KONGUNADU ARTS AND SCIENCE COLLEGE
(AUTONOMOUS)
COIMBATORE -641029

DEPARTMENT OF PHYSICS (UG)

CURRICULM AND SCHEME OF EXAMNINATIONS (CBCS)

(2018-2019 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

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 **2018 –2019 ONWARDS**)

Semester	Part	Subject code	Title of the Paper	Instruction hours / cycle	Exam. Marks			Duration of Exam. Hrs.	Credit
					CIA	ESE	Total		
I	I	18TML103@	**LAN** –Tamil I/Hindi I/ French I / Malayalam I / Sanskrit I	6	25	75	100	3	3
	II	18ENG101	**LAN**–English I	6	25	75	100	3	3
	III	18UPH101	**C.P.1**– Properties of Matter and Sound	6	25	75	100	3	5
		18UPH2CL	**C.Pr.1-**Practical I	3	-	-	-	-	-
		18UMA1A1	**Allied Subject I** Mathematics – I	7	25	75	100	3	5
	IV	18EVS101	Environmental Studies**	2	-	50	50	3	2
				30	**100**	**350**	**450**		**18**
II	I	18TML202@	**LAN-** Tamil II / Hindi II/ French II /Malayalam II / Sanskrit III	6	25	75	100	3	3
	II	18ENG202	**LAN**- English II	6	25	75	100	3	3
	III	18UPH202	**C.P.2** – Heat and Thermodynamics	6	25	75	100	3	5
		18UPH2CL	**C.Pr.1-**Practical I	3	40	60	100	3	2
		18UMA2A2	**Allied Subject I** Mathematics –II	7	25	75	100	3	5
	IV	18VED201	**Value Education** Moral and Ethics**	2	50		50	3	2
				30	**140**	**360**	**550**		**20**
III	I	18TML303@	**LAN -** Tamil III/Hindi III/ French III / Malayalam III / Sanskrit III	6	25	75	100	3	3
	II	18ENG303	**LAN** –English III	6	25	75	100	3	3
	III	18UPH303	**C.P.3** – Mechanics	4	25	75	100	3	5
		18UPH4CM	**C.Pr.2** Practical II	3	-	-	-	-	-
		18UCH3A3	**Allied Subject II** Chemistry –I	4	20	55	75	3	4
		18UCH4AL	**Allied Practical** Chemistry Practical	3	-	-	-	-	-
	IV	18UGA3S1	**Skill based Subject 1 –** General Awareness	2	25	75	100	3	3
	IV	18TBT301/ 18TAT301/ 18UHR3N1	Basic Tamil*/Advanced Tamil** / Non Major Elective-I**	2	75		75	3	2
				30	**120**	**355**	**550**		**18**

IV	I	18TML404@	**LAN–** Tamil IV/Hindi IV/ French IV / Malayalam IV / Sanskrit IV	6	25	75	100	3	3
	II	18ENG404	**LAN** – English IV	6	25	75	100	3	3
	III	18UPH404	**C.P.4 –** Electricity and Magnetism	4	25	75	100	3	5
		18UPH4CM	**C.Pr.2 –** Practical II	3	40	60	100	3	2
		18UCH4A4	**Allied Subject II** Chemistry –II	4	20	55	75	3	4
		18UCH4AL	**Allied Practical** Chemistry Practical	3	20	30	50	3	2
	IV	18UPH4S2	**Skill based Subject –2** Medical Instrumentation	2	25	75	100	3	3
		18TBT402/ 18TAT402/ 18UWR4N2	Basic Tamil* / Advanced Tamil** / Non Major Elective - II**	2	-	75	75	3	2
				30	**180**	**520**	**700**		**24**
V	III	18UPH505	**C.P.5** – Astrophysics	4	25	75	100	3	4
		18UPH506	**C.P.6** – Optics and Laser Physics	4	25	75	100	3	4
		18UPH507	**C.P.7 –** Principles of Electronic Devices and Circuits	4	25	75	100	3	4
		18UPH508	**C.P.8 –** Quantum Mechanics and relativity	4	25	75	100	3	5
		18UPH5E1	Major Elective Paper – I	4	25	75	100	3	5
		18UPH6CN	**C.Pr.3**– Practical III - General	3	-	-	-	-	-
		18UPH6CO	**C.Pr.4**– Practical IV - Electronics , Digital Electronics and Microprocessors	2	-	-	-	-	-
		18UPH6CP	**C.Pr.5–** Practical V - Programming in C	2	-	-	-	-	-
	IV	18UPH5S3	**Skill Based Subject 3 -** Programming in C	3	25	75	100	3	3
				30	**150**	**450**	**600**		**25**
VI	III	18UPH609	**C.P.9 –** Atomic and Solid State Physics	4	25	75	100	3	4
		18UPH610	**C.P.10–** Fundamentals of Digital Electronics	4	25	75	100	3	4
		18UPH611	**C.P.11–** Nuclear Physics	4	25	75	100	3	5
		18UPH6E2	Major Elective Paper - II	4	25	75	100	3	5

		18UPH6E3	Major Elective Paper - III	4	25	75	100	3	5
		18UPH6CN	**C.Pr.3** Practical III - General	3	40	60	100	3	2
		18UPH6CO	**C.Pr.4–** Practical IV - Electronics , Digital Electronics and Microprocessors	2	40	60	100	3	2
		18UPH6CP	**C.Pr.5–** Practical V – Programming in C	2	40	60	100	3	2
	IV	18UPH6S4	**Skill Based Subject 4 –** Introduction to Microprocessor	3	25	75	100	3	3
	V	18NCC/NSS/YRC/PYE101$$	**Extension Activities***	-	50	-	50	-	1
				30	**320**	**630**	**950**		**33**
			Total	**180**			**3800**		**140**

