P.K.R Arts College for Women
(Accredited with 'A' Grade by NAAC)
An Autonomous Institution Affiliated to Bharathiar University
GOBICHETTIPALAYAM – 638476

Department of Physics

Scheme of Examinations and Syllabus

for the candidates admitted in the Academic Year 2018-19

Under CBCS PATTERN

UG COURSE STRUCTURE
CBCS – 2018-2019

Part and Category	No. of Courses	Credit(s)	Total Credits	Proposed Semester
Part – I Tamil/Hindi/French/Kannada/Malayalam/Sanskrit	4	4	16	I – IV
Part – II English	4	4	16	I – IV
Part - III Core Theory /Core Practical	21	5/3/1		
Allied Theory/ Allied Practical	5	4/3/2	93	I-VI
Elective	2	2		
Industrial Training	1	2	2	To be done in Summer Vacation of Semester IV, ESE in Semester V

Part – IV
A. Foundation Courses
  i.   Environment Studies
  ii. Yoga and Value Education
	1
	1
		2
		2
			4	I
				II

B. Skill Enhancement Courses
  i.   Information Security
  ii. Energy Resources
  iii. Soft Skills
  iv. Programming in C, C++ - Practical
	1
	1
	1
	1
		2
		2
		2
		2
			8	III
				IV
				V
				VI

C. Non-Major Electives
  i.   Indian Women and Society / Basic Tamil
  ii. Career Enhancement/ Consumer Rights
	1
	1
		2
		2
			4	III
				IV

D. Open Elective	1	3	3	V
Part - V i. Proficiency Enhancement I - Self Study Course	1	2		V Semester
ii. Proficiency Enhancement II -NSS/YRC/RRC/ CCC/PHY.EDU	1	1	4	II to VI Semesters
iii. Proficiency Enhancement II- Department Activity	1	1		II to VI Semesters

Total Marks : 4200   **Total Credits : 150**

P.K.R ARTS COLLEGE FOR WOMEN
(An autonomous institution, accredited by NAAC with 'A' Grade)
BACHELOR OF SCIENCE-PHYSICS
Programme Scheme and Scheme of Examinations
(For students admitted in the Academic Year 2018-19)

Part	Category	Course Code	Title of the Course	Hrs/ week	Exam hrs.	CIA	ESE	Total marks	Credits
			I –SEMESTER						
I	Language : I	18LTU01/ 18LHU01/ 18LFU01/ 18LKU01/ 18LMU01/ 18LSU01	Tamil- I/ Hindi-I/ French-I/ Kannada-I/ Malayalam-I/ Sanskrit-I	6	3	25	75	100	4
II	English : I	18LEU01	English: I	6	3	25	75	100	4
III	Core : I	18PHU01	Mechanics	6	3	25	75	100	5
III	Core : II	18PHU02	Comprehension in Physics -I (Self-Study / Online Exam)	-	1½	-	50	50	1
III	Allied : I	18PHU03	Mathematics – I	7	3	25	75	100	4
III	Core : IV	18PHU04	Physics – Practical I	3	-	-	-	-	-
IV	Foundation: I	18FCU01	Environmental studies	2	3	--	50	50	2
			TOTAL	30				500	20
			II –SEMESTER						
I	Language : II	18LTU02/ 18LHU02/ 18LFU02/ 18LKU02/ 18LMU02/ 18LSU02	Tamil- II/ Hindi-II/ French II/ Kannada-II/ Malayalam-II/ Sanskrit-II	6	3	25	75	100	4
II	English : II	18LEU02	English: II	6	3	25	75	100	4
III	Core : V	18PHU05	Heat and Thermodynamics	6	3	25	75	100	5
III	Core : VI	18PHU06	Comprehension in Physics -II (Self-Study / Online Exam)	--	1½	--	50	50	1
III	Allied : II	18PHU07	Mathematics – II	7	3	25	75	100	4
III	Core : IV	18PHU04	Physics - Practical I	3	3	40	60	100	3
IV	Foundation: II	18FCU02	Yoga and Value Education	2	3	--	50	50	2
			TOTAL	30				600	23

Part	Category	Course Code	Title of the Course	Hrs/ week	Exam hrs.	CIA	ESE	Total marks	Credits
			III –SEMESTER						
I	Language: III	18LTU03/ 18LHU03/ 18LFU03/ 18LKU03/ 18LMU03/ 18LSU03	Tamil- III/ Hindi-III/ French-III/ Kannada-III/ Malayalam-III/ Sanskrit-III	6	3	25	75	100	4
II	English: III	18LEU03	English III	6	3	25	75	100	4

III	Core : VIII	18PHU08	Optics	3	3	25	75	100	5
III	Core : IX	18PHU09	Comprehension in Physics -III (Self-Study / Online Exam)	--	1½	--	50	50	1
III	Allied : III	18PHU10	Chemistry I	3	3	25	75	100	3
III	Core : XI	18PHU11	Physics - Practical II	3	-	-	-	-	-
III	Allied : IV	18PHU12	Chemistry - Practical	2	-	-	-	-	-
IV	Skill Enhancement : I	18SEU01	Information Security	2	--	--	100	100	2
IV	Non- Major Elective : I	18NMU01A / 18NMU01B	Indian Women and Society / Basic Tamil	2	3	--	50	50	2
IV	Non- Major Elective : II	18NMU02A / 18NMU02B	Career Enhancement (Online exam) / Consumer Rights	3	--	--	--	--	--
			TOTAL	30				600	21
			IV –SEMESTER						
I	Language : IV	18LTU04/ 18LHU04/ 18LFU04/ 18LKU04/ 18LMU04/ 18LSU04	Tamil- IV/Hindi- IV/ French-IV/ Kannada-IV/Malayalam-IV/ Sanskrit-IV	6	3	25	75	100	4
II	English : IV	18LEU04	English - IV	6	3	25	75	100	4
III	Core : XIII	18PHU13	Mathematical Physics	5	3	25	75	100	5
III	Core : XIV	18PHU14	Comprehension in Physics -IV (Self-Study / Online Exam)	--	1½	--	50	50	1
III	Allied : V	18PHU15	Chemistry II	3	3	25	75	100	3
III	Core : XI	18PHU11	Physics - Practical II	3	3	40	60	100	3
IV	Allied : IV	18PHU12	Allied Chemistry - Practical	2	3	40	60	100	2
IV	Skill Enhancement-II	18SEUPH2	Energy Resources	2	3	25	75	100	2
IV	Non- Major Elective : II	18NMU02A/ 18NMU02B	Career Enhancement (Online exam) / Consumer Rights	3	1½	--	50	50	2
			TOTAL	30				800	26

			V –SEMESTER						
III	Core : XVI	18PHU16	Properties of Matter & Sound	6	3	25	75	100	5
III	Core : XVII	18PHU17	Solid State Physics	6	3	25	75	100	5
III	Core : XVIII	18PHU18	Electronics & Communication	5	3	25	75	100	5
III	Core : XIX	18PHU19	Comprehension in Physics -V (Self-Study / Online Exam)	--	1½	--	50	50	1
III	Core : XX	18PHU20	Industrial Training	-	3	-	100	100	2
III	Core : XXI	18PHU21	Electronics- Practical-III	3	-	-	-	-	-
III	Core : XXII	18PHU22	Digital Electronics and Microprocessor - Practical-IV	2	-	-	-	-	-
III	Open Elective	18PHUOE1	Physics in day to day life	3	3	25	75	100	3
III	Elective I	18PHU 23A/	Digital Electronics and	3	3	25	75	100	2

		18 PHU 23B/ 18 PHU 23C	Microprocessor / Soil Physics / Geo Physics						
IV	Skill Enhancement: III	18SEUPH3	Soft Skills	2	3	25	75	100	2
V	Proficiency Enhancement-I	18PEUPH1	Lasers (Self Study)	-	3	-	100	100	2
			TOTAL	30				850	27
			VI –SEMESTER						
III	Core : XXV	18PHU24	Quantum Mechanics and Relativity	5	3	25	75	100	5
III	Core : XXVI	18PHU25	Atomic and Nuclear Physics	5	3	25	75	100	5
III	Core : XXVII	18PHU26	Electricity and Magnetism	5	3	25	75	100	5
III	Core : XXVIII	18PHU27	Applied Instrumentation & Spectroscopy	5	3	25	75	100	5
III	Core : XXIX	18PHU28	Comprehension in Physics -IV (Self-Study / Online Exam)	--	1½	--	--	50	1
III	Core : XXI	18PHU21	Electronics- Practical-III	3	3	40	60	100	3
III	Core : XXII	18PHU22	Digital Electronics and Microprocessor - Practical-IV	2	3	40	60	100	3
III	Elective II	18 PHU 29A/ 18 PHU 29B/ 18 PHU 29C	Basic Concepts of C, C++/ Introduction to Space Physics/ Smart Materials	3	3	25	75	100	2
IV	Skill Enhancement: IV	18SEUPH4	Programming in C, C++ :Practical	2	3	40	60	100	2
			TOTAL	30				850	31
V	Proficiency Enhancement		NSS/YRC/RRC/CCC/PHY.EDU	II – VI SEMESTER					1
			Department activity	II – VI SEMESTER					1

Total Marks: 4200   Total credits: 150

(Signature with Seal)
Head,
Department of Physics,
P.K.R. Arts College for Women,
Gobichettipalayam-638476.

I - SEMESTER

Course Code	Course Name	Category	L	T	P	Credit
18PHU01	**MECHANICS**	**CORE**	90	6	-	5

Preamble

To provide the students deeper knowledge in motion of the particles & objects.

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the Parameters defining the motion of mechanical systems	K1, K2, K3
CO2	Describe dynamics of particles and rigid bodies	K1, K2, K3
CO3	Understand the concept of moment of inertia and be able to solve the problems related to it	K1, K2, K3
CO4	Understanding of the laws and principles of statics	K1, K2, K3
CO5	Describe the physics of *hydrostatics* and laws of flotation	K1,K2, K3

UNIT 1: System of Particles

Dynamics of a system of particles and concept of rigid bodies – Centre of mass coordinates –
Centre of mass of rigid body – Motion of centre of mass and linear momentum – Collision –
Elastic collision – Inelastic collision – Co-efficient of restitution– Rocket.

UNIT 2: Dynamics of Rigid Bodies - I

Rigid bodies – Rotational kinetic energy – Moment of inertia and its physical significance –
Angular acceleration – Angular momentum and torque – Angular momentum of system and centre

of mass – Conservation of angular momentum – Torque – Torque as a cross product of F and r – Analogy between translatory motion and rotatory motion – Work done by a Torque – Theorem of perpendicular axes - Theorem of parallel axes.

UNIT 3: Dynamics of Rigid Bodies - II

Moment of inertia of thin uniform bar, rectangular lamina, ring, circular disc, solid sphere and hollow sphere – Kinetic energy of a body rolling on a horizontal plane – Acceleration of a body rolling down an inclined plane – Simple pendulum - Compound pendulum.

UNIT 4: Statics

Force of friction – Limiting friction – Laws of friction – Angle of friction and resultant reaction – Cone of friction – Motion of a body on a rough inclined plane when (i) angle of inclination of the inclined plane is equal to angle of friction and (ii) angle of inclination of the inclined plane is greater than the angle of friction - Centre of gravity – Expressions for centre of gravity in the case of a solid cone, solid hemisphere and hollow hemisphere.

UNIT 5: Hydrostatics

Definition and determination of centre of pressure – General case – Expression for centre of pressure of rectangular lamina with one side on the surface of the liquid – Expression for centre of pressure of a triangular lamina in the case of (i) vertex in the surface of the liquid and (ii) base in the surface of the liquid – Laws of floatation – Definition for metacentre and metacentric height – Determination of metacentric height of a ship.

Books for study:
1. Mechanics and Electrodynamics by Brijlal, N.Subramanyam and JivanSeshan, S.Chand,
Eurasia Publishing House (Pvt) Ltd. (Unit 1, 2 & 3)
2. A Text book of Mechanics (Statics and Hydrostatics) by Narayanamoorthy and others
(Unit 4 & 5)
Books for Reference:
1. Mechanics by R.Murugeshan
2. Mechanics by D.S.Mathur

Course Code	Course Name	Category	L	T	P	Credit
18PHU04	**CORE PRACTICAL I**	**CORE PRACTICAL**	45	-	3	3

(EXAMINATION AT THE END OF SECOND SEMESTER)
ANY TWELVE EXPERIMENTS ONLY

1. Young's Modulus – Uniform bending – Optic lever

2. Young's Modulus – Non- Uniform bending – Pin and Microscope

3. Air Wedge – Thickness of Wire

4. Spectrometer – Refractive of liquid – Hollow prism

5. Spectrometer – Refractive index of Solid Prism

6. Potentiometer – Low range Ammeter Calibration

7. Compound Pendulum

8. Spectrometer – (i.d) Curve

9. Rigidity modulus – Static Torsion – Scale and Telescope

10. Viscosity of highly viscous liquid - Stoke's method

11. Surface tension - Drop weight method

12. Comparison of Viscosities – Capillary Flow Method

13. Field along the axis of a coil – Moment of a Magnet

14. Potentiometer – Specific Resistance of a wire

15. Moment of magnet – Tan C Position

16. Resonance Column – Velocity of Sound

17. Sonometer –Frequency of A.C

18. Young's Modulus Cantilever Depression –Scale & Telescope

II - SEMESTER

Course Code	Course Name	Category	L	T	P	Credit
18PHU05	**HEAT &THERMODYNAMICS**	**CORE**	90	6	-	5

Preamble

To provide the student to acquire basic knowledge of heat, work and energy and know how to apply the kinetic theory of gases

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	Understand and to define heat, work, thermal efficiency.	K1, K2, K3
CO2	Understand and describe energy exchange processes.	K1, K2, K3
CO3	Understand the steady flow of energy	K1, K2, K3
CO4	Understand and derive the various laws of Thermal Radiation	K1, K2, K3
CO5	Understand the working principle of various heat engines.	K1, K2, K3

UNIT I   **(18hrs)**

Thermometry: Temperature coefficient of Resistance — Platinum Resistance Thermometer — Thermocouple — Seebeck Effect — Peltier Effect — Thermoelectric thermometer.

