E.M.G. YADAVA WOMEN'S COLLEGE, MADURAI – 625 014.

(An Autonomous Institution – Affiliated to Madurai Kamaraj University)

Re-accredited **(3rd Cycle)** with Grade **A+** & **CGPA 3.51** by NAAC

DEPARTMENT OF PHYSICS

CBCS SYLLABUS

BACHELOR OF SCIENCE

PROGRAMME CODE - P

COURSE STRUCTURE

(w.e.f. 2021 – 2022 Batch onwards)

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CRITERION - I

1.1.3 Details of courses offered by the institution that focus on employability / entrepreneurship / skill development during the year.

Syllabus copies with highlights of contents focusing on Employability / Entrepreneurship / Skill Development

To be Noted:

HIGHLIGHTED COLORS	COURSES
	Employability
	Skill Development
	Entrepreneurship
	Skilled & Employability

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DEPARTMENT OF PHYSICS-UG

(w.e.f. 2021-2022 onwards)

COURSE STRUCTURE-SEMESTER WISE

Sem	Part	Subject code	Title of the paper	Teaching hrs.(Per week)	Exam duration (hrs)	Marks Allotted			Credits
						CIA	SE	Total	
I	I	**211T1**	**Part-I** Tamil	6	3	25	75	100	3
	II	**212E1**	**Part-II** English	6	3	25	75	100	3
	III	**21P11**	**Core:** Mechanics, properties of matter and sound	4	3	25	75	100	4
			Core: Major Practical – I	2	-	-	-	-	-
		21AM1	**Allied I**: Mathematics – I	6	3	25	75	100	4
	IV	**21SEP11**	**SBE:** Basic electronics	2	3	25	75	100	2
		21SEP12	**SBE:** Digital Electronics	2	3	25	75	100	2
		21NMP1	**NME:** Energy Physics	2	3	25	75	100	2
II	I	**211T2**	**Part-I** Tamil	6	3	25	75	100	3
	II	**212E2**	**Part-II** English	6	3	25	75	100	3
	III	**21P21**	**Core:** Heat and Thermodynamics	4	3	25	75	100	4
		21P2P	**Core:** Major Practical – I	2	3	40	60	100	3
		21AM2	**Allied I:** Mathematics – II	6	3	25	75	100	5
	IV	**21SEP21**	**SBE:** Electronic Instrumentation	2	3	25	75	100	2
		21SEP22	**SBE:** Electricity	2	3	25	75	100	2
		21NMP2	**NME:** Astro Physics	2	3	25	75	100	2
III	I	**211T3**	**Part-I** Tamil	6	3	25	75	100	3
	II	**212E3**	**Part-II** English	6	3	25	75	100	3
	III	**21P31**	**Core:** Electro Magnetism	4	3	25	75	100	4
			Core: Major Practical - II	2	-	-	-	-	-
		21AM3	**Allied I :** Mathematics – III	6	3	25	75	100	4
		21AKP3	**Allied II:** Physical Chemistry	4	3	25	75	100	4

			Allied II: Practical I-Inorganic Qualitative Analysis	2	-	-	-	-	-
IV	I	**211T4**	**Part-I** Tamil	6	3	25	75	100	3
	II	**212E4**	**Part-II** English	6	3	25	75	100	3
	III	**21P41**	**Core:** Optics	4	3	25	75	100	4
		21P4P	**Core:** Major Practical – II	2	3	40	60	100	3
		21AM4	**Allied I :** Mathematics – IV	6	3	25	75	100	5
		21AKP4	**Allied II**: Organic and Physical chemistry	4	3	25	75	100	4
		21AKP4P	**Allied II**: Practical I-Inorganic Qualitative Analysis	2	3	40	60	100	1
V	III	**21P51**	**Core:** Atomic and Nuclear Physics	4	3	25	75	100	4
	III	**21P52**	**Core:** Programming with C	4	3	25	75	100	4
	III		**Elective –I**	4	3	25	75	100	4
			Core: Major Physics Practical – III	3	-	-	-	-	-
			Core: Major Electronics Practical – IV	3	-	-	-	-	-
			Major Elective –Project	2	-	-	-	-	-
		21AKP5	**Allied II**: Inorganic, Physical and Medicinal Chemistry	4	3	25	75	100	4
			Allied II : Practical II-Volumetric Analysis	2	-	-	-	-	-
	IV	**21SEP51**	**SBE:** Fibre optic communication	2	3	25	75	100	2
		214EV5	Environmental studies	2	3	25	75	100	2
VI	III	**21P61**	**Core:** Solid State Physics	4	3	25	75	100	4
	III	**21P62**	**Core:** Spectroscopy	4	3	25	75	100	4
	III		**Elective –II**	4	3	25	75	100	4
		21P61P	**Core:** Major Physics Practical – III	3	3	40	60	100	5
		21P62P	**Core:** Major Electronics Practical – IV	3	3	40	60	100	5
			Elective-III Project	2	3	20	80	100	3
		21AKP6	**Allied II**: Analytical and Inorganic Chemistry	4	3	25	75	100	4
		21AKP6P	**Allied II**: Practical II-Volumetric Analysis	2	3	40	60	100	1
	IV	**21SEP61**	**SBE:** Introduction to Microcontrollers 8051	2	3	25	75	100	2
		214VE6	Value education	2	3	25	75	100	2
	V	**215NS4/ 215PE4**	Extension Activities NSS/Phy. Education	-	3	25	75	100	1
			Total	180					140