@ Malayalam – 18MLM 101 - 404
@ Hindi/ French/ Sanskrit – 18HIN/FRN/SAN 101 - 404

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

Major Elective Papers

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

1. Principles of Communication Systems
2. Energy Source and Nanoscience
3. Electronic Instrumentation
4. Mathematical Physics
5. Object oriented programming in C++
6. Introduction to Biophysics

Non - Major Elective papers

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

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	24
2	II	English	400	24
3	III	Core- Theory / Practical's	1600	60
		Allied	400	20
		Electives	300	15
4	IV	Basic Tamil /Advanced Tamil /Non-Major Elective	150	4
		Skill Based Subjects	400	12
		Environmental Studies	50	2
		Value Education	50	2
	V	Extension Activities 1	50	1
Total			3800	140

Note:

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

Mark distribution for Core Theory & Practicals

1. Breakup marks for CIA of Theory	
CIA Exam	15
Assignment	5
Attendance	5
Total	**25**
2. Components of Practical	
Breakup marks for CIA of Practical	
CIA Practical Exam	25
Observation Notebook/Regularity	10
Attendance	5
Total	**40**
Breakup marks for ESE of Practical	
*Experiment	50
Record	10
Total	**60**
*** Breakup marks for Experiment (50 Marks)**	
Formula and its expansion	10
Circuit diagram/ Figure/Graph	5
Observation and Tabulation	5
Skill	15
Calculation	10
Result and neatness	5
Total	**50**

Question Paper Pattern for CIA and ESE

Theory

Maximum marks: 75

Section - A (10 × 1 = 10 marks)

Q.No. 1 to 10: Multiple choice types alone with four distracters each

Section - B (5 × 5 =25 marks)

Q.No. 11 to 15: Either or / essay type question (One question ‘a’ or ‘b’ from each unit.)

Note: In Section B, one question should be a problem from any of the five units (both the options ‘a’ and ‘b’)

Section - C (5 × 8 =40 marks)

Q. No. 16 to 20: Either or / essay type question (One question ‘a’ or ‘b’ from each unit.)

Mark distribution for Allied Theory & Practicals

1.Breakup marks for CIA of Theory	
CIA Exam	10
Assignment	5
Attendance	5
Total	**20**
2. Components of Practical	
Breakup marks for CIA of Practical	
CIA Practical Exam	10
Observation Notebook/Regularity	5
Attendance	5
Total	**20**
Breakup marks for ESE of Practical	
*Experiment	25
Record	5
Total	**30**
*** Breakup marks for Experiment (25 Marks)**	
Formula and its expansion	5
Circuit diagram/ Figure/Graph	4
Observation and Tabulation	4
Skill	5
Calculation	5
Result and neatness	2
Total	**25**

Question Paper Pattern for Allied CIA and ESE

Theory

Maximum marks: 55

Section - A (10 × 1 = 10 marks)

Q.No. 1 to 10: Multiple choice types alone with four distracters each

Section - B (5 × 3 = 15 marks)

Q.No. 11 to 15: Either or / essay type question (One question ‘a’ or ‘b’ from each unit.)

Section - C (5 × 6 = 30 marks)

Q. No. 16 to 20: Either or / essay type question (One question ‘a’ or ‘b’ from each unit.)

Course Code: 18UPH101

Programme Code: 03		B.Sc Physics		
Course Code: 18UPH101		Core Paper – 1. Properties of Matter and Sound		
Batch 2018-2019	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 **12 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 – general features of field 'g' on the earth's surface.

UNIT II **12 hrs**

Elasticity

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

UNIT III **12 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: Searl's Torsion Balance Method, the drop-weight method, Quincke's method – Variation of surface tension with temperature – Jaeger's method.

UNIT IV **12 hrs**

Viscosity

Streamline flow, Turbulent flow – Energy of a liquid – Bernoulli's theorem and its important 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 – Searel's method.

Course Code: 18UPH101

UNIT V **12 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– Acoustic grating – **Application of ultrasonics***.

*** Self study**

Teaching methods: Seminar, Assignment, Discussion and PPT

Books for study:

1. D.S.Mathur (2010) Elements of Properties of Matter, Shyamlal Charitable Trust, New Delhi.
2. R.Murugesan (1995) Properties of Matter, S.Chand & Co
3. R.L.Saihgal (1982) A textbook of Sound, S.Chand & Co

Books for reference:

1. N.Subrahmanyan and Brijlal (1980) A Textbook of Sound, Vikas House Pvt.Ltd.Publishing.
2. D.S.Mathur (1996) Mechanics, S.Chand & Co
3. N. Subrahmanyam and Brijlal (2005), Properties of Matter , S.Chand & Co
4. Alex A. Kaufman (2007) Principles of the Gravitational Method, Elsevier.

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**	

SEMESTER I **18EVS101**

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 hours)

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 hours)

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

UNIT IV ENVIRONMENTAL POLLUTION (6 hours)

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 hours)

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, A Text Book of Environmental Studies, Environmental Agency, No 27, Nattar street, Velacherry main road, Velacheery, Chennai – 42, First Edition, Nov. 2004.

References

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

Course Code: 18UPH202

Programme Code: 03		B.Sc Physics		
Course Code: 18UPH202		Core Paper - 2 Heat and Thermodynamics		
Batch 2018-2019	Semester II	Hours/Week 60	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 **12 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 **12 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– Clapeyron's latent heat equation and Clausius latent heat equation from Maxwell's thermodynamic relation.

UNIT III **12 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 .

UNIT IV **12 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

Course Code: 18UPH202

UNIT V **12 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, Discussion and PPT

Books for study:

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

Books for reference:

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

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**

SEMESTER - II **18VED201**

PART IV – VALUE EDUCATION: MORAL AND ETHICS

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

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

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

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

UNIT IV (6 Hours)
Steps for Human Excellence

UNIT V (6 Hours)
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 by Swami Sivananda, A divine Life Society Publication, 2000.