Calorimetry: Specific heat of solids – Radiation correction – Copper block calorimeter – Nernst vacuum calorimeter – Newton's law of cooling – Specific heat capacity of a liquid by cooling – Specific heat capacity of gases–Jolly's differential steam calorimeter and Regnault method.

UNIT II   **(18hrs)**

Kinetic Theory of Gases: Postulates – Mean free path – Degree of freedom –Maxwell's law of velocity distribution and Theorem of equipartition of energy – Viscosity of gases – Van der Waals equation – Critical constants and their determination Low Temperature Physics: Joule-Thomson Effect – Liquefaction of air, hydrogen and helium – Peculiar properties of He II.

UNIT III (18hrs)

Thermal Conduction: Conduction, convection and radiation – Coefficient of thermal conductivity, thermal diffusivity – Steady state – Lee's disc method of determining the thermal conductivity of a bad conductor – Searle's method – Forbe's method – Spherical Shell method – Cylindrical flow of heat

UNIT IV (18hrs)

Thermal Radiation: Black body – Kirchoff's law of heat radiation – Prevost's theory of heat exchange – Stefan's law – Mathematical derivation – Derivation of Newton's law of cooling from Stefan's law – Experimental verification of Stefan's law – Distribution of energy in the spectrum of black body – Derivation of Planck's law – Derivation of Wein's law and Rayleigh-Jean's law from Planck's law

UNIT V (18hrs)

Thermodynamics: First law of Thermodynamics–Isothermal and Adiabatic process–gas equation during an adiabatic process– Work done on adiabatic expansion of gas–Carnot's Theorem– efficiency, Carnot's cycle – Otto Cycle–Entropy – Change in entropy (Reversible and irreversible process) – Temperature–Entropy diagram – Entropy of a perfect gas–Maxwell's thermodynamic relations and applications– Helmholtz function – Gibb's function.

Book for Study:

1. Heat and Thermodynamics by Brijlal and Subramaniam - S.Chand & Co.

Books for Reference:

1 .Thermal Physics by R. Murugesan - S. Chand & Co.

2. Text book of heat by JB Rajam - S. Chand and Co (1988)

3. Text book of heat by Mathus.D. S

ALLIED PAPERS

Course Code	Course Name	Category	L	T	P	Credit
18MAU03	**ALLIED PHYSICS – I**	**ALLIED**	60	4	-	4

Preamble

To understand the fundamentals of physics, give the basic understanding of material properties and to acquire knowledge on magnetism and electricity

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the universal law of gravitation and elastic properties of solids	K1, K2, K3
CO2	Understand thermodynamic state properties for liquids and vapors, and for ideal gases	K1, K2, K3
CO3	Understand how sound is produced and propagated	K1, K2, K3
CO4	Outline the technologies that are used to harness the power of solar energy	K1, K2, K3
CO5	Gain basic understanding of the combined effect of electric and magnetic fields	K1, K2, K3

UNIT- I

Gravitation: Newton's law of Gravitation-Determination of G by Boy's method- mass and density of earth – acceleration due to gravity- Determination of g by compound pendulum.

Elasticity: Bending of beams - Bending moment - Depression at the free end of a cantilever - Hooke's law – Kinds of moduli of Elasticity - Experimental determination of Young's Modulus by Uniform and Non-Uniform bending methods.

UNIT II

Heat and Thermodynamics: Vanderwaal's equation of state-critical constants of a gas-derivation of critical constants in terms of Vanderwaal's contants – Theory of porous plug experiment – Joule-Kelvin effect: Temperature of inversion - Liquefaction of air (Linde's process) - Liquefaction of hydrogen - Liquefaction of Helium - Properties of liquid Helium I and Helium II - Second law of thermodynamics - Carnot's theorem and its proof.

UNIT III

Sound: Transverse waves – velocity along a stretched string-laws of transverse vibration of strings verification of laws- Melde's string - Determination of frequency of a tuning fork (Transverse and longitudinal modes) - Frequency of AC by sonometer- Production of ultrasonic waves by piezo-electric method - Applications of Ultrasonic Waves.

UNIT IV

Solar Physics: - solar constant – measurement of solar radiations by Pyroheliometer and Pyranometer – general applications of solar energy – flat–plate collector - box type cooker - solar water heaters – solar photo – voltaic cells – general applications of solar cells.

UNIT V

Electricity: Moving coil Galvanometer - Conversion of Galvanometer into Ammeter and voltmeter – Ballistic Galvanometer – construction and theory – Electromagnetic induction - Transformers – theory, energy loss and applications.

Magnetism: Basic concepts of magnetic materials – magnetic properties of Dia, Para and Ferro magnetic materials – Antiferro magnetism and Ferri magnetism - electric and magnetic circuits – Curie temperature.

Books for study:

1. Properties of Matter and Sound by R. Murugesan – S.Chand & Company PVT.LTD (1998) (Unit 1)

2. Heat and Thermodynamics by Brijlal and Subramaniam - S.Chand & Company PVT.LTD (2012) - (Unit 2)

3. Sound by Brijlal and Subramaniam- Vikas Publishing House PVT.LTD (1994) - (Unit 3)

4. Solar physics by G.D.Rai- Khanna Publishers New Delhi (2012) - (Unit 4)

5. Electricity and Magnetism by Brijlal and Subramanyam- Vikas Publishing House PVT.LTD (2011) - (Unit 5)

Course Code	Course Name	Category	L	T	P	Credit
18MAU06	**ALLIED PHYSICS – II**	**ALLIED**	60	4	-	4

Preamble

To provide the theoretical basis for the understanding of physical measurement methods and to understand the optical, nuclear and electronic properties of solids

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Obtain basic understanding of the particle nature of light (e.g., Photoelectric effect)	K1, K2, K3
CO2	Understand the properties of the nuclear force properties	K1, K2, K3
CO3	Attain basic knowledge on different types of lasers and their applications	K1, K2, K3
CO4	Gain basic understanding of the semiconductor devices.	K1, K2, K3
CO5	Understand fundamental concepts of number systems and different types of Logic Gates.	K1, K2, K3

UNIT- I **(12hrs)**

Modern physics: Einstein's photo electric equation – verification of Einstein's photo electric equation by Millikan's experiment – photo electric cells – applications

Wave mechanics: De Broglie concept of matter waves – Calculation of De Broglie wave length - Study of De Broglie matter wave by G.P.Thomson experiment.

UNIT- II **(12hrs)**

Nuclear physics: Nuclear forces – nuclear structure by liquid drop model – Binding energy – mass defect – particle accelerators – cyclotron – nuclear Fission and nuclear Fusion – Nuclear Fission reactors – introduction to elementary particles – Leptons, Mesons and Baryons

UNIT III **(12hrs)**

Laser physics: Principles of laser – population inversion – Meta stable state – Spontaneous and Stimulated Emission – conditions for laser actions – Ruby Laser – Helium – neon laser – applications of lasers – Raman Effect – Raman shift – stoke and anti stokes lines.

UNIT IV **(12hrs)**

Semiconductor Devices: Semi conductors – Energy band in Solids – Types of Semi conductors – PN junction Diode – Volt–Ampere Characteristics – Zener diode – Volt–Ampere Characteristics – Rectifiers – Half wave rectifier – Bridge Rectifier.

UNIT V **(12hrs)**

Digital Electronics: Number systems - Binary system - Addition - Subtraction - Complement method of Subtraction- Multiplication - Division - Binary-to-decimal and decimal-to-binary conversion - AND, OR, NOT gates - NAND and NOR as universal gates - Laws of Boolean algebra – Simplification of Boolean expressions - De Morgan's theorems.

Books for study:

1. Modern Physics – R. Murugesan- S.Chand & Company PVT.LTD,New Delhi. (2016)
2. Engineering physics–M. Arumugam–Anuradha Agencies, Educational Publishers (1998).
3. Laser Physics – Thiagarajan - Narosa Publishing House. (2013)
4. Basic Electronics – B.L. Theraja -S. Chand & Company LTD, New Delhi.(2000)

Course Code	Course Name	Category	L	T	P	Credit
18MAU07	**ALLIED PRACTICAL II**	**ALLIED PRACTICAL**	45	-	3	4

(EXAMINATION AT THE END OF SECOND SEMESTER)
ANY TWELVE EXPERIMENTS ONLY

1. Rigidity Modulus – Torsional Pendulum – With & Without symmetrical masses
2. Quincke's method – Surface Tension and Angle of Con tact of Mercury
3. Specific heat capacity – Newton's law of cooling – Spherical calorimeter
3. Spectrometer – Hollow prism – Refractive index of t he Prism
4. Determination of M_H and B_H
5. Zener diode - Characteristics
6. Spectrometer – (i – i') curve
7. Newton's rings – Refractive index of a lens
8. Reduction factors of a Tangent Galvanometer - BG
9. Comparison of Mutual Inductance - BG
11. Spectrometer – Grating – Minimum deviation & Normal Incidence
12. Young's Modulus – Koenig's Method – Non Uniform ben ding
13. Young's Modulus – Koenig's Method – Uniform bending
14. Spectrometer – Cauchy's constant
15. Spectrometer – Dispersive Power
16. Spectrometer – Narrow Angled Prism
17. Carey Foster's Bridge – Temperature Coefficient
18. Potentiometer – Reduction factor of T.G in Primary
19. Potentiometer – EMF of a thermocouple
20. B.G - Absolute Capacity
21. B.G – Determination of High Resistance

FOUNDATION COURSES

18FCU01	Environmental Studies	CATEGORY	L	P	CREDIT
		Foundation Course I	24	-	2

Preamble

To bring about an awareness of a variety of environmental concerns and to create a pro-environmental attitude and a behavioral pattern in society that is based on creating sustainable lifestyle

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	To give information about the environment and the resources to act at our own level to protect them.	K1
CO2	To analyse the roles of organisms as part of interconnected food webs, populations, communities, and ecosystems	K4
CO3	Understand the scale dependence of biodiversity and its measurement	K2
CO4	To learn how to assess pollution sources, study exposure pathways and fate, and evaluate consequences of human exposure to pollution and its impacts to environmental quality.	K1,K3
CO5	To balance our economic, environmental and social needs, allowing prosperity for now and future generations	K5

Unit I

Multidisciplinary Nature of Environmental Studies (4 Hours)

i) Definition, Scope and Importance

ii) Need for Public Awareness

iii) Natural Resources

a)   Natural Resources and Associated Problems

- **Forest Resources:** Use and Over-exploitation, Deforestation, Case Studies. Timber Extraction, Mining, Dams and their Effects on Forests and Tribal People.

- **Water Resources:** Use and Over-utilisation of Surface and Ground Water, Floods, Drought, Conflicts over Water, Dams – Benefits and Problems.

- **Mineral Resources:** Use and Exploitation, Environmental Effects of Extracting and using Mineral Resources, Case Studies.

- **Food Resources:** World Food Problems, Changes Caused by Agriculture and Overgrazing, Effects of Modern Agriculture, Fertilizer-Pesticide Problems, Water Logging, Salinity, Case Studies.

- **Energy Resources:** Growing Energy Needs, Renewable and Non-Renewable Energy Sources, Use of Alternate Sources, Case Studies.