Electives

Semester V (Elective I- Choose any one)

1. Electronics **-21PE5A**
2. Numerical methods **-21PE5B**

Semester VI (Elective II- Choose any one)

1. Theoretical Physics **-21PE6A**
2. Applications of Electronic Devices and Instrumentation **-21PE6B**

Elective-III Project **-21PEPR6**

Allied – Physics for Maths & Chemistry students
CBCS

Class	**Sem**	**Sub Code**	**Title of the paper**	**Teaching hrs(Per week)**	**Duration Of exam (hrs)**	**Marks allotted**			
						C. A	**S.E**	**Total**	**Credits**
I Maths/ II Chemistry	I/III	**21AP1**	Mechanics, Properties of Matter and sound	4	3	25	75	100	4
			Allied : Physics Practical-I	2	-	-	-	-	-
I Maths/II Chemistry	II/IV	**21AP2**	Thermal Physics	4	3	25	75	100	4
		21AP2P	**Allied :** Physics Practical-I	2	3	40	60	100	1
IIMaths/ III Chemistry	III/V	**21AP3**	Electricity and Electronics	4	3	25	75	100	4
			Allied : Physics Practical-II	2	-	-	-	-	-
II Maths/III Chemistry	IV/VI	**21AP4**	Optics	4	3	25	75	100	4
		21AP4P	**Allied :** Physics Practical-II	2	3	40	60	100	1

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(w.e.f. 2021-2022 onwards)

Title of the Paper : Mechanics, Properties of matter and Sound
Semester : I **Contact Hours: 4**
Subject Code :21P11 **Credits : 4**

Objectives:

To Gain deeper understanding of mechanics and its fundamental ideas on conservation laws, rotational motion of rigid bodies, Gravitational fields and to learn the basics of Elasticity and sound.

Unit : I Mechanics: Significance of Conservation laws-Concepts of work, power and energy-Conservative forces-Energy- Conservation of linear momentum-Collision—Calculation of final velocities of colliding particles(one dimension only)-Systems of variable mass-The Rocket.

Unit: II Dynamics of Rigid Bodies : Rigid body –Torque-Angular momentum-Moment of inertia(Radius of Gyration)–General theorems on moment of inertia-Particular cases of moment of inertia(circular disc, circular ring, solid cylinder, solid sphere, hollow sphere).

Unit:III Gravitation: Newton's law of gravitation-Experimental determination of gravitational constant (G) using Boy's method- Kepler's laws -Compound pendulum(to find value of g and T using bar pendulum)

Viscosity-Viscosity- Newton's law of viscous flow-Coefficient of viscosity- Equation of continuity of flow- Bernoulli's theorem - Applications of Bernoulli's theorem (Venturimeter, Pitot tube).

Unit :IV Elasticity: Introduction– Load, Stress and strain – Hooke's law -Different types of Elasticity – Poisson's ratio-Relations connecting the elastic constants –Determination of Young's modulus for a material(for a thick Bar) -Bending moment – Determination of Elastic constant (Searle's method).