Question Paper Pattern
(External only)

Duration: 3 hrs **Total Marks: 50**

Answer all Questions (5 × 10 = 50 Marks)

Essay type, either or type questions from each unit.

Course Code: 18UPH2CL

Programme Code: 03		B.Sc Physics		
Course Code: 18UPH2CL		CORE PRACTICAL - I		
Batch 2018-2019	Semester I & II	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 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 – 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
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.

Course Code: 18UPH2CL

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
21. Measurement of Terminal velocity for different liquids by Stokes method
22. Determination of surface tension and interfacial surface tension of a liquid by drop weight method.

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: 18UPH303

Programme Code: 03		B.Sc Physics		
Course Code: 18UPH303		Core Paper - 3: Mechanics		
Batch 2018-2019	Semester III	Hours/Week 4	Total Hours 60	Credits 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.

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

Course Code: 18UPH303

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 and Assignment

Books for study:

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

Books for reference:

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

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**	

SEMESTER III **18UGA3S1**

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 hours)**

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 hours)**

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 hours)**

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 hours)**

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 hours)**

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.

SEMESTER - III **18UHR3N1**

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.

Course Code: 18UPH404

Programme Code: 03		B.Sc Physics		
Course Code: 18UPH404		Core Paper - 4: Electricity and Magnetism		
Batch 2018-2019	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:

Properties of magnetic field B – divergence of B – curl of B – 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* .**

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

Books for study:

1. Brijlal and Subramaniam (2000) Electricity and magnetism, Ratan Prakashan Mandir
2. R. Murugesan, (2004) Electricity and magnetism, S.Chand & Co

Books for reference:

1. K.K. Tewari (2003) Electricity and magnetism with electronics, S.Chand & Co
2. D.S.Mathur (2003) Mechanics, S.Chand & Company publishers, New Delhi.
3. D.N. Vasudeva (1998) Fundamentals of Electricity and magnetism, McGraw Hill Publishers

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: 18UPH4S2

Programme Code: 03		B.Sc Physics		
Course Code: 18UPH4S2		SKILL BASED SUBJECT II – Medical Instrumentation		
Batch 2018-2019	Semester IV	Hours/Week 2	Total Hours 30	Credits 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 **9 hrs**

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

UNIT II **9 hrs**

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

UNIT III **9 hrs**

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

UNIT IV **9 hrs**

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

UNIT V **9 hrs**

50 Hz interference - Magnetic component - Electric component - Lead as a path of least resistance - Patient body as a path of least resistance - Determination the frequency of interference.

*** Self study**

Teaching Methods: Power Point presentation / Seminar / Discussion / Assignment

Course Code: 18UPH4S2

Books for study:

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

Book for reference:

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

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**	

SEMESTER - IV **18UWR4N2**

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 2 **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).

Course Code: 18UPH4CM

Programme Code: 03		B.Sc Physics		
Course Code: 18UPH4CM		Core Practical - II		
Batch 2018-2019	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.
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

Course Code: 18UPH4CM

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: 18UPH505

Programme code: 03		B.Sc., Physics		
Course Code: 18UPH505		Core Paper - 5 : Astrophysics		
Batch 2018-2019	Semester V	Hours/Week 4	Total Hours 60	Credits 4

Course Objective

To enable the learners to

1. To know about the sun, star and planetary motion
2. To know about the astronomical instruments
3. To know about the age and evaluation of earth

Course Outcome (CO)

K1	**CO1**	Understand the fundamental principles that underpins modern theoretical and observational astrophysics.
K2	**CO2**	Know the importance of stellar astrophysics and evolution of universe.
K3	**CO3**	Enhance the knowledge of our solar system and its members. To know the age and evolution of earth.
K4	**CO4**	Understand stars luminosity, brightness, distance and magnitude and astronomical instruments and its working.

UNIT I **15 hrs**

Theories of the universe, galaxies and star clusters

Origin of the universe - the big bang theory - the steady state theory - the oscillating universe theory - Hubble's law

Galaxies

Types of galaxies - Milky Way - star clusters - **globular clusters***

UNIT II **15 hrs**

Solar System

Mass and stability of the sun of the sun - solar constant - temperature of the sun - source of solar energy - solar wind - corona

Other members of the solar system

Mercury - Venus - Earth - Mars - Jupiter - Saturn - Uranus - Neptune - Moon - Bode's law

UNIT III **15 hrs**

Age and evaluation of earth

Solar nebula theory – planetesimials theory – age of earth – radiative dating – exposure age of meteoroids – age of radiative elements – motion of the planets – evaluation of earth's atmosphere – formation of ozone layer – role of life in changing the earth's atmosphere

UNIT IV **15 hrs**

Distance and magnitude of stars

Magnitude and brightness - apparent magnitude of stars - absolute magnetic of stars - relation between apparent magnitude and absolute magnitude of stars - Luminosities of stars - **measurement of stellar distance***

UNIT V **15 hrs**

Astronomical Instruments

Optical telescope – reflecting telescope – types of reflecting telescope – advantages – antenna requirements for solar observations – parapoloid reflection antenna – broad band antennas – dipole arrays

*** Self study**

Course Code: 18UPH505

Teaching methods: Seminar, Assignment, Discussion and PPT

Books for study:

1. K. S. Krishnaswamy (2002), Astrophysics: A modern perspective, New Age Int. Pvt Ltd
2. A. B. Bhattacharya, S.Joardar, R.Bhattacharya (2010) Astronomy and Astrophysics, Overseas Press

Books for reference:

1. B. Basu,(2001), An introduction to Astrophysics, Hall of India Pvt Ltd
2. R. Murugesan, (2003) Modern Physics, 11th edition, S.Chand and Co.