- **Land Resources:** Land as a Resource, Land Degradation, Man Induced Landslides, Soil Erosion and Desertification.

b)   Role of an Individual in Conservation of Natural Resources

c)   Equitable Use of Resources for Sustainable Lifestyles

Unit II

Ecosystems   **(5 Hours)**

i) Concept of an Ecosystem

ii) Structure and Function of an Ecosystem

iii) Producers, Consumers and Decomposers

iv) Energy Flow in the Ecosystem

v) Ecological Succession

vi) Food Chains, Food Webs and Ecological Pyramids

vii) Introduction Types, Characteristics Features, Structure and Function of the following Ecosystem:

a). Forest Ecosystem

b). Grassland Ecosystem

c). Desert Ecosystem

d). Aquatic Ecosystems (Ponds, Streams, Lakes, Rivers, Ocean, Estuaries)

Unit III

Biodiversity and its Conservation   **(5 Hours)**

i.   Introduction – Definition – Genetic, Species and Ecosystem Diversity

ii.   Bio-geographical Classification of India

iii.   Value of Biodiversity – Consumptive Use, Productive Use, Social, Ethical, Aesthetic and Option Value

iv.   Biodiversity at Global, National and Local Levels

v.   India as a Mega-Diversity Nation

vi.   Hot-Spots of Biodiversity

vii.   Threats to Biodiversity – Habitat Loss, Poaching of Wildlife, Man-Wildlife Conflicts

viii. Endangered and Endemic Species of India

ix.   Conservation of Biodiversity – In-situ and Ex-situ and Conservation of Biodiversity

Unit IV

Environmental Pollution   **(5 Hours)**

i)   Definition, Causes, Effects and Control Measures of:

      a)   Air Pollution

      b)   Water Pollution

      c)   Soil Pollution

      d)   Noise Pollution

      e)   Thermal Pollution

ii)   Solid Waste Management – Causes, Effects and Control Measures of Urban and Industrial Wastes

iii)   Role of an Individual in Prevention of Pollution

iv)   Pollution Case Studies

v)   Disaster Management – Floods, Earthquake, Cyclone and Landslides

Unit V

Social Issues and the Environment   **(5 Hours)**

i)   Sustainable Development

ii)   Urban Problems Related to Energy

iii)   Water Conservation, Rainwater Harvesting, Watershed Management

iv)   Resettlement and Rehabilitation of People; Its Problems and Concerns, Case Studies

v)   Environmental Ethics – Issues and Possible Solutions

vi)   Climate Change, Global Warming, Ozone Layer, Depletion, acid Rain, Nuclear   Accidents

and Holocaust, Case Studies

vii)   Consumerism and Waste Products

viii)   Environmental Protection Act

ix)   Air (Prevention and Control of Pollution) Act

x)   Water (Prevention and Control of Pollution) Act

xi)   Wildlife Protection Act

xii)   Forest Conservation Act

xiii)   Issues Involved in Enforcement of Environmental Legislation

xiv)   Public Awareness

xv)   Human Population and the Environment

- Population Growth and Distribution

- Population Explosion – Family Welfare Programme

- Environment and Human Health

- Human Rights

- Value Education

- HIV/AIDS

- Women and Child Welfare

- Role of Information Technology in Environment and Human Health

- Medical Transcription and Bioinformatics

Text Book:

Environmental Studies, Bharathiar University, Publication Division, 2004

Reference Book:

S.No	Authors	Title	Publishers	Year of Publication

1	R.C.Sharma & Gurbir Sangha	Environmental Studies	Kalyani Publishers	2005

17FCU02	**Yoga and Value Education**	**CATEGORY**	**L**	**P**	**C**
		Foundation Course II	24	-	2

Preamble

To enable the learners to acquire the knowledge on basic yogasanas and values and practice them in real life.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Acquire the basic knowledge on yoga and value education.	K1
CO2	Understand the importance of yoga, mental exercises, principles of life and components of values	K2
CO3	Enhance their physical and mental health by practicing the different types of asanas, kriyas, mental exercises and values.	K3
C04	Lead a meaningful life for the fulfillment of the needs of family, workplace, society and country.	K4

UNIT I (5 Hours)

Yoga And Health

Theory:

Yoga-Meaning- Importance of Yoga – Pancha Koshas - Benefits of Yoga-General Guidelines.

Practice:

Dynamic Exercise- Surya Namaskar-Basic Set of Asanas-Pranayama & Kriya.

UNIT II

Art of Nurturing the Mind (5 Hours)

Theory:

Ten Stages of Mind-Mental Frequency – Methods for Concentration

Eradication of Worries- Benefits of Blessings- Greatness of Friendship- Individual Peace and World Peace

Practice: - Worksheet

UNIT III (5Hours)

Philosophy and Principles of Life

Purpose and Philosophy of Life- Introspection – Analysis of Thought - Moralization of Desires-Neutralization of Anger.Vigilance and Anti- Corruption- Redressal mechanism - Urban planning and Administration.

Practice - Worksheet

UNIT IV (5 Hours)

Value Education (Part-I)

Ethical Values: Meaning – Need and Significance- Types - Value education – Aim of education and value education Components of value education: Individual values – Self discipline, Self Confidence, Self Initiative, Empathy, Compassion, Forgiveness, Honesty, Sacrifice, Sincerity, Self-control, Tolerance and Courage.

Practice - Worksheet

UNIT V (4 Hours)

Value Education (Part-Ii)

Family Values Constitutional or National values – Democracy, Socialism, Secularism, Equality, Justice, Liberty, Freedom and Fraternity.Social values – Pity and probity, self control, universal brotherhood.Professional values – Knowledge thirst, sincerity in profession, regularity, punctuality and faith.Religious values – Tolerance, wisdom, character.

Practice - Worksheet

Reference Books:

1 Vethathiri Maharishi (2015), 'Yoga for human excellence'- Sri Vethathiri Publications.

2. Value Education for human excellence- study material by Bharathiar University.

3. Value Education - Study Material by P.K.R Arts College for Women.

III - SEMESTER

Course Code	Course Name	Category	L	T	P	Credit
18PHU08	OPTICS	CORE	45	3	-	5

Preamble

To provide a knowledge about the optical instruments and nature of light

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the types of aberrations	$K_1, K_2,$
CO2	Understand the concept of interference	K_1, K_2
CO3	Understand the concept of diffraction	$K_1, K_2,$
CO4	Basic knowledge about Polarization	K_1, K_2
CO5	Basic knowledge about quantum optics	K_1, K_2

UNIT I - Geometrical Optics **(12 Hours)**

Aberrations - Spherical aberrations in lens – coma Astigmatism - chromatic aberration - dispersion by a prism - Cauchy's dispersion formula- dispersive power, achromatism in prismdeviation without dispersion - chromatic aberrations in a lens - circle of least confusion – achromaticlens condition for achromatism of two thin lenses separated by a finite distances

UNIT II - Physical optics - Interference (12 Hours)

Fresnel's Biprism – Interference in thin films due to reflected light – Fringes due to wedge shaped thin film – Newton's rings – Refractive index of the Liquid – Michelson interferometer – Determination of a wave length of monochromatic light – difference in Wave length between two neighboring spectral lines

UNIT III - Diffraction (12 Hours)

Fresnel's assumptions – rectilinear propagation of light – half period zone – Zone Plates – Action and Construction – comparison with a convex lens – Fresnel and Fraunhofer diffraction – Fraunhofer diffraction at a Single light – Diffraction grating – Resolving power & Dispersive power of Grating

UNIT IV - Polarization (12 Hours)

Double Refraction – Huygen's explanation --Optic axis in the plane of incidence, inclined and perpendicular to the crystal surface – Production and Detection of Plane, Circularly and Elliptically Polarized light – Optical Activity – Fresnel's explanation – Specific rotation – Half Shade Polarimeter

UNIT V - Quantum Optics (12 Hours)

Light quanta and their origin – Resonance radiation– Metastable states – Population Inverse – Optical pumping – Spontaneous and Stimulated emission – Einstein's coefficient– Ruby, He-Ne, CO laser – Resonant cavities – elements of non linearoptics – second harmonic generation –threshold condition for laser – Stimulated Raman scattering

Books for Study

1. A Text book of Optics - Dr. N. Subramaniam Brijlal, Dr. M.N. Avadhanulu, 2016, S. Chand & Company Pvt. Ltd (Unit 1-5)

Books for Reference

1. Modern Physics - R.Murugesan, Kiruthiga Sivaprasath, 2018, S.Chand and Company Limited
2. Optics and Spectroscopy - R.Murugesan , 5th Edition, 2005, S.Chand and Company Limited

Course Code	Course Name	Category	L	T	P	Credit
18PHU11	PHYSICS - PRACTICAL II	CORE PRACTICAL	90	–	3	3

(EXAMINATION AT THE END OF SECOND SEMESTER)

ANY TWELVE (12) EXPERIMENTS ONLY

1. Rigidity Modulus – Torsional Pendulum – With & Without symmetrical masses
2. Quincke's method – Surface Tension and Angle of Con tact of Mercury
3. Specific heat capacity – Newton's law of cooling – Spherical calorimeter
4. Spectrometer – Hollow prism – Refractive index of t he Prism
5. Determination of M_H and B_H
6. Zener diode - Characteristics
7. Spectrometer – (i – i') curve
8. Newton's rings – Refractive index of a lens
9. Reduction factors of a Tangent Galvanometer - BG
10. Comparison of Mutual Inductance - BG
11. Spectrometer – Grating – Minimum deviation & Normal Incidence
12. Young's Modulus – Koenig's Method – Non Uniform ben ding
13. Young's Modulus – Koenig's Method – Uniform bending
14. Spectrometer – Cauchy's constant
15. Spectrometer – Dispersive Power
16. Spectrometer – Narrow Angled Prism
17. Carey Foster's Bridge – Temperature Coefficient
18. Potentiometer – Reduction factor of T.G in Primary
19. Potentiometer – EMF of a thermocouple
20. B.G - Absolute Capacity
21. B.G – Determination of High Resistance

Course Code	Course Name	Category	L	T	P	Credit
18PHU10	ALLIED CHEMISTRY – I	ALLIED	45	3	-	3

Preamble

The aim is to provide the student to understand problems associated with hard water and treatment methods. To understand about basic concepts of organic chemistry, metals and its extraction & basic aspects of chemical kinetics and photochemistry

Course outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the concepts of extraction of metals	K_1, K_2
CO2	To select and use eco-friendly fuels industrial and domestic purpose	K_1, K_2
CO3	To suggest methods to minimize problems related to hard water in industrial operations	K_1, K_2
CO4	The students will get knowledge on the structural basics of organic compounds	K_1, K_2
CO5	To use appropriate methods to study chemical reactions	K_1, K_2

Unit I - Metals and its Extraction

Minerals and Ores-Oxide and Sulphide ores .General methods of extraction of metals-Extraction of Uranium from its Ore. Methods of ore dressing-Gravity separation, Magnetic separation and Froth flotation- Reduction methods-Roasting, Calcination and Smelting- Types of refining Van Arkel method, Zone refining and Electro refining

Unit II - Fuels and Fertilizers

Fuels- Classification-Composition and uses of gaseous fuels like water gas, producer gas, liquefied petroleum gas, gobar gas, Compressed natural gas-Advantages of gaseous fuels over solid fuels - Fertilizers- Classification – Urea , Ammonium sulphate, superphosphate, Triple super phosphate, potassium nitrate- manufacture and uses - Silicones - Preparation, properties and applications

Unit III - Water Treatment

Hardness of water: temporary and permanent hardness, disadvantages of hard water - Softening of hard water - Zeolite process, demineralization process and reverse osmosis - Purification of water for domestic use- Chlorination-Break point chlorination, Ozonolysis and UV treatment- Definition and importance of BOD and COD

Self study Topics: Role of activated carbon in water treatment – Adsorption

Unit IV - Fundamentals of Organic Chemistry

Hybridization in methane, ethane, acetylene, benzene - Classification of reagents - electrophiles, nucleophiles and free radicals - Classification of reactions addition, substitution, elimination, condensation and polymerisation - Polar Effects - Inductive effect, resonance, hyper-conjugation, steric effect - electrophilic substitution mechanism in benzene (Nitration , Sulphonation, Friedal crafts alkylation and acylation)

Unit V - Chemical Kinetics and Photochemistry

Rate of chemical reaction- Differential rate expression - order and molecularity - Integrated rate expression for first, second and zero order reactions - Half-life period— Effect of temperature on reaction rate - Activation energy- Arrhenius equation

Photochemistry - Statement of Grothus - Draper Law, Stark-Einstein's Law- Difference between Photo chemical and Thermal reaction- Quantum Yield-Definition- Kinetics of H_2-Br_2 reaction. Photosynthesis, Photosensitisation, Phosphorescence, Fluorescence, Chemiluminescence - Definition with examples

Books for Study

1. Text book of Ancillary Chemistry - Dr. Veeraiyan V, Edition - 2008, High mount Publishing House, Chennai-14 (Both in Tamil and English)
2. Text book of Ancillary Chemistry - Vaithyanathan S. and Others, Edition-2006, Priya Publications, Karur-2

Books for Reference

1. Text book of Organic chemistry - Soni P and Others, Edition -2006, Sultan Chand and

Company, New Delhi

2. Text book of inorganic chemistry - Soni P and Others, Edition -2006, Sultan Chand and Company, New Delhi

3. Text book of Physical Chemistry - Puri B.R., Sharma and Pathania, Edition-2006, Vishal Publishing Co., New Delhi

Course Code	Course Name	Category	L	T	P	Credit
18PHU12	ALLIED CHEMISTRY PRACTICAL	ALLIED PRACTICAL	60	-	2	2

I. VOLUMETRIC ANALYSIS:

1. Estimation of sodium hydroxide using standard sodium carbonate.

2. Estimation of hydrochloric acid- standard oxalic acid.

3. Estimation of oxalic acid- standard sulphuric acid.

4. Estimation of ferrous sulphate- standard Mohr salt solution.

5. Estimation of oxalic acid- standard ferrous sulphate.

6. Estimation of potassium permanganate- standard sodium hydroxide.

II. ORGANIC ANALYSIS: systematic analysis

1. Detection of Elements (N, S, Halogens).

2. To distinguish between aliphatic and Aromatic.

3. To distinguish between saturated and unsaturated.

4. Functional group tests for phenols, acids (mono and di), aromatic primary amine, amide, diamide, carbohydrate.

   Functional groups characterized by confirmatory test.

Books for Reference

1. Basic Principles of practical Chemistry: Venkateswaran, Veerasamy & Kulandaivel, S.Chand &Co

Total Marks: 100

External - 60

Organic Qualitative Analysis – 24, **Volumetric Estimation** -24, **Record** - 12

Internal Assessment - 40

Volumetric Analysis (mark split up)

i) Procedure 4 marks

ii) Results < 2 % - 20 marks 2-3 % -16 marks 3-4 % - 12 marks 4 > 4 % - 6 marks

Organic Qualitative Analysis (mark split up)

 i) Identification of Nitrogen - 6 marks

ii) Saturated on unsaturated - 2 marks

iii) Aliphatic or Aromatic - 2 marks

iv) Preliminary reactions with Procedure - 6 marks

v) Functional group identified correctly- 8 marks

Course Code	Course Name	Category	L	T	P	Credit
18SEU01	INFORMATION SECURITY	SKILL ENHANCEMENT COURSE - I	30	2	-	2

Preamble

To learn about the basics of Information Security

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Obtain fundamental knowledge of Information Security	K1,K2
CO2	Learn basic concepts of Risks in Information Security	K1,K2
CO3	Familiarize the ideas of security planning and policies	K2,K3
CO4	Understand with Privacy and Ethical Issues in Information Security	K3,K4

CO5	Learn about Cryptography	K4, K5

Unit I - Introduction to Information Security **(5 Hours)**

Information Security: Principles, Concepts and definitions - The need for Information Security - Benefits of information security. The Security Problem in Computing: The meaning of computer Security - Computer Criminals

Unit II - Information Risk **(5 Hours)**

Information Risk: Threats and vulnerabilities of Information systems – Introduction to Risk management. Information security management Policy, standards and procedures

Unit III - Security Planning **(5 Hours)**

Administering Security: Security planning - Security planning team members - Assuring Commitment to a security plan - Business Continuity Plan - Incident response plan - Organizational Security policies, Physical Security.