Unit :V Sound : Simple harmonic motion – Linearity and superposition principle –Wave motion -Characteristics of wave motion-Transverse wave motion- Longitudinal wave motion-Definitions-Relation between frequency and wavelength-Properties of longitudinal progressive wave-Stationary waves-Properties of stationary longitudinal waves- Melde's experiment –Acoustics-Reverberation-Factors affecting the Acoustics of buildings-Requisite for Good Acoustics.

Text books :

1.Mathur.D.S, Revised by Hemne P.S - *Mechanics* , S. Chand & Co.,New Delhi, First Revised Edition, 2012.

Unit: I Chapter 5.1-5.4,6.1,6.9,6.10,6.12

Unit: II Chapter 11.1-11.4,11.7,11.9

Unit: III Chapter 12.2,12.3,12.40,7.7.2,15.2,15.3,15.6,15.8,15.10

Unit: IV Chapter 13.1-13.3,13.7,13.11,13.12,14.5,14.13

2.Subramaniam.N and Brijlal, *A Text Book of Sound*, S. Chand & Co.,New Delhi,Second Revised Edition,1995.

Unit: V Chapter 1.3,1.10,4.1,4.3-4.8,6.1,6.2,7.5,10.14,10.15,10.20,10.22

Reference books:

1.Brijlal and Subramanyam.N, *Waves & Oscillations* , Vikas Publishing House Pvt. Ltd. Noida, Second Edition,1994.

2.Gupta.A.B.*College physics*, *Volume I* ,Books and Allied (P) Ltd, Kolkata, First edition, 2011.

3.Murugesan.R, *Mechanics and Mathematical Methods,* S.Chand and Co, New Delhi, Third edition, 2010

4.Mathur.D.S , *Elements of properties of matter*, S.Chand and Co New Delhi ,First Edition,Reprint,2012.

5.Paul.A.Tipler, *Physics, Volume I,* CBS Publishers and Distributors, New Delhi, First edition 2003.

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DEPARTMENT OF PHYSICS-UG

(w.e.f. 2021-2022 onwards)

Skill based Elective-I

Title of the Paper : Basic Electronics
Semester : I **Contact Hours: 2**
Subject Code : 21SEP11 **Credits : 2**

Objectives :

To understand the fundamental concepts of Various types of Passive components, Transistor configurations and characteristics of Semiconductors.

Unit : I Resistors: Resistors – Resistor types –Wire wound resistors- Carbon composition resistors – Carbon film resistors – Cermet film resistors – Metal film resistors –Power rating – value tolerance – Variable resistors – Potentiometers and rheostats – Resistor colour code –Resistance colour bands.

Unit : II Inductor: Inductor-Comparison of different cores –Inductance of an inductor – Another definition of inductance –Mutual inductance – Coefficient of coupling – Variable inductors – Inductors in series or parallel without M – Series combination with M.

Unit : III Capacitors: Capacitors – Capacitor connected to a battery – Capacitance – Factors controlling capacitance – Types of capacitors – Fixed capacitors – Variable capacitors.

Unit :IV Transistor: Bipolar Junction Transistor- Transistor Biasing–Important biasing Rule-Transistor Circuit Configuration-CB, CE, CC Configurations and Characteristics-Relation between Transistor Currents-Leakage Currents in a Transistor-Thermal Runway.

Unit :V Semiconductor and Types of Semiconductors: Semiconductor – Bonds in semiconductor – Crystals – Commonly used semiconductor – Energy band description of semiconductors – Effect of temperature on semiconductors -Intrinsic semiconductor – extrinsic semiconductor – N type – P type semiconductors.

Text Books :

1. Theraja B.L, *Basic electronics* , S.Chand and Company Limited, New Delhi, Second Edition, 2012.

Unit: I Chapter 5.2 – 5.12,5.14,5.15

Unit: II Chapter 5.19 - 5.27

Unit: III Chapter 5.35 – 5.41

Unit: IV Chapter 18.1-18.3,18.6-18.8,18.10,18.11-18.13

2. Metha V.K, Rohit metha, *Principles of electronics*, S.Chand and Company Limited, New Delhi, Eleventh Revised Edition, Reprint 2012.

Unit: V Chapter 5.1 – 5.6,5.8-5.11.

Reference Books:

1**.** Ghosh. B*, Fundamental Principles of Electronics*, Books and Allied (P) Ltd, Kolkata, Second Edition,2011.