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**	**H**	**S**	**H**	**H**
CO 4	**S**	**S**	**S**	**S**	**S**
S- Strong		**H-High**	**M-Medium**		**L - Low**

Course Code: 18UPH506

Programme code: 03		B.Sc., Physics		
Course Code: 18UPH506		Core Paper - 6: Optics and Laser Physics		
Batch 2018-2019	Semester V	Hours/Week 4	Total Hours 60	Credits 4

Course Objective

To enable the learners to
1. Acquire knowledge in ray optics
2. Understand mechanism of energy transfer in the form of waves
3. Basic principles of laser physics

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**	Be able to understand wave optics, interference, diffraction and polarization.
K3	**CO3**	Be acquainted with Fresnel and Fraunhofer diffraction.
K4	**CO4**	Have an understanding of the basic principles of Laser, operation and construction of different Laser systems.

UNIT I **15hrs**

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– **circular of least confusion***, achromatic lenses –condition for achromatism of two thin lenses separated by a finite distance.
Eye pieces – Ramsden and Huygen's eye piece.

UNIT II **15hrs**

Physical Optics: 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 neighbouring spectral lines – Fabry perot intefrometer - visibility of fringes – sharpness of fringes– resolving power – Airy's formula.

UNIT III **15hrs**

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.

IV **15hrs**

Polarization

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

Course Code: 18UPH506

UNIT V **15hrs**

Laser Physics

Basic principles of Laser – Einstein coefficients – **condition for light amplification – population inversion*** – Threshold condition – Types of Laser– Ruby Laser – He-Ne Laser – Applications of Laser in industry, medicine and holography.

*** Self study**

Teaching methods: Seminar, Assignment, Discussion and PPT

Books for study:

1.Brijlal, M.N.Avadhanulu and N. Subrahmanyam,(2012), A Text book of Optics, S. Chand & Co
2. K. Thyagarajan, Ajoy Ghatak (2010), Lasers: Fundamentals and Applications, Springer Science & Business Media

Books for reference:

1. R.Murugesan (2003), Optics and spectroscopy, S. Chand & CO
2. William T.Silvast (2004), Laser Fundamentals, Cambridge University Publishers

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: 18UPH507

Programme code: 03		B.Sc., Physics		
Course Code: 18UPH507		Core Paper - 7 Principles of Electronic Devices and Circuits		
Batch 2018-2019	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 **15 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 **15 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.

UNIT III **15 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.

Course Code: 18UPH507

UniJunction 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 **15 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 **15 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, Discussion and PPT

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

Book for reference:
1. Bernod Grob, (1992) , Basic Electronics , McHraw Hill, New Delhi

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: 18UPH508

Programme code: 03		B.Sc., Physics		
Course Code: 18UPH508		Core Paper – 8: Quantum Mechanics and Relativity		
Batch 2018-2019	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 **15 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 **15 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.

UNIT III **15 hrs**

Ooperators 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 **15 hrs**

Physical aapplications of Schrödinger's Equation - The Free particle - Particle in a box - Potential step – Refelcetance 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.

Course Code: 18UPH508

UNIT V **15 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, Discussion and PPT

Books for study:

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

Books for reference:

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

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**

Course Code: 18UPH5S3

Programme code: 03		B.Sc., Physics		
Course Code: 18UPH5S3		Skill Based Subject III- Programming in C		
Batch 2018-2019	Semester VI	Hours/Week 3	Total Hours 45	Credits 3

Course Objective

To enable the learner to

1. Know about basic in C language
2. Develop programming skill in C language
3. to exhibit multidisciplinary approach to solve problems.

Course Outcome (CO)

K1	**CO1**	work in interdisciplinary groups
K2	**CO2**	gain expertise in identifying and solving problems related to computer language.
K3	**CO3**	develop programs for simple problems
K4	**CO4**	involve in advanced software systems

UNIT I **6 hrs**

Constants, Variables and data types

Introduction – character set – C tokens – keywords and identifiers – constants – variables – data types – declaration of variables – assigning values to variables – operators and expressions : operators : arithmetic – relational – logical – assignment – increment and decrement – conditional – bitwise - special operators – arithmetic expressions – evaluation of expressions – precedence of arithmetic operators

UNIT II **6 hrs**

Managing input and output operations

Introduction – reading a character – writing a character – formatted input and output – decision making and branching: simple if – if else – nesting of if else – else if ladder – switch statement – conditional expressions – goto statement

UNIT III **6 hrs**

Decision making and looping

The while statement – The Do statement – the for statement - jumps in loop – arrays – declaration and initialization of one dimensional and two dimensional arrays

UNIT IV **6 hrs**

Character arrays and strings

Introduction – declaring and initializing string variables – reading strings from terminal and writing strings to screen – structure and unions (basic concepts only)

UNIT V **6 hrs**

Pointers and C preprocessors

Pointers: Introduction – understanding pointers – accessing the address of a variable – declaring pointer variables – initialization of pointer variables – The preprocessors: Macro substitution – File inclusion

Teaching Methods: PowerPoint presentation / Seminar / Discussion / Assignment

Course Code: 18UPH5S3

Books for study:

1. E. Balagurusamy,(2011), Programming in ANSI C, Tata McGraw Hill Publishers Ltd., 5th Ed

Books for reference:

1. Yashwant Kaneetka, (2008), Let us C, BPB Publications, New Delhi

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

Course Code: 18UPH609

Programme code: 03		B.Sc., Physics		
Course Code: 18UPH609		Core Paper - 9: Atomic and Solid State Physics		
Batch 2018-2019	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**	Get 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**

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 waals' 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

Course Code: 18UPH609

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 – Sommerfield 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, Discussion and PPT

Books of study

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

Books for reference:

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

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**

Course Code: 18UPH610

Programme code: 03		B.Sc., Physics		
Course Code: 18UPH610		Core Paper - 10: Fundamentals of Digital Electronics		
Batch 2018-2019	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 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.