Unit IV - Privacy and Ethical Issues in Information Security **(5 Hours)**

Legal Privacy and Ethical Issues in Information Security: Protecting Programs and data - Information and the law - Rights of Employees and Employers - Software failures - Computer Crime - Ethical issues in Information Security

Unit V - Cryptography **(4 Hours)**

Cryptography: Introduction to Cryptography - What is Cryptography – Plain text – Cipher text – Substitution Ciphers - Transposition Ciphers

Books for Study

1. Sumitra Kisan and D.Chandrasekhar Rao,Information Security Lecture Notes, Department
   of Computer Science and Engineering & Information Technology, Veer Surendra Sai
   University of Technology (Formerly UCE,   Burla) urla, Sambalpur, Odisha .

Books for Reference

1. Andy Taylor (Editor), David Alexander, Amanda Finch & David Sutton, Information

Security Management Principles an ISEB Certificate, The British Computer

Society, 2008

Course Code	Course Name	Category	L	T	P	Credit
18NMU01A	INDIAN WOMEN AND SOCIETY	NON - MAJOR ELECTIVE: I	30	2	-	2

Preamble

　　　　To familiarize students with the specific cultural contexts of women in India

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Demonstrate knowledge of the history of women's studies as an academic discipline	K1,K2
CO2	Analyze the various roles of women and the challenges faced by them in the society	K3
CO3	Assimilate and evaluate the importance of women health	K3,K5
CO4	Identify the different issues related to women in general	K4
CO5	Assessing the Women Empowerment and the role of Central & State Government in developing Women	K5

Unit I - Historical Background (5 Hours)

　　　　History of Women's status from Vedic times, Women's participation in India's Pre and Post Independence movement and Economic Independence, fundamental rights and importance of women in Modern Society

Unit II - Role of Women (Challenges & remedies) (5 Hours)

　　　　Women in Family, Agriculture, Education, Business, Media, Defense, Research and Development, Sports, Civil Services, Banking Services, Social Work, Politics and Law

Unit III - Women and Health (5 Hours)

　　　　Women and health issues, Malnutrition, Factors leading to anemia, Reproductive maternal health and Infant mortality, Stress

Unit IV - Issues of Women   (5 Hours)

Women's issues, Dowry Related Harassment and Dowry Deaths, Gender based violence against women, Sexual harassment, Loopholes in Practice to control women issues

Unit V - Women Empowerment   (4 Hours)

Meaning, objectives, Problems and Issues of Women Empowerment, Factors leading to Women Empowerment, Role and Organization of National Commission for Women, Central and State Social Welfare Board for Women Empowerment, Reality of women empowerment in the era of globalization

Books for Reference

1. Writing the Women's Movement: A Reader - Mala Khullar, 2005, Zubaan

2. The State and the Women's Movement in India, IAWS, 1994, IAWS, Delhi

3. Crossing Thresholds: Feminist Essays in Social History- Kosambi, Meera, 2007, Permanent Black

4. Hidden from History: Women's Oppression and the Fight against It - T Rowbotham, Sheila, 1975, Pluto Press, London

5. Revolution and the Status of Women - Susheela Mehta,1989, Metropolitan Book co.pvt ltd, New Delhi

Course Code	Course Name	Category	L	T	P	Credit
18NMU01B	BASIC TAMIL	NON - MAJOR ELECTIVE: I	30	2	-	2

gFjp –IV: mbg;gilj; jkpo;j;jhs; -1

%d;whk; gUtk;

,sq;fiy 2017-18 fy;tpahz;L Kjy; Nru;Nthu;f;FupaJ

(12-Mk; tFg;G tiu jkpo; nkhopg;ghlk; gapyhjth;fSf;F)

Gw kjpg;gPl;Lj; Njh;T kl;Lk;

1. jkpo; nkhopapd; mbg;gilf; $Wfs;.

   vOj;Jfs;   : KjnyOj;Jfs; (caph; vOj;J> nka; vOj;J> caph;nka; vOj;J)

   nrhw;fs;   : ngah;r;nrhy;> tpidr;nrhy;> ,ilr;nrhy;> chpr;nrhy;

njhlh;   : njhluikg;G (vOtha;> nrag;gLnghUs;> gadpiy)

2. Fwpg;G vOJjy; : gj;Jg; gjpide;J njhlh;fspy; Fwpg;G tiujy;
gpioePf;fp vOJjy; : (xw;Wg;gpio> vOj;Jg;gpio)

2017 – 2018 fy;tpahz;L Kjy; gapy;gth;fSf;Fg; gpd;tUk; tpdhj;jhs; mikg;G gpd;gw;wg;gl Ntz;Lk;.

Course	Sections	Assessment Domain	Marks and Unit Weightage	Total ESE
Non-Major Elective I (Basic Tamil)	**Section A**	K1: Remember Level K2: Understand Level	4 X 5 = 20 Four out of Six *(Open choice)* *(At least one question from each unit)*	50*
	Section B	K3: Apply Level K4: Analyze Level K5: Evaluate Level	3 X 10 = 30 Three out of Five *(Open choice)* *(At least one question from each unit)*	

Group – VI Services
FOREST APPRENTICE
Paper III - General Studies
TOPICS FOR OBJECTIVE TYPE

Unit I

General science

Physics Universe-General Scientific laws-Scientific instruments-Inventions and discoveries-National scientific laboratories-Science glossary-Mechanics and properties of matter-Physical quantities, standards and units-Force, motion and energy-Electricity and Magnetism, Electronics and Communication -Heat, light and sound-Atomic and nuclear physics-Solid State Physics – Spectroscopy- Geophysics - Astronomy and space science.

Chemistry Elements and Compounds-Acids, bases and salts-Oxidation and reduction-Chemistry of ores and metals-Carbon, nitrogen and their compounds- Fertilizers, pesticides, insecticides-Biochemistry and biotechnology- Electrochemistry-Polymers and plastics

BotanyMain Concepts of life science-The cell-basic unit of life-Classification of living organism-Nutrition and dietetics-Respiration-Excretion of metabolic waste-Bio-communication

Zoology Blood and blood circulation-Endocrine system-Reproductive system- Genetics the science of heredity-Environment, ecology, health and hygiene, Biodiversity and its conservation-Human diseases-Communicable diseases and noncommunicable diseases- prevention and remedies- Alcoholism and drug abuse- Animals, plants and human life

Unit II

Current Events

History Latest diary of events – National--National symbols-Profile of States- Defence, national security and terrorism-World organizations-pacts and summits-Eminent persons & places in news-Sports & games-Books & authors - Awards & honours-Cultural panorama-Latest historical events-- India and its neighbours-- Latest terminology- Appointments-who is who?

Political Science1. India's foreign policy-2. Latest court verdicts – public opinion-3. Problems in conduct of public elections-4. Political parties and political system in India-5. Public awareness & General administration-6. Role of Voluntary organizations & Govt.,-7. Welfare oriented govt. schemes, their utility

Geography Geographical landmarks-Policy on environment and ecology

Economics

Current socio-economic problems-New economic policy & govt.sector

Science Latest inventions on science & technology-Latest discoveries in Health Science-Mass media & communication

Unit III

Geography

Earth and Universe-Solar system-Atmosphere hydrosphere, lithosphere- Monsoon, rainfall, weather and climate-Water resources --- rivers in India-Soil, minerals & natural resources-Natural vegetation-Forest & wildlife-Agricultural pattern, livestock & fisheries-Transport including Surface transport & communication-Social geography – population-density and

distribution-Natural calamities – disaster management-Climate change - impact and consequences - mitigation measures-Pollution Control

Unit IV

History and culture of India

Pre-historic events--Indus valley civilization-Vedic, Aryan and Sangam age- Maurya dynasty-Buddhism and Jainism-Guptas, Delhi Sultans, Mughals and Marathas-Age of Vijayanagaram and the bahmanis-South Indian history-Culture and Heritage of Tamil people-Advent of European invasion-Expansion and consolidation of British rule-Effect of British rule on socio-economic factors- Social reforms and religious movements-India since independence- Characteristics of Indian culture-Unity in diversity –race, colour, language, custom-India-as secular state-Organizations for fine arts, dance, drama, music- Growth of rationalist, Dravidian movement in TN-Political parties and populist schemes- Prominent personalities in the various spheres – Arts, Science, literature and Philosophy – Mother Teresa, Swami Vivekananda, Pandit Ravishankar , M.S.Subbulakshmi, Rukmani Arundel and J.Krishnamoorthy etc

Unit V

Indian Polity

Constitution of India-. Preamble to the constitution- Salient features of constitution- Union, State and territory- Citizenship-rights amend duties- Fundamental rights- Fundamental duties- Human rights charter- Union legislature – Parliament- State executive- State Legislature – assembly-Status of Jammu & Kashmir- Local government – panchayat raj – Tamil Nadu- Judiciary in India – Rule of law/Due process of law- Indian federalism – center – state relations-. Emergency provisions- Civil services in India- Administrative challenges in a welfare state- Complexities of district administration- Elections - Election Commission Union and State. Official language and Schedule-VIII Amendments to constitution- Schedules to constitution-. Administrative reforms & tribunals- Corruption in public life- Anti-corruption measures – Central Vigilance Commission, lok-adalats, Ombudsman, - Comptroller and Auditor General of India- Right to information - Central and State Commission- Empowerment of women- Voluntary organizations and public grievances Redressal- Consumer protection forms

Unit VI

Indian Economy

Nature of Indian economy-Need for economic planning-Five-year plan models-an assessment-Land reforms & agriculture-Application of science in agriculture- Industrial growth-Capital formation and investment-Role of public sector & disinvestment-Development of infrastructure- National income- Public finance & fiscal policy- Price policy & public distribution-Banking, money & monetary policy- Role of Foreign Direct Investment (FDI)- WTO-globalization & privatization- Rural welfare oriented programmes- Social sector problems – population, education, health, employment, poverty-HRD – sustainable economic growth- Economic trends in Tamil Nadu -Energy Different sources and development- Finance Commission -Planning Commission- National Development Council

Unit VII

Indian national movement

National renaissance-Early uprising against British rule-1857 Revolt- Indian National Congress-Emergence of national leaders-Gandhi, Nehru, Tagore, Nethaji -Growth of militant movements -Different modes of agitations-Era of different Acts & Pacts-World war & final phase struggle-Communalism led to partition- Role of Tamil Nadu in freedom struggle - Rajaji, VOC, Periyar, Bharathiar & Others-Birth of political parties /political system in India since independence

Unit VIII

Aptitude & Mental Ability Tests

Conversion of information to data-Collection, compilation and presentation of data - Tables, graphs, diagrams-Parametric representation of data-Analytical interpretation of data -Simplification-Percentage-Highest Common Factor (HCF)-Lowest Common Multiple (LCM)-Ratio and Proportion-Simple interest- Compound interest-Area-Volume-Time and Work-Behavioral ability -Basic terms, Communications in information technology-Application of Information and Communication Technology (ICT)- Decision making and problem solving-Logical Reasoning-Puzzles-Dice-Visual Reasoning-Alpha numeric Reasoning- Number Series-Logical Number/Alphabetical/Diagrammatic Sequences

Course Code	Course Name	Category	L	T	P	Credit
18NMU02B	CONSUMER RIGHTS	NON - MAJOR ELECTIVE : II	45	3	-	2

Preamble

This paper seeks to familiarize the students with their rights and responsibilities as a Consumer, the social framework of consumer rights and legal framework of protecting Consumer Rights

Unit - I

Introduction of consumer protection act1986-other amendments-salient features

Unit– II

Definitions of the terms- : consumer - appropriate laboratory - complainant - consumer dispute -complaint-restrictive trade practice

Unit – III

The various consumer rights:-right to safety, Right to information, Right to choose, -right to be heard -Right against exploitation -Right to consumer education

Unit – IV

Consumer protection councils:-Central - State

Unit – V

Consumer disputes redressal agencies:-Direct forum-state commission-national commission

IV- SEMESTER

Course Code	Course Name	Category	L	T	P	Credit
18PHU13	MATHEMATICAL PHYSICS	CORE	75	5	-	5

Preamble

The aim is to provide the student to acquire knowledge and apply it to various physical problems and to develop the problem solving ability

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	Study the matrices and apply it to solve problems	K_1, K_2
CO2	Understand the concepts of vector calculus	K_1, K_2
CO3	Study the basic concepts in statistics and probability	K_1, K_2
CO4	Describe and understand Empirical Laws and Curve Fittings	K_1, K_2
CO5	Demonstrate knowledge of core principles in mechanics Understand and apply Lagrange's equations and Hamilton's equation to simple physical systems	K_1, K_2

Unit I - Matrices

Introduction – Special types of Matrices - Adjoint of a matrix – Eigen values and Eigen Vectors – Characteristic Equation of a Matrix- Cayley – Hamilton theorem -Problems