2. Halkias.C, Millman .J, *Integrated Electronics*, Tata McGraw Hill Education Private Limited, New Delhi,2012.

3. Robert L, Boylest, Louis Nashelsky ,*Electronics Devices and Circuit Theory*, Prentice Hall of India Private Limited, New Delhi, Eighth Edtion, 2002.

4. Salivahanan.S and Suresh Kumar N, *Electronic Devices and Circuits*, Tata McGraw Hill Education Private Limited, New Delhi, Second Edition ,2012.

5. Sedha.R.S, *Applied Electronics*, S.Chand and Company LTD, New Delhi, Sixth Edition, 2006.

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DEPARTMENT OF PHYSICS-UG

(w.e.f. 2021-2022 onwards)

Skill based Elective- II

Title of the Paper : Digital Electronics
Semester : I **Contact Hours: 2**
Subject Code : 21SEP12 **Credits : 2**

Objectives:

To acquire knowledge on number system, arithmetic building blocks, logic gates, karnaugh map , and the concept of multiplexer and decoder.

Unit :I Binary number system: Number System – Conversion of decimal number into binary number – Binary to decimal conversion – Binary addition – Binary subtraction –1's and 2's complement method – Binary multiplication and division – Hexadecimal numbers.

Unit :II Logic gates: Basic logic gates AND gate –OR gate –NOT gate– Characteristics of logic gates –NOR gate- NAND gate –Exclusive OR gate- Logic gate families- TTL NAND gate- TTL NOR gate.

Unit :III Demorgan's laws and applications: Boolean equation of logic circuits – Standard forms for expressing logic functions – Sum of products form-Products-of -sums form-Boolean algebra – Demorgan's laws The NAND gate and NOR gate as universal building block, different expressions for X-OR gate.

Unit :IV Karnaugh Map: Two variable map-Three variable map- Four variable map-Minterm- Maxterm-Truth table from the karnaugh map-Don't care conditions- Product of-sums simplification.

Unit :V Binary adder: Half adder – full adder- Half subtractor-Full subtractor-Multiplexer-Demultiplexer-Encoder –Decimal to BCD encoder –Decoders - BCD- to-decimal decoder-BCD to seven segment decoder.

Text Book:

1.Jose Robin.G , Ubald Raj.A, *Analog Electronics and Digital Electronics,* Indira Publications, Marthandam, First Edition, 2008.

Unit: I **Chapter6**

Page.no [286-305,309-310]

Unit: II **Chapter 7a**

Page.no [327-349]

Unit: III **Chapter 7b**

Page.no [352-353,357-376]

Unit: IV **Chapter 7c**

Page.no [389-397,404-408]

Unit:V **Chapter 8**

Page.no [421-425,427-445]

Reference Books:

1. Ghosh.B, *Fundamental Principles of Electronics,* Books and allied (P) Ltd, Kolkata, Second Edition,2011.

2.Hohn.D.Ryder, *Electronic Fundamentals and Applications,* , PHI Learning Private limited, New Delhi , Fifth Edition, 2009.

3.Salivahanan.S, Arivazhagan.S, *Digital circuits and design*, Vikas Publishing House PVT LTD, New Delhi, Third Edition, 2007.

4.Salivahanan.S, Suresh Kumar.N, *Electronic Devices and circuits*, Tata McGraw Hill Education Private Limited, New Delhi , Second Edition , 2011.

5.Raja.P, *Digital electronics*, SCI tech publication (India) PVT LTD, Chennai, Second Edition, 2011.

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(w.e.f. 2021-2022 onwards)

Non Major Elective- I

Title of the Paper : Energy Physics
Semester : I **Contact Hours : 2**
Subject Code : 21NMP1 **Credits : 2**

Objectives:.

To understand the fundamentals of energy sciences, types of energy and practical usage of energy in various forms.

Unit :I Fundamentals of Energy Science: Introduction-Energy, Economy and social development - Classification of Energy Resources-Importance of Non–Conventional energy sources-Advantages and Disadvantages of conventional energy sources-Environmental aspects of energy.

Unit :II Solar Energy: Introduction-solar collectors-solar water heater-solar industrial Heating System-Solar refrigeration and air conditioning system-Solar cookers.

Unit :III Wind Energy: Introduction-Origin of winds-Nature of winds-Wind turbine sitting-Major application of wind power-Environmental aspects- Wind energy programme in India.