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.

Course Code: 18UPH610

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, Discussion and PPT

Books for study::

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

Books for reference::

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

Course Code: 18UPH611

Programme code: 03		B.Sc., Physics		
Course Code: 18UPH611		Core Paper - 11: Nuclear Physics		
Batch 2018-2019	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:

Synchro-cylotron – 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.

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.

Course Code: 18UPH611

UNIT IV **12 hrs**

Nuclear fission and fusion

Nuclear fission – energy released in fission – Bohr and Wheeler's theory of nuclear fission – chainreaction- 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

Books for study:

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

Books for reference:

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

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**	

Course Code: 18UPH6S4

Programme code: 03		B.Sc., Physics		
Course Code:18UPH6S4		Skill Based Subject IV: Introduction to Microprocessor		
Batch 2018-2019	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 – difference between microprocessor and microcomputer – Uses of Microprocessor

UNIT II **9 hrs**

Architecture

Pin diagram of 8085 – Architecture – Data and address bus – Control signals and their generation

UNIT III **9 hrs**

Instruction Set and Programming

Instruction set – Data Transfer Group - Arithmetic Group – Logical Group – Control Group – Machine Control Group – Mnemonics – Op code – **Simple Programming: Addition, Subtraction, Multiplication, Division, Sorting arrays, Finding smallest & biggest number in an array, etc*.**

UNIT IV **9 hrs**

Interfacing

Need for interfacing – Basic interfacing concepts – Interfacing output displays, Interfacing input devices, memory, memory mapped i/o and i/o mapped i/o schemes.

UNIT V **9 hrs**

Stack and Subroutine

Stack, Stack Pointer, Stack related Instruction – Push and Pop – Subroutine – Unconditional and Conditional Call and return instructions.

*** Self study**

Teaching Methods: PowerPoint presentation / Seminar / Discussion / Assignment

Books for study:

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

Course Code: 18UPH6S4

Books for reference

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

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**	

Course Code:18UPH6CN

Programme code: 03		B.Sc., Physics		
Course Code:18UPH6CN		Core Practical – III – General Experiments		
Batch 2018-2019	Semester V & VI	Hours/Week 3	Total Hours 90	Credits 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. Determination of Mutual Inductance – Ballistic Galvanometer
9. Comparison of Mutual Inductance - Ballistic Galvanometer
10. Comparison of Capacitors - Ballistic Galvanometer
11. Hartmann's interpolation formula – Determination of the wavelength of the arc spectrum – Spectrometer
12. Energy Gap Measurement of Semiconducting materials
13. Melting point of wax using Thermistor
14. Impedance and Power factor of an Inductive – Resistive circuit
15. Study of Transformer
16. Polarimeter – Rotation of plane of polarization
17. Fresnel's Biprism – Optic bench
18. Planck's constant – Photo electric emission

19. Boltzmann constant
20. Hysteresis- B-H curve
21. Anderson Bridge – Determination of Dielectric constant
22. Determination of Magnetic field - using Earth inductor
23. Determination of capacitance using Schering Bridge
24. Comparison of capacitance using DeSauty Bridge
25. Measurement of Inductance using Owen's Bridge
26. Rydberg's Constant – Scale and Telescope
27. Study of various types of electronic components and Study of basic electronic instruments (Multimeter – Analog and digital , AFO, CRO, function generator, etc)

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**

Course Code: 18UPH6CO

Programme code: 03		B.Sc., Physics		
Course Code: 18UPH6CO		Core Practical IV - Electronics, Digital Electronics & Microprocessor		
Batch 2018-2019	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 and to understand the ALP using 8085 processor
K5	**CO2**	Develop the ability to analyse and design analog electronic circuits using discrete components.
K5	**CO3**	To acquire knowledge in digital electronics by constructing logic circuits
K5	**CO4**	Take measurements to compare experimental results in the laboratory with the theoretical analysis

LIST OF EXPERIMENTS

(Any Fifteen; five from each section)

SECTION – A
ELECTRONICS

1. Construction and study of IC Regulated Power Supply
2. Voltage doubler
3. Transistor Characteristics - CE configuration
4. RC-Coupled Amplifier –Single Stage
5. Feedback Amplifier
6. Hartley Oscillator
7. Monostable multivibrator using Transistor
8. Bistable multivibrator using Transistor
9. FET characteristics

Course Code: 18UPH6CO

SECTION – B
DIGITAL ELECTRONICS

10. Logic gates using IC – Verification of truth tables and DeMorgan's theorem
11. NOR and NAND gates – Universal building blocks
12. Half adder and Full adder
13. Half subtractor and Full subtractor
14. Analog to Digital convertor
15. Digital to Analog convertor.
16. Op-Amp LM741 as adder, subtractor and scalar.
17. Op-Amp LM741 as inverting and non inverting amplifier

SECTION – C
MICROPROCESSOR

18. 8085-ALP for 8 Bit addition, Subtraction
19. 8085-ALP for 8 Bit Multiplication and Division
20. 8085-ALP to sort the array in descending order and ascending order
21. 8085-ALP for finding the biggest element in the array and sum the element in the array
22. 8085-ALP for one's compliment, masking off most significant 4 bits and setting bits .
23. 8085-ALP to count the number of zeros, +ve, -ve number and square of a number
24. 8085-ALP- Matrix addition.
25. 8085-ALP for ASCII to decimal conversion, BCD to Hex conversion, Hex to Decimal conversion and Hex to binary form