Unit II - Vector Calculus

Gradient of a scalar field – Divergence of a Vector function - Curl of a Vector function and its physical significance – Gauss divergence theorem and it's proof -problems – Stoke's theorem and it's proof – Problems

Unit III - Statistics

Measures of central tendency- Mean-Median and Mode- Mean deviation – Standard deviation – Moments-Moment Generating Function –simple problems-Probability-Addition and Multiplication laws of Probability- Simple Problems

Unit IV- Empirical Laws and Curve Fittings

Introduction – The linear law – Laws reducible to linear law – Graphical method – Method of group averages – Fitting a straingt line – Equations involving three constants – Principle of least squares – Fitting a straight line and a parabola

Unit V- Lagrangian & Hamiltonian Formulation

Concept of Lagrangian- Generalized Coordinates- D'Alembert's Principle – Lagrangian equation of motion from D'Alembert's Principle – Application of Lagrangian equation to simple pendulum, Linear harmonic oscillator - Hamiltonian function H – Physical significance of H – Applications of Hamilton's equation to Simple pendulum, Linear Harmonic Oscillator

Books for Study

1. Mathematical Physics – Jaya Prakash

2. Mathematical Physics – H.K.Dass, 2005, S.Chand & Company Ltd, New Delhi (Unit 1, 2 & 3)

3. Classical Mechanics - Gupta, Kumar and Sharma, 2015, Pragati Publications (Unit 5)

4. Numerical Methods - P. Kandasamy, K. Thilagavathy and K. Gunavathi, S. Chand & Co
   (Unit 4)

Books for References

1. Mathematical Physics with Classical Mechanics - Satyaprakash, 2002, Sultan Chand &
   Sons, New Delhi

2. Mathematical Physics – B.D.Gupta, 4th Edition, 2010, Vikas Publishing House

Course Code	Course Name	Category	L	T	P	Credit
18PHU15	ALLIED CHEMISTRY – II	ALLIED	45	3	-	3

Preamble

The aim is to provide the student to acquire knowledge about experimental techniques in chemistry & to apply chemistry in Batteries

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Study the applications of coordination compounds	K_1, K_2
CO2	Understand the concepts of biomolecules	K_1, K_2

CO3	Describe and understand the knowledge about phase rule	K_1, K_2
CO4	Demonstrate knowledge about Electro chemistry	K_1, K_2
CO5	To know about uses of analytical techniques	K_1, K_2

Unit I - Co-Ordination Chemistry

Definition of terms - Classification of Ligands - Nomenclature - Chelation - EDTA and its application – Werner's Theory - Effective Atomic Number - Pauling's theory- Postulates - Applications to $Ni(CO)_4$,$Ni(CN)_4$, $K_4[Fe(CN)_6]$- Merits and Demerits of Werner's and Pauling's theory - Biological Role of haemoglobin and Chlorophyll (elementary idea only) - Applications of coordination compounds in qualitative analysis and Quantitative analysis like Separation of copper and cadmium ions; Nickel and cobalt ion; Identification of metal ions like cu, Fe and Ni. Estimation of Ni using DMG and Al using Oxine

Unit II – Biomolecules

Carbohydrates- Classifications, preparation and reactions of glucose and fructose. Discussion of open and ring structure of glucose-Mutarotation-Inter conversion of glucose to fructose and vice versa - Preparation and properties of sucrose. Properties of starch, cellulose and derivatives of cellulose - Diabetes - causes and control measures - Amino acids: Classification, preparation and properties of alanine -preparation of dipeptide using Bergman method

Unit III - Phase Diagram

Phase rule: Definition of Phase- Component- Degree's of freedom- One component system- Water system- Reduced phase rule- Simple Eutectic system- Pb-Ag system- Pattinson's process – Extraction of Silver from Lead ore

Unit IV - Electrochemistry

Galvanic cells – emf - standard electrode potential - reference electrodes - electrochemical series and its applications - Determination of pH using H_2,Quinhydrone and glass electrodes - Electroplating process -Nickel and Chrome plating – Batteries- Primary and Secondary- Ni-Cd Battery- Lithium ion Battery- Fuel cells- H_2-O_2 fuel cells- Advantages

Self study Topic: Batteries in future

Unit V - Analytical Techniques

Fundamental principles, theory, instrumentation and simple applications : UV-Visible,FT-IR Spectroscopy, and Raman spectroscopy- Difference between Raman and FT-IR Spectroscopy. Seperation techniques- Chromatography - Types- Principle and Applications of Thin Layer Chromatography - Gas Chromatography (GC) and HPLC

Books for Study

1. Text book of Ancillary Chemistry - Dr. Veeraiyan V, Edition - 2008, High mount Publishing house, Chennai-14 (Both in Tamil and English)

2. Text book of Ancillary Chemistry - Vaithyanathan S. and Others, Edition-2006, Priya Publications, Karur-2

Books for Reference

1. Text book of Organic chemistry - Soni P L and Others, Edition -2006, Sultan Chand and Company, New Delhi

2. Text book of inorganic chemistry - Soni P L and Others, Edition -2006, Sultan Chand and Company, New Delhi

3. Text book of Physical Chemistry - Puri B.R., Sharma and Pathania, Edition-2006, Vishal Publishing Co., New Delhi

Course Code	Course Name	Category	L	T	P	Credit
18SEUPH2	ENERGY RESOURCES	SKILL ENHANCEMENT COURSE - II	30	2	-	2

Preamble

The aim is to provide the student to acquire knowledge of Conventional and non-Conventional Energy Sources and apply it in day to day life & to understand the Importance of energy management

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Study about the concepts of Conventional Energy Sources and its applications	K_1, K_2
CO2	Study about the concepts of renewable energy sources	K_1, K_2
CO3	Study the basic concepts of Biomass energy fundamentals	K_1, K_2
CO4	To know about Biomass Utilization To understand its merits and demerits	K_1, K_2
CO5	To describe other forms of energy sources To understand the Importance of energy management	K_1, K_2

Unit I - Conventional Energy Sources

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

Unit II - Solar Energy

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

Unit III - Biomass energy fundamentals

Biomass energy – classification – photosynthesis – Biomass conversion process– biogas plant – biomass applications

Unit IV - Biomass Utilization

Gobar gas plants – wood gasification – advantages & disadvantages of biomass as energy source

Unit V - Other forms of energy sources

Geothermal energy – Wind energy – Ocean thermal energy conversion – energy from waves and tides (basic ideas) - Importance of energy management

Books for Study

1. Non- Conventional Energy Sources – G.D.Rai, 4th Edition, 2005, Kanna Publishers Ltd., (Unit 1-5)

Books for References

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

2. Renewable Energy sources and their environmental impact – S.A. Abbasi, 2008, Nasema Abbasi PHI Learning Pvt. Ltd., New Delhi

V- SEMESTER

Course Code	Course Name	Category	L	T	P	Credit
18PHU16	PROPERTIES OF MATTER & SOUND	CORE	90	6	-	5

Preamble

The aim is to identify the characteristics of matter in terms their properties and to know the basic principles of acoustics

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Study about the concepts of Elasticity and rigidity modulus	K_1, K_2
CO2	Study and understand the bending of beams	K_1, K_2
CO3	Study the basic concepts of Surface tension	K_1, K_2
CO4	To know about Hydrodynamics and Viscosity To understand Bernoulli's theorem and Poiseuille's formula	K_1, K_2, K_3

CO5	To describe about Sound To understand Ultrasonic and its applications	K_1, K_2, K_3

UNIT I - Elasticity (18 Hours)

Hooke's law - Stress – strain diagram – Elastic Moduli - Relation between elastic constants - Poisson's Ratio – Twisting couple on a wire – Work done in twisting – Torsional pendulum – determination of rigidity modulus of a wire. Determination of Rigidity modulus and moment of inertia - q, η and by Searles method. Torsion of a body – Expression for torque per unit twist – Determination of rigidity modulus: Static torsion method (Searle's apparatus - Scale and telescope) and Dynamic torsion method

UNIT II - Bending of beams (18 Hours)

Expression for bending moment - Cantilever – Expression for depression at the loaded end - oscillations of a Cantilever - Expression for time period - Determination of Young's modulus by cantilever oscillations Nonuniform bending - Determination of young's modulus by Koenig's method - Uniform bending - Expression for elevation – Experiment to determine young's modulus using pin and microscope method

UNIT III - Surface tension (18 Hours)

Surface tension- Definition and dimensions of surface tension - Surface tension and surface energy, molecular theory, angle of contact, elevation and depression of liquid columns in a capillary tube, excess pressure in a spherical bubble and spherical drop. Synclastic and anticlastic surface - Excess of pressure - Application to spherical and cylindrical drops and bubbles - variation of surface tension with temperature - Jaegar's method

UNIT IV - Hydrodynamics and Viscosity (18 Hours)

Equation of continuity – Energy of the liquid – Euler's equation for unidirectional flow – Bernoulli's theorem – Explanation and Applications of Bernoulli's theorem Coefficient of Viscosity – Poiseuille's formula for the flow of a liquid through a capillary tube – Corrections to

Poiseuille's formula – Searle's viscometer: Rotating cylinder method of finding coefficient of viscosity – Modification of Poiseuille's formula for gases

UNIT V - Sound   **(18 Hours)**

Laws of Transverse vibrations in strings-Determination of frequency by Melde's method. Musical Sound and Noise - Characteristics of' Musical Sound - Intensity of Sound. Acoustics - Reverberation - Sabine's Reverberation formula - Determination of Absorption coefficient. Newton's Formula for velocity of sound –Effect of Temperature, Pressure, Humidity, Density of medium and Wind - Speech- Intensity of sound –Measurement of intensity of sound :Decibel and Phon- Bel. Reverberation – Sabine's Reverberation formula – Factors Affecting the Acoustics of Buildings – Sound distribution in an Auditorium – Requisites for good acoustics – Ultrasonics - Piezo-electric effect and Magnetostriction effect-Production of Ultrasonics by Piezoelectric oscillator and Magnetostriction oscillator- Detection and Applications of Ultrasonic waves

Book for Study

1. Properties of matter - Brijlal & N. Subrahmanyam, 2001, S.Chand & Co. Ltd., (Unit 1,2,3,4)
2. A Text Book of Sound - Brijlal & N. Subramanyam, 2008, Vikas Publishing. Pvt. Ltd,.
   (Unit 5)

Book for Reference

1. Fundamentals of Physics - D Halliday, R Resnick and J Walker, 6 th Edition, 2001, Wiley NY

2. Properties of matter - Brijlal & N. Subrahmanyam, 2001, S.Chand & Co. Ltd.,

3. Elements of Properties of matter - D.S. Mathur, Revised edition, 2010, S. Chand & Co

4. Properties of matter – Murugeshan, 2004, S Chand & Co. Pvt. Ltd.,

5. A Text Book of Sound, R.L. Saihgal, 1979, S. Chand & Co. Pvt. Ltd.,

Course Code	Course Name	Category	L	T	P	Credit
18PHU17	SOLID STATE PHYSICS	CORE	90	6	-	5

Preamble

The aim is to provide the student to acquire knowledge about solids and their bonds.To gain an

idea about different alloys in semiconducting and conducting materials and motivate the students in order to apply the principles of band theory in their research studies

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Learn about various types of solids and crystal classifications	K_1, K_2
CO2	Understand the concepts of crystal defects, crystallography and bonding in solids	K_1, K_2
CO3	Study the basic concepts Magnetic Properties of Materials	K_1, K_2
CO4	Demonstrate knowledge of core principles in elementary band theory	K_1, K_2
CO5	Study the concepts of Superconductivity, Polarization and Dielectrics along with various properties of magnetic materials	K_1, K_2

Unit I - Solids   **(15 Hours)**

Amorphous and Crystalline Materials **Crystal:** Distinction between crystalline and amorphous solids – Different features of the crystal – Crystal lattice – Basis – Unit cell – Crystal structure – Number of lattice points per unit cell – Bravais lattice – Lattice Translation -Types of Lattices-Miller indices

Unit II - Crystallography   **(15 Hours)**

Elements of symmetry – Structure of KCl and NaCl crystal – Atomic Packing – Atomic Radius – Lattice constant and Density – Crystal structure (sc, hcp, bcc, fcc)

X-rays: Bragg's law – Laue Method- Rotating crystal method – Powder Photograph method

Bonding in Solids: (Qualitative treatment) Ionic – Covalent – Metallic – Molecular bonds – Dulong and Pettit's law – Einstein's theory of specific heat of solids – Fermi levels and Debye theories of specific heat of solids-T^3 law

Crystal Defects: (Qualitative study): Frenkel defect – Schottky Defect – Edge dislocation – Screw dislocation

Unit III - Magnetic Properties of Materials   **(15 Hours)**

Dia, Para, Ferri and Ferromagnetic Materials, Classical Langevin Theory of dia – and Paramagnetic Domains - Quantum Mechanical Treatment of Paramagnetism - Curie's law, Weiss's Theory of Ferromagnetism and Ferromagnetic Domains - Discussion of B-H Curve - Hysteresis and Energy Loss

Unit IV - Free Electron Theory   **(15 Hours)**

Free electron theory – Drude Lorentz theory – Explanation of Ohm's law – Electrical conductivity – Thermal conductivity – Wide-Mann and Franz ratio – Sommerfield model – Hall effect – Hall voltage and Hall coefficient – Mobility and Hall angle – Importance of Hall effect – Experimental determination of Hall coefficient -Band Gaps-Conductors-Semiconductors and insulators, Conductivity of Semiconductors

Unit V- Dielectrics and Superconductivity   **(15 Hours)**

Dielectrics-Dielectric constant and displacement vector- Clausius mossotti relation – Atomic or molecular Polarizability - Types of Polarizability- Super conductivity- Phenomena-magnetic properties – High T_c Superconductivity - Meissner effect- Experimental facts –Isotopes effect- Thermodynamic effect