Unit :IV Biomass Energy: Introduction- Photosynthesis process -Biomass Resources-Biomass conversion Technologies- Biogas production from waste biomass.

Unit : V Ocean Energy: Introduction-Tidal Energy- Origin and Nature of Tidal Energy – Limitations of Tidal energy-Wave Energy- Power in Waves- Ocean thermal Energy- Ocean thermal Energy Conversion Technology.

Text Book:

1. Khan B.H, *Non-conventional Energy Resources*, Tata McGraw Hill Education Private Limited, New Delhi, Third reprint, 2017.

Unit : I Chapters 1.1,1.2,1.4,1.6,1.9,1.12

Unit : II Chapters 5.1,5.2(5.2.1-5.2.6),5.3,5.5,5.6,5.7

Unit : III Chapters 7.1-7.5, 7.13, 7.14

Unit : IV Chapters 8.18.2,8.4,8.5,8.10(8.10.1-8.10.6)

Unit : V Chapters 10.1,10.2,,10.2.1,10.2.2,10.3,10.3.1,10.4,10.4.2

Reference Books:

1. Kothari D.P, Singal k.c. , Rakeshranjan, *Renewable energy source and emerging technologies,* PHI learning private limited, New Delhi, First Edition, 2011.

2.Rai G.D, *Solar energy utilization*, Khanna Publishers, New Delhi, Fourth Edition,2008.

3. Solanki.C.S , *Renewable energy technologies* , PHI learning private limited, New Delhi, First Edition, 2009.

4.TiwariG.N, *Solar energy fundamentals, design modeling and applications*, Narosa Publishing house, NewDelhi, First Edition Reprint, 2013.

5. Twidell.J, Weir.T, *Renewable Energy Resources*, Taylor and Francis, Abbigndon,Oxon, Second Edition, 2013.

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(w.e.f. 2021-2022 onwards)

Title of the Paper : Heat and Thermodynamics
Semester : II **Contact Hours : 4**
Subject Code : 21P21 **Credits : 4**

Objectives:

To understand the phenomena connected with heat capacities, conduction, convection and radiation, the process of making use of heat energy to do mechanical work.

Unit :I Calorimetry: Definitions – Newton's law of cooling-Specific heat of liquid-Callendar and Barne's Continuous flow method –Two Specific heats of a gas – Specific heat of a gas at constant volume by Joly's Differential Steam Calorimeter-Specific heat of a gas at constant pressure by Regnault's method- Dulong and Petit's law.

Unit :II Transmission of Heat: Introduction – Coefficient of thermal conductivity- Lee's disc method for bad conductors-Spherical shell method (Radial flow of heat)- Cylindrical flow of heat – Thermal conductivity of Rubber - Thermal conductivity of Glass- Wiedemann -Franz law.

Unit :III Radiation: Introduction- Thermal Radiation – Applications of heat radiation - Blackbody-Black body in practice-Stefan-Boltzmann law-Wien's Displacement law-Rayleigh-Jeans law-Planck's Radiation law-Planck's Quantum Postulates-Experimental verification of Stefan's law- Solar constant- temperature of sun.

Unit :IV Kinetic Theory of Gas: Kinetic model (Postulates of kinetic theory of gases)-Degrees of freedom - Maxwell's law of equipartition of energy- Specific heats of Mono –Di and polyatomic gas-Adiabatic Expansion of an Ideal gas-Mean free path-Transport Phenomena-Viscosity: Transport of Momentum.

Unit :V Thermodynamics: First Law of Thermodynamics- Adiabatic process- Isothermal process- Clement and Desormes method Determination of γ -Second Law of thermodynamics- Carnot's Ideal heat engine - change in entropy- Entropy in adiabatic and reversible ,irreversible process–Relation of thermodynamical Potentials with their variables(Maxwell's equations)

Text Book:

1. Brijlal, Dr.Subramanyam, Hemne.P.S, *Heat Thermodynamics and Statistical Physics* ,S.Chand & Company Ltd,New Delhi,Revised edition 2010 (Reprint 2018)

Unit: I Chapters 14.1,14.5,14.7,14.10,14.11,14.12,14.17

Unit: II Chapters 15.1,15.11,15.13,15.14,15.15,15.16,15.19

Unit: III Chapters 8.1,8.4,8.6,8.7,8.12,8.14,8.15,8.17,8.18,8.22,8.26,8.27

Unit: IV Chapters 1.3,1.18,1.19,1.21,1.24,3.2,3.7,3.8

Unit: V Chapters 4.7,4.10.4,4.10.7,4.17,4.23,4.28,5.2,5.3,5.4,5.6,6.7.