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**

Course Code: 18UPH6CP

Programme code: 03		B.Sc., Physics		
Course Code: 18UPH6CP		CORE PRACTICAL - V : PROGRAMMING in C		
Batch 2018-2019	Semester VI	Hours/Week 2	Total Hours 60	Credits 2

Course objective

To enable the learners to:

1. Have a good foundation in the fundamentals of C-programming
2. Acquire the skill of writing and executing programs.
3. Employ the practical result to support the theory

Course Outcome (CO)

K5	**CO1**	Develop the ability to write programs for simple problems.
K5	**CO2**	Get familiarized to computer 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. Write a program that inputs three integers from the keyboard and prints the SUM, AVERAGE, PRODUCT, SMALLEST, and LARGEST of THREE NUMBERS.
2. Arrange a set of numbers in ascending order using SELECTION SORT
3. Graphical representation of motion of free falling objects
4. Convert integer in the range 1 to 100 into words
5. Calculation of half lifetime of a radioactive element.
6. Verification of Boyle's law
7. Matrix addition
8. Matrix multiplication
9. Develop a C program to check for palindrome string in a sentence
10. Matrix Subtraction
11. Develop a C program to illustrate the addition of objects
12. Develop a C program to calculate the value of m^n
13. Develop a C program to calculate an electricity bill
14. Develop a C program to illustrate String handling functions
15. Develop a C program to check whether a given number is odd and even
16. Develop a C program to Calculate the sum of natural numbers
17. Develop a C program to write a multiplication table
18. Develop a C program to convert days to month
19. Develop a C program to conversion of distance

Course Code: 18UPH6CP

20. Develop a C program to conversion of temperature
21. Develop a C program to find the length of a string using arrays
22. Develop a C program to find the greatest among 10 numbers using arrays
23. Develop a C program to write vowels using switch case statement
24. Develop a C program to calculate the age using nested if else statement

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

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

1. Principles of Communication Systems
2. Energy Source and Nanoscience
3. Electronic Instrumentation
4. Mathematical Physics
5. Object oriented programming in C++
6. Introduction to Biophysics

UPH53

Major Elective Paper 1

Course Code:

Programme code: 03		**B.Sc., Physics**		
Course Code:		**Principles of Communication Systems**		
Batch 2018-2019	**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 fibre 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 I I **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

Course Code:

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

Books for study:

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

Book for reference:

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

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**

UPH55

Major Elective Paper 2

Course Code:

Programme code: 03		**B.Sc., Physics**		
Course Code:		**Energy Sources and Nanoscience**		
Batch 2018-2019	**Semester**	**Hours/Week 4**	**Total Hours 60**	**Credits 5**

Course Objective

To enable the learner to

1. Know about the Conventional Energy Sources and Renewable energy sources.
2. Gain knowledge about Nanoscience and Nanotechnology.

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**

Conventional Energy Sources

World's reserve - commercial energy sources and their availability – various forms of energy – renewable and conventional energy system – comparison – Coal, oil and natural gas – applications – Merits and Demerits

UNIT II **12 hrs**

Solar Energy

Renewable energy sources – solar energy – nature and solar radiation – components – solar heaters – crop dryers – solar cookers – water desalination (block diagram) – Photovoltaic generation – merits and demerits

UNIT III **12hrs**

Other forms of energy sources

Energy from Biomass:

Biomass energy - photosynthesis - Biomass conversion technologies (wet processes , dry processes)

Wind Energy:

Principles of wind energy conversion – The nature of the wind – Power in the wind- Applications of wind Energy.

Geothermal energy & Ocean thermal energy:

Nature of Geothermal fields - Geothermal sources – An introduction to Energy from the Oceans

UNIT IV

Development of Nano materials **12 hrs**

Introduction - Solid materials and their strength – Perspective of length – Nanoscience and Nano technology - Quantum Structures – Quantum confinement – Top down and Bottom up approach – Synthesis of nanomaterials – Arc discharge method – Coprecipitation method

Course Code:

UNIT V

Overview of Nanomaterials **12 hrs**

Nanomaterials and Nanostructures in nature – Super hydrophobic surfaces - Fundamental approaches for cleaning – Self-cleaning and easy cleaning materials: Self-cleaning and easy cleaning glasses and tiles – Self-cleaning paints , textiles and other materials.

Teaching Methods: Seminar / Discussion / Assignment and PPT

Books for study:

1. D.P. Kothari, K.C. Singal & Rakesh Ranjan (2008), Renewable energy sources and emerging Technologies, Prentice Hall of India pvt. Ltd., New Delhi
2. G.D.Rai, (12th re print 2014) Non Conventional Energy Sources, Khanna Publishers,
3. M.A.Shah & Tokeer Ahmed ,(2010), Principles of Nanoscience and Nanotechnology, Narosa Publishing house
4. Micheal F. Ashby , Paulo J. Ferreira , Daniel L.Schodek (2009), Nanomaterials, Nanotechnologies and design: An introduction for Engineers and Architects , Elsevier Science

Book for Reference:

1.S.A. Abbasi and Nasema Abbasi (2008), Renewable Energy sources and their Environmental impact, PHI Learning Pvt. Ltd., New Delhi.
2. D.S.Chauhan & S.K.Srivastava, (2004), Non-Conventional Energy Resources, New Age International Publishers.
3.C.N.R.Rao , P.J.Thomas and G.U . Kulkarni , (2007), Nano Crystals : Synthesis , Properties and Applications, Springer

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**	

UPH57

Major Elective Paper 3

Course Code:

Programme code: 03		**B.Sc., Physics**		
Course Code:		**Electronic Instrumentation**		
Batch 2018-2019	**Semester**	**Hours/Week 4**	**Total Hours 60**	**Credits 5**

Course Objective

To enable the learners to

1) impart knowledge on various electronic instruments
2) study about different current indicating instruments
3) understand the working of electronic instruments

Course Outcome (CO)

K1	**CO1**	Able to identify direct current indicating instruments
K2	**CO2**	Able to describe the working of alternating current indicating instruments
K3	**CO3**	Able to design the circuits of various parts of oscilloscope
K4	**CO4**	Able to apply the knowledge of different electronic instruments and Able to demonstrate the types of transducers.