Books for Study

1. Solid State Physics – Gupta and Kumar, 9 [th] Revised Edition, 2016, K. Nath & Co, Meerut (Unit 1-5)
2. Modern Physics – R Murugesan, 2018, S. Chand & Co (Unit 1-5)

Books for References

1. Introduction to Solid State Physics – Charles Kittel, 8th Edition, 2004, Wiley India Pvt.Ltd
2. Solid State Physics – A J Dekker, 1999, Macmillan India Pvt Ltd.,
3. Elements of Solid State Physics – J.P. Srivastava, 2nd Edition, 2006, Prentice-Hall of India
4. Introduction to solids – Leonid V.Azaroff, 2004, Tata Mc-Graw Hill
5. Solid State Physics – Neil W.Ashcroft and N.David Mermin, 1976, Cengage Learning
6. Solid State Physics – Rita john, 2014, McGraw Hill

Course Code	Course Name	Category	L	T	P	Credit
18PHU18	ELECTRONICS & COMMUNICATION	CORE	75	5	-	5

Preamble

To provide the students to acquire knowledge about various electronic instruments and motivate them to apply principles of electronics in their day to day life

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Study the basics of semiconductor diodes and analyze the rectifier and filter circuits	K_1, K_2, K_3
CO2	Understand the types of transistors and its biasing	K_1, K_2
CO3	Understand the concepts of amplifiers and oscillators	K_1, K_2, K_3
CO4	Understand the principles of FET, UJT and Multivibrators	K_1, K_2
CO5	Acquire knowledge about AM and FM modulation and demodulation	K_1, K_2

Unit I - Diodes, Rectifiers and Filters   **(15 Hours)**

Characteristics of PN Junction diode – Half Wave Rectifier – Efficiency and Ripple Factor –Centre Tapped Full Wave Rectifier – Bridge Rectifier – Efficiency and Ripple Factor – Zener Diode –Zener Voltage Stabilization – Applications of diodes – clipper and clamper circuits. Filter Circuits: Capacitor Filter – Choke input Filter – Capacitor input Filter (Pi Filter) Special Purpose Diodes: LED – Photodiode – Tunnel Diode

Unit II - Transistors and Transistor Biasing   **(15 Hours)**

Transistor action – Expression for collector current in common base and common emitter connections – Relation between α and β – Characteristics of CE connection – Transistor line analysis – DC load line – Operating point -Need for transistor biasing – Stabilization – Essentials

of transistor biasing circuit – Stability factor– Base resistor method of transistor biasing – Voltage divider biasing

Unit III - Amplifiers and Oscillators   (15 Hours)

Single stage transistor amplifier – Practical circuit of amplifier – Phase reversal – Load line analysis - Classification of amplifiers – RC coupled amplifier - Amplifier with negative feedback- Feedback – Principle of negative feedback amplifier – Gain - Sinusoidal Oscillator – Types – Oscillatory circuit – Positive feedback – Barkhausen criterion – Colpitt's oscillator – Hartley oscillator – Phase-shift oscillator – Wein Bridge oscillator

Unit IV- FET, UJT and Multivibrators   (15 Hours)

JFET – Difference between JFET and BJT – Principle and working of JFET – output characteristics – Parameters of JFET- MOSFET – Working – Depletion and Enhancement mode - UJT – Construction and operation – Characteristics of UJT – Advantages – UJT as Relaxation Oscillator - Multivibrator – types – Astable – Monostable – Bistable multivibrators

Unit V – Modulation and Demodulation   (15 Hours)

Modulation – Types – Amplitude Modulation – Modulation factor – Analysis of AM wave – Side band frequencies in AM wave – Transistor AM modulator – Power – Limitations of AM – Frequency Modulation –Demodulation – Essentials in demodulation – AM diode detector – AM radio receivers – Superheterodyne receiver – Advantages

Book for Study

1. Principles of Electronics – V K Mehta and Rohit Mehta, 2005, S. Chand & Co. Ltd., (Unit 1,2,3)
2. Electronic communications Modulations of Transmission, Prentice – Hall of India (Unit 5)
3. Handbook of Electronics, Gupta and Kumar, Pragati Prakashan, Meerut (Unit 1-5)

Books for Reference

1. Basic Electronics (Solid State) - B.L. Theraja, 1995, S. Chand & Co. Ltd
2. A textbook of Applied Electronics - R.S. Sedha, 1999, S. Chand & Co. Ltd

Course Code	Course Name	Category	L	T	P	Credit
18PHU21	ELECTRONICS - PRACTICAL - III	CORE PRACTICAL	90	-	3	3

(EXAMINATION AT THE END OF SIXTH SEMESTER)

ANY TWELVE (12) EXPERIMENTS ONLY

1. Bistable Multivibrator

2. Astable Multivibrator

3. Series and Parallel resonance circuits

4. Differentiating and Integrating circuits

5. Clipping and Clamping Circuits

6. Logic Gates – Discrete Components

7. Junction diode & Zener diode Characteristics

8. IC – Regulated Power Supply

9. Dual Power Supply

10. Square wave generator using IC 555

11. UJT Characteristics

12. Bridge rectifier with Voltage regulation

13. Emitter follower

14. Hartley Oscillator – Transistor

15. Colpitt's Oscillator – Transistor

16. Monostable Multivibrator

17. FET characteristics

18. RC Coupled amplifier - Transistor

Course Code	Course Name	Category	L	T	P	Credit
18PHU22	DIGITAL ELECTRONICS AND MICROPROCESSOR - PRACTICAL - IV	CORE PRACTICAL	60	-	2	3

(EXAMINATION AT THE END OF SIXTH SEMESTER)

ANY TWELVE (12) EXPERIMENTS ONLY

1. Verification of Truth tables of IC gates: OR, AND, NOT, XOR, NOR, and NAND

2. NAND as universal building block

3. NOR as universal building block

4. Verification of De Morgan's theorems

5. Boolean Algebra – problem solving

6. Study of RS Flip-flop

7. Study of Shift – Registers- Serial in Parallel out

8. Half Adder

9. Full Adder

10. Half Subtractor

11. Full Subtractor

12. Code converter (Binary to gray and vice versa)

13. 8085 ALP for 8 bit Addition and Subtraction

14. 8085 ALP for 8 bit Multiplication

15. 8085 ALP for 8 bit Division

16. 8085 ALP for finding the Biggest number element in the array

17. 8085 ALP for Sum of the elements in the Array

18. 8085 ALP for One's Complement

19. 8085 ALP for Two's Complement Addition and Subtraction

20. 8085 ALP for Masking off most significant bits and setting bits

Course Code	Course Name	Category	L	T	P	Credit
18PHUCO1	PHYSICS IN DAY TO DAY LIFE	OPEN ELECTIVE	45	3	-	3

Preamble

To demonstrate knowledge and understanding of the fundamental concepts in Physics

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Demonstrate Knowledge in Measurement of Distances	K_1, K_2
CO2	Understand the concepts in Electricity	K_1, K_2
CO3	Study about the Magnetism	K_1, K_2
CO4	Study the Some Natural Phenomena	K_1, K_2
CO5	Demonstrate Knowledge in Management of Natural Resources	K_1, K_2

Unit I - Motion and Measurements of Distances **(15 Hours)**

History of Transportation-Measurement of Length – Distance-Conventional Methods of Measurement-Standard Units of Measurement-Types of Motion

Unit II - Electricity **(15 Hours)**

Electric current-Electric circuit-Components of basic electric circuit: Cell, Switch, and Bulb Conductor - Insulator - Electric potential and potential difference - Circuit diagram - Ohm's law Factors on which the resistance of conductor depends - Resistance of a system of resistors-Heating effect of electric current - Electric power

Unit III - Chemical Effects of Electric Current and Magnetism **(15 Hours)**

Conduction of Electricity - Conduction of Electricity in Liquids – Electrolysis-Electrolysis and Electroplating - Discovery of Magnets-Magnet-Poles of a magnet - Like poles repel and unlike poles attract Magnetic Field of Earth and Compass

Unit IV - Some Natural Phenomena **(15 Hours)**

Lightning-Charging by rubbing-Transfer of Charge-The Story of Lightning-Lightning Safety Phenomena related to earthquakes-Protection against earthquakes

Unit V - Management of Natural Resources **(15 Hours)**

Save the Environment from Environmental Pollution – Reuse– Recycle-Why do we need to manage our natural resources-Forest and wildlife-Sustainable management-Water for all : dam-Water harvesting-Coal and petroleum

Books for Study and References

1. Monograph – Department of Physics

Course Code	Course Name	Category	L	T	P	Credit
18PHU23A	DIGITAL ELECTRONICS AND MICROPROCESSOR	ELECTIVE	45	3	-	2

Preamble

The aim is to provide basic knowledge of binary addition, combinations of logic circuits & microprocessor

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Study the Number systems, Codes and its Conversions	K_1, K_2, K_3
CO2	Understand the concepts of Arithmetic Circuits and Memory Devices	K_1, K_2, K_3
CO3	Study the working of Flip-flops and their applications	K_1, K_2
CO4	Understand the basics of 8085 Microprocessor	K_1, K_2
CO5	To write various programs for 8085 Microprocessor	K_1, K_2

Unit I - Number System and Codes (15 Hours)

Binary - Octal - Decimal – Hexa decimal number systems – Conversion of one number system into other. Codes- BCD codes –Gray code –ASCII Code

Arithmetic operation – Binary addition- Binary subtraction – 1's complement subtraction- 2's complement subtraction – Binary to Gray code converter – Gray to Binary converter.

Logic gates: OR, AND, NOT, NAND, NOR, Ex-OR, Ex-NORgates – Universal building blocks

Unit II - Boolan algebra and Arithmetic circuits (15 Hours)

Basic laws – Boolean addition and multiplication – properties – De Morgan's theorems-Minimization using algebraic method – Sum of Product method – Karnaugh map and its

simplifications – Product of Sum method-Arithmetic circuits – Half adder – Full adder – Half subtractor – K map simplifications

A/D and D/A Converters and Memory Devices: A/D Converters– D/A Converters- Memory Devices: Classification of memories –ROM-PROM, EPROM, EEPROM, RAM (Basic ideas only)

Unit III - Flip-flops and their applications (15 Hours)

SR flip-flop- Clocked SR flip flop – D flip-flop – JK flip-flop – T flip-flop – Triggering of flip-flops – Level triggering – Edge triggering –Master slave JK flip-flop
Applications: Shift Registers – 3 and 4 bit shift registers – Counters –Asynchronous counters – Synchronous counters – MOD-3, MOD-6, MOD-10 counters

Unit   IV - Microprocessors (15 Hours)

8085 microprocessors – Microprocessor communication and bus timings – Demultiplexing the bus AD7-AD0 – Generating control signals – A detailed architecture of 8085 microprocessor – 8085 machine cycles and bus timings - Op-code fetch machine cycle – Memory read machine cycle –Memory interfacing: Memory structure and its requirements – Basic concepts in memory interfacing - Address decoding - interfacing circuit – Address decoding and memory address

Unit V - Programming the 8085 (15 Hours)

8085 programming model – Instruction classifications – Instruction and data format – 8085 Instructions: Data transfer operations – Logic operations – Branch operations – Programming techniques – Looping, counting and indexing – Additional data transfer and 16-bit arithmetic instructions – Counters and time delays – Simple programs – Addition, subtraction, multiplication, division, setting bits, masking bits

Book for study
1. Digital circuits and Design - S.Salivahanan and S.Arivazhagan, 3rd Edition, 2007, Vikas
   Publisher (Unit 1, 2, 3)
2. Digital principle and Applications- Malvino and Leach, 4th Edition1993, Tata McGraw- Hill
   Publishing Company Ltd (Unit 1)

3. Microprocessor Architecture, Programming and applications with the 8085 - Ramesh

 S.Gaonkar, 3rd Edition, 1997, Penram International Publisher (Unit 4, 5)

Books for Reference

1. Handbook of Electronics - Gupta and Kumar, 2012, Pragati Prakashan, Meerut

2. Introduction to Microprocessors - A.P.Matur, 3rd Edition, 1996,Tata McGraw- Hill

 Publishing Company Ltd

Course Code	Course Name	Category	L	T	P	Credit
18PHU23B	SOIL PHYSICS	ELECTIVE	45	3	-	2

Preamble

 The aim is to provide the student to gain deeper knowledge and understanding of

mechanical   properties of soils and learn information about transfer processes in soils then know

about the   saturated and unsaturated soils

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Gain basic understanding of mechanical properties of soils	K1, K2
CO2	Comprehend transfer processes for water, air, solutes, and heat in soils	K1, K2
CO3	To measure selected physical properties (parameters) of soils and appropriate and transport parameters of agrochemicals in soils	K1, K2
CO4	Use mathematical models to quantify transfer processes for air, water, and solutes in saturated soils	K1, K2
CO5	Gain the knowledge about transfer processes for air, water, and solutes in water unsaturated soils	K1, K2

Unit I - Introduction   **(12 Hours)**

 Soil Physics before the 70s-Soil Physics in relation to Natural Sciences and Soil Science-

How to acquire Physics knowledge by Scientific Methods-Application of Physics laws in Soil

Physics- Fundamental and derived physical quantities and System of units

Unit II- Basic Physical Properties of Soils **(12 Hours)**

Soil as a porous medium, volume and mass relationship- Soil texture- specific surface area- soil structure and aggregation- Pore size and distribution- pore geometry

Unit III - Soil Water **(12 Hours)**

General properties of water- Water rise in a capillary tube- Soil water content- Measurement of soil water content- Energy status of soil water-Soil moisture release curves- Measurement of soil water potential