Reference Books:

1.Arora C. L. Rajam J. B, *Heat and Thermodynamics for Degree Students*, S. Chand & Company Ltd ,New Delhi, Eighth Edition, 1979.

2.Daniel V. Schroeder, *An Introduction to Thermal Physics*, Pearson Education, New Delhi, First Edition, Reprint , 2012.

3. Gupta A.B, Roy A.B, *Thermal Physics* ,Books & Allied(P) Ltd, Kolkata, First Edition, 2002.

4.Panat.P.V, *Thermodynamics and Statistical Mechanics*, Narosa Publishing House, Kolkata, First Edition Reprint,2011

5.Saxena.A.K, *An Introduction to Thermodynamics and Statistical Mechanics*, Narosa Publishing House, Kolkata, First Edition, 2010.

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(w.e.f. 2021-2022 onwards)

Title of the Paper : Major Physics Practicals-I
Semester : I-II **Contact Hours: 2**
Subject Code : 21P2P **Credits : 3**

Any Twelve:

1. Young's modulus-uniform bending using Pin & Microscope method.
2. Young's modulus-uniform bending using optic lever method
3. Young's modulus-non-uniform bending using Pin & Microscope method
4. Young's modulus-non-uniform bending using optic lever method
5. Rigidity modulus by Torsion pendulum.
6. Compound pendulum-To find g and K
7. Logic gates AND, OR, NOT using IC's
8. Logic gates NAND, NOR using IC's
9. Potentiometer- low range-voltmeter calibration
10. Potentiometer-ammeter calibration
11. Sonometer- To determine the unknown frequency
12. Lee's Disc method-To determine the thermal conductivity of Bad conductor
13. Newton's law of cooling –To determine specific heat capacity of liquid
14. Stoke's method – To find the viscosity of liquid

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(w.e.f. 2021-2022 onwards)

Skill based Elective –III

Title of the Paper : Electronic Instrumentation
Semester : II **Contact Hours: 2**
Subject Code : 21SEP21 **Credits : 2**

Objectives:

To gain basic ideas of the construction and working of electronic devices and circuits.

Unit :I Power supplies- Introduction-Linear mode power supply-Requirements of linear mode power supply-rectifiers-half wave rectifier – full wave rectifier –bridge rectifier – Advantages of the bridge rectifier.

Unit :II Cathode ray oscilloscope-CRO - Vertical and horizontal voltage amplifiers-Power supply circuits– Cathode ray tube – Special Oscilloscopes- Applications of CRO.

Unit :III Ammeter, Voltmeter, Ohmmeter-Ammeter – DC voltmeter – Vacuum Tube Voltmeter –VTVM Using Vacuum Tube Diode –VTVM Using Triodes -Digital voltmeter-Ohmmeter-Series type ohmmeter – shunt type ohmmeter.

Unit : IV Multimeter-Digital multimeter – Measurement of resistance – measurement of inductance – measurement of capacitance – measurement of Q

Unit :V Measuring Instruments- Frequency meter –Time meter-Energy meter –Power meter –Watt meter –Electrodynamometer Watt meter.

Text Book:

1. Salivahanan.S, N.Sureshkumar, A, *Electronic devices &circuits*,Tata MC Graw Hill Publishing Company Limited, New Delhi, Third Edition, 2012.

Unit: I Chapters 18.1,18.2,18.2.1,18.2.2

Unit: II Chapters 23.1-23.2.5

Unit: III Chapters 23.3-23.6,23.7

Unit: IV Chapters 23.8-23.9.4

Unit: V Chapters 23.10-23.14

Reference Books:

1.Albert D. Helfrick, William D.cooper, *Modern Electronics Instrumentation and Measurement techniques*, PHI Learning Private Limited, New Delhi, First Edition, 2011.

2.Basudev Ghosh, *Fundamental Principles of Electronics*, Books and Allied (p) Ltd, Kolkata, Second Edition,2011.

3.Jose Robin .G,Ubald Raj .A , *Basic Electronics and Applied Electronics*, Indira Publication, Marthandam, First Edition, 2004.