UNIT I **12 hrs**

Direct Current Indicating Instrument

Suspension galvanometer- Torque and deflection of the galvanometer - Permanent magnet moving coil mechanism – Temperature compensation - D.C. Ammeters - **D.C. Voltmeters*** - Voltmeter sensitivity - Series and Shunt type ohm meter - Multimeter or Vom.

UNIT II **12 hrs**

Alternating Current Indicating Instrument

Electrodynamometer (EDM) - Moving iron instruments - Rectifier type instruments - Thermo instruments - Electrodynamometer in power instruments - Watt-Hour meter - Power factor meter, **Instrument transformer***

UNIT III **12 hrs**

Oscilloscopes

Basic CRO operation - Cathode ray tube (CRT) - CRT circuits - Vertical deflection system - Delay line – Multitrace - Horizontal deflection system - CRO probes - Determination of Frequency, Phase angle and time delay **-** Lissajou's figures - **Digital storage Oscilloscope***

UNIT IV **12 hrs**

Electronic Instruments

Electronic Multimeter - considerations in choosing an analog voltmeter - Differential voltmeters - Digital voltmeters - Successive Approximation conversion – All electronic component measurements - Q meters - Vector impedance meter - **Vector voltmeters***

UNIT V **12 hrs**

Transducers

Classification of transducers - Selecting a transducer - Strain gauges – Gage factor - Displacement transducers (Capacitive, Inductive, Variable differential transformer) - Temperature measurements (Resistance thermometers, Thermocouples, Thermistor) - Photosensitive devices (Vacuum phototube, Gas filled phototube, Multiplier, **Photoconductive cells***)

*** Self study**

UPH58

Course Code:

Teaching Methods: PowerPoint presentation / Seminar / Discussion / Assignment

Books for study:

1. H.S.Kalsi,(2010), . Electronic Instrumentation, Tata McGrawHill Co.
2. A.D. Helfrick and W.D.Cooper, (1994), Electronic Instrumentation and Measurement Techniques P.H.I .

Book for reference

1. Dobelin.E.O., (1996) Measurement Systems: Application and Design, Mc-Graw Hill Kogakusha Ltd., Tokyo
2. Millman and Halkies, (2009), Integrated Electronics , Tata McGraw Hill edition, New Delhi

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**

UPH59

Major Elective Paper 4

Course Code:

Programme code: 03		**B.Sc., Physics**		
Course Code:		**Mathematical Physics**		
Batch **2018-2019**	**Semester** **V**	**Hours/Week** **4**	**Total Hours** **60**	**Credits** **5**

Course Objective

To enable the learners to about
1. Know about the differential equations
2. Know about the special functions, curvilinear coordinates, errors etc
3. Having completed the course the student will

Course Outcome (CO)

K1	**CO1**	Be familiar to find the series solution of second order homogenous differential equations
K2	**CO2**	Have knowledge about the various recurrence relations, generating functions and ortonormality conditions for different special functions
K3	**CO3**	Have an understanding about curvilinear coordinates and geometrical application of different calculus.
K4	**CO4**	Know about error functions and extremum of functions

UNIT I **12 hrs**

Differential Equations

Second order homogeneous differential equations and their series solution (example: Bessel equation), linear independence of two solutions (Wronskian), Integral and power series methods for second solution.

UNIT II **12 hrs**

Special Functions

Bessel, Legendre (spherical harmonics), Hermite and Laguerre: generating functions and recurrence relations, orthonormality conditions, Dirac delta function.

UNIT III **12 hrs**

Curvilinear Coordinates

Orthogonal curvilinear coordinates; concept of a metric, spherical and **cylindrical coordinates*** and their unit vectors.

UNIT IV **12 hrs**

Geometrical Applications of Differential Calculus

Curvature – Cartesian and polar co-ordinates – **Centre and radius of curvature*** – Circle of curvature – Involutes and evolutes – Envelopes – Properties of envelopes and evolutes –Evolute as envelope of normals.

UNIT V **12 hrs**

Errors, Approximations and Extremum of Functions

Introduction to errors-classifications-accuracy of a function methods-error in laboratory instruments and methods-utility of errors. Approximation and applications. Maxima and minima: Geometrical interpretation and physical application-two and more independent variables-Lagrangian multiplier.

UPH60

Course Code:

*** Self study**

Teaching methods: Seminar, Assignment, Discussion and PPT

Books for study:

1. Satya Prakash, (2006), Mathematical Physics, Sultan chand and Sons, New Delhi
2. B D Gupta, (2001), Mathematical Physics, Vikas Publishing house.
3. Rajput, (2000), Mathematical Physics, Pragati Prakashan.

Books for reference:

1. Arfken and Weber, (1984), Mathematical Methods for Physicists , Academic Press.
2. Kandasamy. P, Thilagavathy. K and Gunavathy. K, (2008), Engineering Mathematics, S.Chand & Co, New Delhi.
3. Veerarajan..T, (2004), Engineering Mathematics, TataMcGraw Hill, Fourth Edition.
4. Venkataraman.M.K, (2004), Engineering Mathematics, The National Pub. Co Volume I & II Revised

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**

UNIT I **6 hrs**

Beginning with C++

Basic concepts of OOP – Tokens – keywords – identifiers and constants – basic data types – user defined data types – derived data types – declaration of variables – dynamic initialization of variables – reference variables – scope resolution operators **Major Elective Paper 5**

Course Code:

Programme code: 03		**B.Sc., Physics**		
Course Code:		**Object Oriented Programming in C++**		
Batch 2018-2019	**Semester**	**Hours/Week 4**	**Total Hours 60**	**Credits 5**

Course Objective

To enable the learners to

1. Know about the basic in C++ language
2. Develop programming skill in C++ language
3. Understand about various Functions and operators.