Unit IV - Water Flow in Saturated Soils **(12 Hours)**

Driving force for water flow-Darcy flux and pore water velocity Darcy's law and Poiseuille's Law- Saturated hydraulic conductivity, permeability, and fluidity Vertical and horizontal water flow-Water flow in layered soils

Unit V - Water Flow in Unsaturated Soils **(12 Hours)**

Darcy's Law in unsaturated soils- Hydraulic conductivity as function of water content and potential- Estimation of hydraulic functions and diffusivity from soil moisture release curves and from particle-and pore size distribution- Equation of continuity and Richard's equation- Steady and unsteady water flow- Infiltration, redistribution and evaporation

Book for Study

1. Text book of soil physics - Arunkumar saha Anuradha saha, 2012, Kalyani Publisher

2. Soil physics an introduction - Manoj K.Shukla, 2013, CRC press

3. Principles of soil physics - Rattan Lal, Manoj K. shukla, 2004, CRC press

4. Environmental Soil Physics, by Daniel Hillel, 1998. Academic Press, Inc. San Diego,
   California.

Study material available in the website: www.soilphysicsnotes.com

Course Code	Course Name	Category	L	T	P	Credit
18PHU23C	GEOPHYSICS	ELECTIVE	45	3	-	2

Preamble

The aim is to provide the student to gain deeper knowledge in geological Physics, earth structure & fossil animals

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Exploring and analyzing active processes of the Earth	K1, K2
CO2	Gain the knowledge about plateaus and plains	K1, K2
CO3	Analyzing geologic maps	K1, K2
CO4	Find out the preservation of fossils	K1, K2
CO5	Know about the fossil animals.	K1, K2

Unit I - Physical Geology **(12 Hours)**

Origin of the Earth - Age of the Earth - Interior of the earth - Structure and constitution of the interior of the earth - Earthquakes: Definition - Effects - Causes - Earthquake waves and their transmission - Seismographs - Distribution of earthquake belts - Volcanoes: Distribution - Causes - Effects of volcanic eruptions - Concepts of Plate Tectonics

Unit II **(12 Hours)**

Mountains: Origin - Types - Characteristics - Distribution - Types of Plateaus and Plains - Weathering: Types - Products.

Unit III - Structural Geology **(12 Hours)**

Introduction to Structural geology: Topographic maps - Geologic maps - Outcrops and their topography - Clinometer compass and its uses - Representation of attitude of beds.

Unit IV - Paleontology   (12 Hours)

Definition of fossil -Nature and modes of preservation of fossils - Uses of fossils - General Morphology, classification, geological history and stratigraphical importance of the following invertbrates: Corals, Echinoids, Crinoids and Blastoid - Pelecypods and Cephalopods.

Unit V   (12 Hours)

Brachilopods - Trilobites – Graptolites - A brief outline on the classification of vertebrates - A very short account of the evolution of Man, Elephant and horse - Gondwana flora of India - An outline of the uses of Micropaleontology.

Book for Study

1. Principles of Physical Geology - Arthur Holmes, Thomas Nelson and Sons Ltd., London, 1965

2. Elements of Structural Geology - E. Sherbon Hills, Champan and Hall Ltd. and Science Paperback, 1963

3. An outline of Structural Geology by Bruce E. Hobbs, Winthrop D. Means and Paul F.Williamsn, John Wiley and Sons, New York, 1976

4. Vertebrate Palaeontology - A.S. Romer, 1960, Chicago Press.

5. Invertebrate Palaeontology - Henry Woods, 1967, Cambridge University Press, Cambridge.

Course Code	Course Name	Category	L	T	P	Credit
18SEUPH3	SOFT SKILLS	SKILL ENHANCEMENT COURSE -III	30	2	-	2

Preamble

The aim is to provide the student to   know about interpersonal skills, team work & also Self motivation

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	Learning to connect and work with others to achieve a set task	K1, K2

CO2	Identifying the strengths within the team	K1, K2
CO3	Learning to handle emotions including tolerance and behavioral responses	K1, K2
CO4	Defining and committing to achieving one's goals	K1, K2
CO5	Knowing the right choice and predict all possible outcomes in order to succeed	K1, K2

Unit I - Interpersonal Skills **(9 Hours)**

Understanding the relationship between Leadership Networking & Team work - Assessing Interpersonal Skills Situation description of Interpersonal Skill - Team Work: Necessity of Team Work Personally, Socially and Educationally

Unit II - Leadership **(9 Hours)**

Skills for a good Leader - Assessment of Leadership Skills

Unit III - Stress Management **(9 Hours)**

Causes of Stress and its impact - how to manage & distress - Circle of control - Stress Busters -Emotional Intelligence -Emotional quotient - Emotion Scales - Managing Emotions.

Unit IV - Goal Setting **(9 Hours)**

Wish List - SMART Goals - Blue print for success - Short Term - Long Term - Life Time Goals -Time Management - Value of time - Diagnosing Time Management - Weekly Planner To do list - Prioritizing work

Unit V - Decision Making **(9 Hours)**

Importance and necessity of Decision Making - Process and practical way of Decision Making - Weighing Positives & Negatives

Books for Study:
1. Soft Skills - S.Hariharan
2. Developing Soft Skills - R.M. Sherfield
3. Soft skills for managers – Chakravarthi

Course Code	Course Name	Category	L	T	P	Credit
18PEUPH1	LASERS	PROFICIENCY ENHANCEMENT -I	-	-	-	2

Preamble

The aim is to provide the students to know the principles of laser light and also the applications of Lasers

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	Gain the knowledge about fundamentals of Lasers	K_1, K_2
CO2	Know about the concepts of pumping	K_1, K_2
CO3	Study about the basic properties of lasers	K_1, K_2
CO4	Understand the working of solid and gas lasers	K_1, K_2
CO5	know the principle and working of semiconductors lasers	K_1, K_2

Unit I - Fundamentals of Lasers

Electromagnetic radiation – energy levels – Interaction of radiation and matter – fluorescence, absorption, stimulated emission

Unit II - Laser materials

Population inversion – optical pumping- excitation by electron collisions – resonant transfer of energy – resonant cavity

Unit III - Properties of laser light

Line width – collimation – spatial profiles of laser beams – temporal behavior of Laser output – Q switched operation – mode locked operation – cavity dumping – coherence – radiance – focusing properties of Laser radiation – power

Unit IV - Gas Laser

He-Ne Laser – ionized gas laser – Molecular Laser (CO_2) — Solid state lasers: Neodymium YAG Lasers- glass Lasers- Ruby Lasers

Unit V - Semi conductor Laser

Semiconductor laser properties – Diode structures – diode doped solid state laser – Organic dye lasers – chemical lasers – X ray lasers – Tunable lasers

Book for study

1. Laser & Non – Linear Optics – B.B. Laud, 3 rd Edition - New age International

   Publication (Unit 1-5)

2. Laser Systems and Applications – V.K.Jain, 2013, Narosa Publishing House (Unit 1-5)

Books for reference

1. Lasers and Optical fibre Communications – P.Sarah, 2008, I.K.International Publishing House

2. Laser Physics – S. Mohan, V. Arjunan, M. Selvarani, M. Kanahana mala, 2012, MJP Publishers

VI - SEMESTER

Course Code	Course Name	Category	L	T	P	Credit
18PHU24	QUANTUM MECHANICS AND RELATIVITY	CORE	75	5	-	5

Preamble

To develop the problem solving ability and to motivate the students to apply Schrödinger's equation or solving problems in wave mechanics, nuclear physics etc.,

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand and explain the wave properties of matter	K_1, K_2
CO2	Understand the idea of uncertainty principle and its applications	K_1, K_2, K_3
CO3	Understand the wave function and its physical interpretation through Schrödinger's wave equation	K_1, K_2
CO4	Apply Schrödinger's wave equation to solve problems, understand quantum numbers and commutation relations	K_1, K_2, K_3
CO5	Understand the concepts of special and general theories of relativity	K_1, K_2

Unit I - Wave Properties of Matter   **(15 Hours)**

Introduction – Phase velocity and Group velocity – Analytical expression for a group of waves –Nature of De' Broglie relation – Derivation of the De' Broglie relation – Phase velocity of De' Broglie waves – Relation between the Phase velocity and the wavelength of De' Broglie wave– De' Broglie wavelength associated with a particle of mass M and kinetic energy – Verification of De' Broglie relation – Davission and Germer's experiments – G P Thomson's experiments

Unit II - Uncertainty Principle   **(15 Hours)**

Introduction – Uncertainty Principle – Elementary proof between – Displacement and Momentum – Energy and Time – Physical Significance of Heisenberg's Uncertainty Principle – Illustration – Diffraction of electrons through a slit – Gamma ray microscope through experiment – Application – Non-existence of free electrons in the nucleus – Size and Energy in the ground state of Hydrogen atom

Unit III - Schrödinger's Wave Equation   **(15 Hours)**

Introduction – Wave function for a free particle – Schrödinger's One dimensional wave equation– Time-dependent and Time independent – Physical interpretation - Limitation – Normalization of wave function – Operators – Eigen function – Eigen Value – Eigen equation – Operator for Momentum, Kinetic Energy and Total Energy – Postulates of Quantum Mechanics –

Orthogonality of Energy Eigen function – Proof – Probability current density – Ehrenfest's theorem – Statement and proof

Unit IV- Applications of Schrodinger's Equation   (15 Hours)

Particle in a box - Potential step –The barrier penetration problem – Linear harmonic oscillator **- Significance of Quantum Numbers:** Significance of various quantum numbers – n, l, m_l - Electron probability density

Unit –V Special Theory of Relativity   (15 Hours)

Galilean Transformation equation – Ether Hypothesis – Michelson-Morley experiment – Explanation of the Negative results – special theory of Relativity – Lorentz transformation equation – Length contraction – Time dilation – Addition of Velocities – Variation of Mass with velocity – Mass energy equivalence.

General Theory of Relativity: General theory of relativity- Effect of gravitational field on a ray of light- Gravitational red shift- Black hole

Books for Study

1. Quantum Mechanics - S.P Singh, M.K Bagde, C.Kamal Singh, 1st Edition, 2001, S.Chand & Co (Unit 1-4)

2. Concepts of Modern Physics – Arthur Beiser, 5th Edition, 1995, Tata McGraw- Hill Publishing Company Ltd (Unit 5)

Books for Reference

1. Quantum Mechanics - Leonard I. Schiff, 1968, Tata McGraw- Hill Publishing Company Ltd

Course Code	Course Name	Category	L	T	P	Credit
18PHU25	ATOMIC AND NUCLEAR PHYSICS	CORE	75	5	-	5

Preamble

The aim is to provide the student to acquire knowledge about atom, nucleus and their properties. To motivate the students in order to apply the principles of radio activity in their

research studies

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the properties of positive rays	K_1, K_2
CO2	Understand the principles of atom models	K_1, K_2
CO3	Understand the properties and structure of nucleus	K_1, K_2
CO4	Describe and understand radioactivity, its properties and its applications	K_1, K_2
CO5	Understand the working principles of nuclear detectors and the basics concepts of nuclear fission and fusion	K_1, K_2

Unit I - Positive Rays **(15 Hours)**

Positive rays – Discovery – Properties – Positive ray analysis – Thomson's Parabola method –action of Electric and Magnetic fields – Determination of e/m – determination of mass – discovery of stable isotopes– Limitations – Dempster's mass spectrograph –Aston's mass Spectrograph- mass defect and packing fraction

Unit II - Atom Models **(15 Hours)**

The Bohr atom model – Critical Potentials – Method of excitation of atoms – Experimental determination of critical potentials by Davis and Goucher's method - Somerfield's relativistic model -Vector model-.Zeeman effect-Explanation from vector atom model -Pauli's exclusion principle – Periodic classification of elements

Unit III - Magneto Optical Properties of Spectrum **(15 Hours)**

Magentic dipole moment due to orbital motion of the electron – Magnetic dipole moment due to spin – The Stern and Gerlach experiment – Optical spectra – Fine Structure of the sodium D line – Zeeman effect – Experiments – Lorentz classical theory – Expression for the Zeeman shift – Larmor's theorem – Quantum mechanical explanation of the normal Zeeman effect – Anomalous Zeeman effect – Paschen – Back effect – Stark effect

Unit IV - Radioactivity **(15 Hours)**

Natural Radioactivity : Alpha, Beta and Gamma rays – Properties – Determination of e/m of Alpha particle – Origin of Gamma rays – Laws of Radioactivity – Law of Radioactive disintegration – Half life period – Mean life period (Definitions, Expression) – Units of Radioactivity – Artificial Radioactivity –Preparation of radio elements – Application of radio isotopes

Unit V - Nuclear Detectors **(15 Hours)**

Principle and working of solid state detector - Proportional Counter - Wilson's cloud chamber - Scintillation counter. Accelerators: Synchrocyclotron - Synchrotron - Electron synchrotron - proton synchrotron - Betatron

Nuclear Fission and Fusion: Nuclear fission – Energy released in Fission – Bohr and Wheelers theory of nuclear fission – Nuclear fusion

Books for Study

1. Modern Physics by R. Murugesan, 2009, S.Chand & Co., (Unit 1-5)

2. Atomic Physics by J.B. Rajam, 2009, S.Chand & Co., (Unit 2)

3. Nuclear Physics by D.C.Tayal, 2002, Himalaya Publishing House. (Unit 5)

Books for Reference

1. Modern Physics by Sehgal Chopra Sehgal, 8th Edition, 1998, Sultan Chand & Sons

2. Concept of Modern Physics by Arthur Beiser, 5 [th] Edition, International Edition Mc Graw Hill Inc.,

Course Code	Course Name	Category	L	T	P	Credit
18PHU26	ELECTRICITY AND MAGNETISM	CORE	75	5	-	5