4.Kalsi .H.S, *Electronic Instrumentation*, Tata MC Graw Hill Publishing Company Limited, New Delhi, Third Edition, 2003.

5. RanganC.S, SarmaG.R,Mani .VSV, *Instrumentation Devices& systems* , Tata McGraw-Hill Education Private Limited, New Delhi, Second Edition, 2012.

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DEPARTMENT OF PHYSICS-UG

(w.e.f. 2021-2022 onwards)

Skill based Elective –IV

Title of the Paper : Electricity
Semester : II **Contact Hours: 2**
Subject Code : 21SEP22 **Credits : 2**

Objectives:

To provide comprehensive knowledge and understanding of the basics of Electricity.

Unit :I Electrostatics: Electric field and flux – Gauss law-Derivation of Coulomb's law from Gauss law-Differential form(Maxwell equation)-Field due to a uniformly charged sphere –Coloumb's theorem –Mechanical force on the surface of a charged conductors – Potential-Electric potential –Potential due to a point charge-equipotential surface-relation between field and potential-electric potential energy.

Unit :II Current electricity : Current –Current density- Expression for current density – Resistance and resistivity-Kirchhoff's laws –Application to Wheat stone's network –Carey foster's bridge –Determination of resistivity and temperature coefficient of resistance - Potentiometer –measurement of potential and calibration of voltmeter and Ammeter.

Unit :III- Capacitors: Introduction –Concept of capacitance –capacitance of an isolated spherical conductor –parallel plate capacitor with a dielectric- Dielectric strength

Unit :IV Alternating currents : Introduction –Impedance ,Reactance and Admittance-Alternating voltage applied across a resistance –Alternating voltage applied across an inductance- Alternating voltage applied across a capacitance.

Unit :V Thermo electricity: Introduction –Seebeck effect- variation of thermo - emf with temperature –Peltier effect –Explanation of Seebeck and Peltier effect-Peltier coefficient – Thomson effect and its prediction -EMF in a thermocouple.

Text books:

1. Palaniappan.M, *Electricity and electromagnetism*, L.M.N Publication, Madurai, First Edition , 2002.

Unit I : Chapters 1.1-1.8,2.1-2.6

Unit II : Chapter 4.1-4.11

2. Satyaprakash, *Electricity and magnetism*, Pragati Prakashan, meetur, Twenty Sixth Edition 2011.

Unit III : Chapter 7.1-7.4,7.6

Unit IV : Chapter 10.1,10.3,10.4-10.6

Unit V : Chapter 17.1-17.8

Reference books:

1.Basudev Ghosh, *Foundations of Electricity and Magnetism*, Books and Allied (p) Ltd, Kolkata, Third Edition, 2012.

2.Chattopadhay. D, Rakshit.P.C , *Electricity and Magnetism*, New Central Book Agency (P) Ltd, Kolkata, Fifth Edition, 2004.

3.Murugesan .R , *Electricity & Magnetism*, S. Chand & Company Ltd ,New Delhi, Sixth Edition, 2004.

4.Tayal.D. C., *Electricity and Magnetism*, Himalaya Publishing House, Mumbai, Second Edition, 1989.

5.Vasudeva.D.N., *Fundamentals of Magnetism and Electricity* ,S. Chand & Company Ltd , New Delhi,Fifth Edition, 2011.

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DEPARTMENT OF PHYSICS-UG

(w.e.f. 2021-2022 onwards)

Non Major Elective –II

Title of the Paper : Astrophysics
Semester : II **Contact Hours : 2**
Subject Code :21NMP2 **Credits : 2**

Objectives:

To impart an understanding of the great number of diverse phenomena in the Universe through Physics.

Unit: I The earth-The zones of earth- shape of the earth- radius of the earth- rotation of earth-Foucault's pendulum experiment-gyroscope experiment .

Unit: II The moon- Introduction- phases of moon- successive phases of moon- lunar librations- summer and winter full moons- path of the moon with respect to the sun- Surface structure of the moon- The tides.

Unit: III The solar system-Introduction- The sun- Mercury- Venus-Mars- Asteroids-Jupiter- Saturn- Uranus-Neptune.

