliances	Eric Kleinert, Mc Graw Hill, McGraw Hill Professional, third edition, 2012.

UPH 85

ADVANCED LEARNING COURSE

EXPERIMENTAL TECHNIQUES AND DATA ANALYSIS

Credits : 2

Course Objective

To enable the learners to

1. Basic concepts of measuring device
2. Aware of calibration errors
3. Applications of measurements

Unit I

Basic Concept of Measurement & Transducers

Introduction – System configuration – Problem Analysis – Basic Characteristics of measuring devices, Calibration.

Transducers: capacitive, transducer-Photoelectric effect – Photoconductive Transducers-Piezoelectric transducers- temperature and pressure transducers.

Unit II

Measurement of errors:

Accuracy, precision, Significant Figures –types of errors-Statistical Analysis-Probability of errors-limiting error

Unit III

Standards of measurements:

Classification of standards- Standards for Mass, Length and Volume- time and frequency standards, electrical standards, standards of temperature and luminous intensity.

Unit IV

Electronic Measuring Instruments:

Q-meter- Vector impedance meter- Digital frequency meter – Digital voltmeter – Phase meter-RF power and voltage measurement –Power factor meter – Vector voltmeter.

Unit V

Vibration

Random Vibration – Shock – Analyzing vibration sensing devices – Generalized second order system – Absolute displacement – Absolute velocity and acceleration vibrating sensing devices – Velocity transducer – Banded strain gauge accelerators – Piezo electric accelerometer

Books for study and Reference:

1. Modern Electronic Instrumentation and Measurement Techniques — Hefrick .A.O and Cooper, Prentice Hall India (1992).
2. Instrumentation Devices and Systems — C.S. Rangan, G.R. Sharma, Tata McGraw Hill Publications (1997).

Books for Reference

1. Electronic Instrumentation and Measurement Techniques — WD. Cooper, Prentice-Hall (1978).
2. Measurement and Instrumentation Systems — William Bolton, Newnes (1996).