Preamble

To acquire knowledge in electricity and magnetism, problem solving ability & also understand the laws and equations

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Study the laws of electricity and magnetism and its applications	K_1, K_2
CO2	Understand the properties of magnetic materials	K_1, K_2
CO3	Study the basic concepts of thermoelectricity	K_1, K_2
CO4	Explanation of Helmholtz equation of varying current.	K_1, K_2
CO5	To understand the dynamics of charged particles	K_1, K_2

Unit I - Electrostatics (15 Hours)

Gauss theorem and its applications: Coulomb's law, Electric Field and potentials, Electric field due to a point charge. Normal electric induction Gauss theorem, application of gauss theorem - Energy stored in unit volume of an electric field – Electric field due to an infinite plane sheet

Capacitance and Capacitors: Spherical capacitor, cylindrical capacitor, Force of attraction between charged plates of a capacitor – capacity of a parallel plate capacitor; effect of introducing a dielectric slab between the plates - polarization in dielectric materials

Unit II - Magnetic Properties of materials (15 Hours)

Electron theory of magnetism; dia, para, ferromagnetism and their properties - Magnetic field B; magnetization M; magnetic field intensity H; magnetic susceptibility and magnetic permeability; magnetic materials and magnetization -magnetic hysterisis – area of the hysterisis loop- determination of susceptibility: Guoy's method – magnetic circuits – circuits comparison of magnetic application with electrical circuits

Unit III - Thermo Electricity (15 Hours)

Seebeck effect – Laws of thermo e.m.f – Peltier effect- Peltier Coefficient – determination of Peltier co-efficient – thermo dynamical consideration of Peltier -effect – Thomson effect – Thomson Co-efficient – e.m.f generated in a thermocouple taking both Peltier -effect and Thomson

effect in the metals – Thermo electric power – Application of thermodynamics to Thermocouple – Thermoelectric diagrams and their uses

Unit IV- Helmholtz equation of varying current   **(15 Hours)**

Growth and decay of current in an inductive – resistive circuit – charging and discharging of a capacitor through a resistance – charging and discharging of capacitor through an inductance – oscillatory circuits- Force on a current carrying conductor – Theory of Ballistic Galvanometer

Unit V - Dynamics of charged particles   **(15 Hours)**

Charged particles in uniform and constant electric field – Charged particles in an alternating electric field – Charged particles in a uniform and constant magnetic field – charged particles in combined electric and magnetic field when the fields are parallel and are in mutually perpendicular direction. A conducting rod moving through a uniform magnetic field – inductance in series – in parallel – self inductance of coaxial cylinders – self inductance of toroidal coil of rectangular cross section – circular cross section – Grassot fluxmeter – comparison with Ballistic galvanometer – rotating magnetic field

Books for Study

1. Electricity and Magnetism – Brijlal and Subramaniam, 1994, The National Publishing
   Company (Unit 1-5)
2. Electricity and Magnetism – R. Murugesan, 4 th Edition, 1997, Shoban Lal Nagin CHAND &
   Co. (Unit 1-5)

Books for Reference

1. Electricity and Magnetism – D.N. Vasudeva, Edition 1999, S. Chand & Company Ltd.
2. Electricity and Magnetism – Nagarathanam and Lakshminarayanan
3. Fundamental of Electricity and Magnetism – B.D.Duggal and C.L. Chhabra
4. Mechanics – D.S. Mathur, Edition 1998, S. Chand & Company Ltd.,

Course Code	Course Name	Category	L	T	P	Credit
18PHU27	APPLIED INSTRUMENTATION & SPECTROSCOPY	CORE	75	5	-	5

Preamble

To provide a good foundation in measurements, knowledge of the behavior of instruments and to inspire interest for the knowledge of concepts regarding measurements

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the basic concept of measurement	$K_1, K_2,$
CO2	Knowledge about pressure measurement	K_1, K_2
CO3	Understand thermal and nuclear radiation	$K_1, K_2,$
CO4	Knowledge of signal conditioning and data conversion	K_1, K_2
CO5	Basic knowledge of Spectra and X-ray properties	K_1, K_2

Unit – I Basic Concept of Measurement (15 Hours)

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

Measurement of Temperature

Temperature scales – The ideal gas thermometer -Thermisters – Thermoeletric effects – quartz crystal thermometer – liquid crystal thermography

Unit – II Pressure Measurement (15 Hours)

Mechanical Pressure measurement devices – Bourdon tube Pressure gauge – The Bridgeman Gauge – Dead weight tester – Low Pressure measurement – The Mc lead gauge – Pirani thermal Conducting gauge – The Knudsen gauge

Unit – III Thermal and Nuclear Radiation Measurements (15 Hours)

Introduction – Detection of thermal radiation – Measurement of emissivity – Reflectivity and Transmitting measurements – Solar radiation measurements – Detection of Nuclear radiation – The Geiger Muller counter

Unit – IV Data Acquisition and Conversion **(15 Hours)**

Introduction – Signal conditioning of the inputs – Single channel data acquisition systems – Data conversion – Digital to Analog converter – Analog to Digital converter. Oscilloscope -Basic principles – CRT features – Basic principles of signal displays – Block Diagram of oscilloscope – Simple CRO- Display devices: LED – LCD

Unit V - X-ray Spectra **(15 Hours)**

X-ray – Coolidge tubes – Properties – X-ray Spectra – Continuous and characteristics X-ray Spectrum – Mosley's law (Statement, Explanation and Importance) – Compton Effect – Expression for change of wave length

Book for Study

1. Instrumentation Devices and Systems – C S Rangan, G R Sharma, V S V Mani TMH
   (Unit 1& 4)

2. Experimental methods for Experiments - Jack P Holman (Unit 1, 2 & 3)

3. Electronic Instrumentation - H S Kalsi, TMH (Unit 4)

4. Modern Physics - R Murugesan, S. Chand & Company Limited (Unit 5)

Course Code	Course Name	Category	L	T	P	Credit
18PHU29A	BASIC CONCEPTS OF C & C++	ELECTIVE	45	3	-	3

Preamble

The aim is to provide the student gain knowledge on of basics of C AND C++

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	To acquire basic knowledge about Programming in C	K1, K2, K3
CO2	To Gather Knowledge In C Programming And Developing Programming Skills	K1, K2, K3
CO3	To strengthen the knowledge on structures, arrays etc., of C programming	K1, K2, K3

CO4	To understand the principle of oriented program	K1, K2, K3
CO5	To understand the inheritance	K1, K2, K3

Unit I - Overview of C   **(9 Hours)**

Introduction- Importance of C- Basic Structure of C program- Tokens-Variables- Data types- Operators and Expression- Managing Input and Output Operators

Unit II - Conditional Statements   **(9 Hours)**

If statement- switch statement- goto statement- while statement- do statement-for statement- continue statement- break statement

Unit III – Arrays   **(9 Hours)**

One dimensional array- Two dimensional array- Multidimensional array

Unit IV – Principles of Object Oriented Programming   **(9 Hours)**

Object Oriented Programming Paradigms- basic concept of OOPS- benefits of OOP what is C++-simple C++ program-structure of C++ program

Unit V – Inheritance   **(9 Hours)**

Single inheritance-multilevel-multiple inheritance-hierarchical-hybrid

Books for Study

1. Computing Fundamental & C Programming - E .Balagurusamy, 2011, Tata McGraw Hill (Unit 1, 2 & 3)
2. Object Oriented Programming with C++ - E. Balagurusamy, 2008, Tata McGraw-Hill Publication (Unit 4, 5)

Books for Reference

1. Programming in C - N. Kamthane Ashok, 2nd Edition, 2013, Pearson Education
2. let us C - Yashvant P. Kanetkar, 8th Edition, 2008, Infinity science press

Course Code	Course Name	Category	L	T	P	Credit
18PHU29B	INTRODUCTION TO SPACE PHYSICS	ELECTIVE	45	3	-	3

Preamble

The aim is to provide the student gain knowledge on astronomical backgrounds, astronomical concepts and Understand cosmic rays

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the concepts of Milky Way.	K1, K2, K3
CO2	Understand and describe about the Galaxies	K1, K2, K3
CO3	Understand the features of Sun.	K1, K2, K3
CO4	Understand the Hubble theory behind Hubble telescope.	K1, K2, K3
CO5	Learning about the stars	K1, K2, K3

Unit I - The Sun **(9 Hours)**

Introduction - Astronomical background - General description of the sun - Sun's outer layers – Composition - Visible features on the sun - Temperature of the corona - Solar activity and Sunspot cycles

Unit II - Introduction to Cosmic rays **(9 Hours)**

Nature of Cosmic rays - the origin of cosmic rays - Cosmic ray shower - effect of geomagnetic field on cosmic rays - Primary cosmic radiation - Secondary Cosmic radiation - time variation of cosmic rays

Unit III - Galactic astronomy **(9 Hours)**

Milkyway - Hubble telescope - Classification of galaxies - Spiral galaxies - Elliptical galaxies - Irregular galaxies - Dwarf galaxies - Dark matter

Unit IV - Stellar Objects   **(9 Hours)**

       Composition of Stars - Velocity, Mass and Sizes of Stars-Types of Stars- Temperature Dependence - The colour index of a star - Luminosities of stars - Age of stars

Unit V - Age of Stars   **(9 Hours)**

       Stellar Evolution- Protostar - Main Sequence Star - Subgiant, Red Giant, Supergiant -Core Fusion - Planetary Nebula (or) Supernova - White Dwarfs - Novae And Supernovae - Neutron Stars-Pulsars-Black Holes-Detecting Black Holes

Books for Study and Reference

1. An Introductory Course on Space Science and Earth's Environment - S.S.Degaonker, Gujarat
   University Publication, Ahmedabad
2. Atomic and Nuclear Physics-An Introduction- Subrahmanayam
3. An introduction to Astro Physics-Saraswathy K.N

Study material available in the website: www.astronomynotes.com

Course Code	Course Name	Category	L	T	P	Credit
18PHU29C	SMART MATERIALS	ELECTIVE	45	3	-	3

Preamble

       To gain deeper knowledge of smart materials, sensors, actuators &the advances in smart materials

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	Understanding the different types of polymer materials	K1, K2
CO2	Gain the knowledge about low strain smart sensors	K1, K2
CO3	Discuss about actuators.	K1, K2

| CO4 | Know about the composite beams | K1, K2 |
| CO5 | Know about the advances in smart structures. | K1, K2 |

Unit I - Overview of Smart Materials **(9 Hours)**

Introduction to Smart Materials - Principles of Piezoelectricty - Perovskyte Piezoceramic Materials - Single Crystals vs Polycrystalline Systems - Piezoelectric Polymers - Principles of Magnetostriction - Rare earth Magnetostrictive materials - Giant Magnetostriction and Magneto-resistance Effect

Unit II - High-Band Width, Low Strain Smart Sensors **(9 Hours)**

Piezoelctric Strain Sensors - In-plane and Out-of Plane Sensing - Shear Sensing- Accelerometers - Effect of Electrode Pattern - Active Fibre Sensing - Magnetostrictive Sensing - Villari Effect - Matteuci Effect and Nagoka-Honda Effect - Magnetic Delay Line Sensing - Application of Smart Sensors for Structural Health Monitoring (SHM) - System Identification using Smart Sensors

Unit III - Smart Actuators **(9 Hours)**

Modelling Piezoelectric Actuators - Amplified Piezo Actuation – Internal and External Amplifications - Magnetostrictive Actuation - Joule Effect - Wiedemann Effect - Magnetovolume Effect - Magnetostrictive Mini Actuators - IPMC and Polymeric Actuators - Shape Memory Actuators - Active Vibration Control - Active Shape Control - Passive Vibration Control - Hybrid Vibration Control

Unit IV - Smart Composites **(9 Hours)**

Review of Composite Materials - Micro and Macro-mechanics - Modelling Laminated Composites based on Classical Laminated Plate Theory - Effect of Shear Deformation - Dynamics of Smart Composite Beam - Governing Equation of Motion - and Finite Element Modelling of Smart Composite Beams

Unit V - Advances In Smart Structures & Materials   **(9 Hours)**

      Self-Sensing Piezoelectric Transducers - Energy Harvesting Materials - Autophagous Materials - Self- Healing Polymers - Intelligent System Design - Emergent System Design

Books for Study and Reference

1. Smart Structures and Materials - Brian Culshaw, Artech House, 2000

2. Smart Structures - Gauenzi.P Wiley, 2009

3. Piezoelectricity – Cady W. G, Dover Publication

Study material available in the website: www.smartmaterials.com

Course Code	Course Name	Category	L	T	P	Credit
18SEUPH4	PROGRAMMING IN C, C++	SKILL ENHANCEMENT COURSE - IV	30		2	2

Programming in C

1. Find the number of days elapsed between two dates

2. Convert Integer in the range 1 to 100 in words

3. Write a program that uses functions to compare two strings input by user. The Program should state whether the first string is less than, equal or greater than the second string

4. Write a Program to compare two files printing the character position where they equal and where they are different

5. Write a Program for Matrix Addition

6. Write a Program for Matrix Multiplication

7. Write a Program for Addition of Two times

Programming in C++

1. To read any two number through the key board and to perform simple Arithmetic Operation (Use Do While Loop)

2. To display the name of the day in a week, depending upon the number entered through the keyboard using Switch – Case statement

3. To read the elements of the given two matrix of m × n and to perform the Matrix Addition

4. Write a Program to find the Inverse of given m × n matrix

5. Write a Program to compare two files printing the character position where they are equal and
where they are different