Course Outcome (CO)

K1	**CO1**	Acquire basic knowledge about various data types, variables, operators and solving programs for real data.
K2	**CO2**	understand about function prototyping and function overloading
K3	**CO3**	To acquire relevant information about various classes, objects and programming with various functions and arguments.
K4	**CO4**	have a good knowledge about various Constructors, Destructors **Po**lymorphism and inheritance

– **expression and their types – control structures***

UNIT II **6 hrs**

Functions in C++

Introduction - the main function – function prototyping – call by reference – return by reference - inline functions – default arguments – const arguments – function overloading

UNIT III **6 hrs**

Classes and Objects

Introduction – Specifying a class – defining member functions – A C++ program with class – making an outside function inline – nesting of member functions – private member functions – arrays within class – memory allocation for objects – static data members and functions – arrays of objects – objects as function arguments – friendly functions

UNIT IV **6 hrs**

Constructors and Destructors

Introduction – constructors – parameterizes constructors – multiple constructors in class – copy constructors – dynamic constructors – destructors

UNIT V **6 hrs**

Polymorphism and Inheritance

Introduction – defining operator overloading – overloading unary and binary operators – rules for overloading operators – inheritance: Introduction – defining derived class – single inheritance – **multilevel inheritance*** – multiple inheritance

UPH62

Course Code:

Teaching Methods: PowerPoint presentation / Seminar / Discussion / Assignment

Books for study:

1.E.Balagurusamy, (2008), Object Oriented Programming with C++, Tata McGraw Hill

Books for reference:

1. Yashwant Kaneetka, (2008), Let us C++, BPB Publications, New Delhi
2. H. Schildt , (2014), C++: A beginners guide , Mc Graw Hill. 3rd Edition

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**

UPH63

Course Code:

Programme code: 03		B.Sc., Physics		
Course Code:		Introduction to Biophysics		
Batch 2018-2019	Semester	Hours/Week 4	Total Hours 60	Credits 5

Course Objective

To enable the learners to:

1. Biophysics of Muscle
2. Biophysics of Human Ear
3. Physics of Vision

Course Outcome (CO)

K1	**CO1**	Able to know about biomechanics, biostatics, biodynamics
K2	**CO2**	Able to understand biophysics and fluidrun
K3	**CO3**	To acquire the knowledge about Biophysics and gas transport
K4	**CO4**	To know the concept of physics of audition and physics of vision

Unit – I Biomechanics **6 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 **6 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 **6 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.

.

Unit – IV Physics of Audition **6 hrs**

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

Unit – V Physics of Vision **6 hrs**

Geometrical Optics – Refraction – Gradient index Lens – Spherical Aberration – Chromatic Aberration – Refraction Power of Eye – Reduced Eye Model – Accommodation - Refractive Errors – 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

UPH64

Course Code:

Books for study:

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

Books for reference:

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

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**

UPH65

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

Course Code:18UPH63A1

Programme code: 03		**For B.Sc Mathematics and B.Sc Chemistry**		
Course Code:18UPH63A1		**Allied Subject I -Physics–I** (MECHANICS, HEAT, SOUND, MAGNETISM AND ELECTRICITY)		
Batch 2018-2019	**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.

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.

Course Code:18UPH63A1

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 and Discussion.

Books for study:

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

Books for reference:

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

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**

UPH67

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

Course Code: 18UPH4A2

Programme code: 03		**For B.Sc Mathematics and B.Sc Chemistry**		
Course Code: 18UPH4A2		**Allied Subject II -Physics–II (MODERN PHYSICS, ELECTRONICS AND DIGITAL ELECTRONICS)**		
Batch 2018-2019	**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.

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 and Discussion**.**

Books for study:

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

Books for reference:

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

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**

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

Course Code: 18UPH4AL

Programme code: 03		For B.Sc Mathematics and B.Sc Chemistry		
Course Code: 18UPH4AL		Allied Physics Practical		
Batch 2018-2019	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 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. Surface tension and interfacial S.T – Drop weight Method.
4. Rigidity Modulus – Static torsion.
5. Torsional pendulum – Moment of inertia and rigidity modulus.
6. Acceleration due to gravity – Compound pendulum.
7. Specific heat of liquid by cooling – Newton's cooling.
8. Sonometer - AC frequency.
9. Thermal conductivity – Lee's disc.
10. Spectrometer – Refractive index of material of the prism– Solid prism.
11. Spectrometer – Grating – Wavelength determination – Minimum deviation method.
12. Newton's ring – Radius of curvature of lens surface.
13. Potentiometer – Low range Ammeter calibration.
14. Potentiometer – Specific Resistance.
15. Moment of a magnet – Tan C position.

16. Figure of Merit – Ballistic galvanometer.
17. Characteristics of PN - Junction diode.
18. Characteristics of a Zener diode.
19. Verification of the truth tables of OR, AND, NOR, NOT, NAND gates using IC'S.
20. Verification of De-Morgan's theorems.
21. Potentiometer – Low range Voltmeter calibration.
22. Determination of frequency – Melde's method
23. Measurement of Terminal velocity for different liquids by Stokes method
24. Spectrometer – Refractive index of Liquid– Liquid prism.
25. Determination of surface tension and interfacial surface tension of a liquid by drop weight 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**