Unit: IV The stellar universe-Introduction- Stellar motion- Solar motion- Constellation-The milky way-survey of constellations-winter constellations-spring constellations-summer constellations-autumn constellations

Unit: V Stars-Introduction- Distance of stars- Magnitude of stars- Absolute magnitudes-The colour and size of the stars- Star clusters.

Text Book:

1. Kumara velu. S, Susheela kumaravelu , *Astronomy* , Sivakasi Art printers,sivakasi, Second Revised Edition, 2007.

Unit : I Chapter:3

Page.no [87, 94,102,104, 105]

Unit :II Chapter:12

Page.no [229,239,240,243,244,245,252,255]

Unit :III Chapter:17

Page.no [327-336]

Unit :IV Chapter:18

Page.no [341-343,355,357,359]

Unit :V Chapter:18

Page.no [344,345,347,349,353]

Reference books:

1.Abhyankar .K.D, *Astro Physics-Stars and Galaxies*, University Press (India) Ltd, Hyderabad,First edition, 2001.

2.BaidyanathBasu, Tanuka Chattopadhyay, Sudhindra Nath Biswas, *An Introduction to Astro Physics*, PHL Learning Private Ltd, New Delhi,Second Edition,2010.

3. Kumara velu. S, Susheela kumaravelu , *Space Research* , Sivakasi Art printers,sivakasi, First Edition, 2002.

4.Singhal.R.P,Elements of Space Physics , PHL Learning Private Ltd, New Delhi, First Edition,2009.

Web Sources:

1. http://www.astronomy.com
2. http://www.astronomy links .com.
3. http://p.webring:com/nub?ring=astroclub

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DEPARTMENT OF PHYSICS-UG

(w.e.f. 2021-2022 onwards)

ANCILLARY PHYSICS(for B.Sc Maths & Chemistry)

Title of the Paper : Mechanics , Properties of matter and Sound
Semester : I/III **Contact Hours: 4**
Subject Code : 21AP1 **Credits : 4**

Objectives :

To understand the fundamental ideas on rotational motion of rigid bodies, gravitational fields and to learn the basics of elasticity and sound.

UNIT : I Force, Work, Power and Energy:The basic Forces in nature-Central forces – Conservative forces-Non conservative forces-Friction-Limiting friction, Co efficient of friction and Angle of friction-Laws of friction-Experiment to determine the coefficient of friction-Work –Work done by a varying force –Energy-Kinetic energy- Potential energy-Power.

UNIT :II Rotational Motion: Angular velocity-Angular acceleration-Normal acceleration - Centripetal force – Centrifugal force- Torque –Angular momentum-Expression for torque in rotational motion-Expression for angular momentum of a rotating rigid body-Kinetic energy of rotation- Expression for work and power in rotational motion - Moment of inertia – Perpendicular axes theorem –Theorem of parallel axes-Moment of Inertia of circular disc, Solid sphere .

UNIT : III Gravitational motion: Kepler's law of planetary motion –Newton's law of gravitation-Mass and Density of the Earth-Determination of G-Boy's method – The compound pendulum-Determination of g with compound pendulum-Variation of g with latitude ,altitude and depth- artificial satellites.

UNIT : IV Elasticity: Different moduli of Elasticity-Poisson's ratio-Bending of beams – expressions for the bending moment-Depression of the loaded end of a cantilever-Determination of Young's modulus by uniform and non uniform bending – Torsion of a

cylinder-Work done in twisting -Torsional oscillations of a body-Rigidity modulus by Torsion pendulum.

UNIT :V Sound: Simple Harmonic Motion - Composition of two S.H.M in a straight line-Beats- Progressive waves and their properties- Stationary waves and their properties-Melde's experiment -Transverse and longitudinal mode of vibration-Acoustics of buildings-Ultrasonics, Production and applications.

Text Book :

1.Murugehsan.R, *Mechanics Properties of Matter and Sound , shantha publication* , Madurai, First edition, 2012.

Unit: I Chapter 1.1-1.14

Unit: II Chapter 2.1-2.18,2.21

Unit: III Chapter 3.1-3.9

Unit: IV Chapter 4.1-4.8,4.10-4.13

Unit: V Chapter 6.1-6.2,6.5-6.9,6.11-6.12

Reference Books :

1.Brijlal and Subramanyam.N, *Waves & Oscillations* , Vikas Publishing House Pvt. Ltd. Noida, Second Edition,1994.

2.Gupta.A.B.*College physics, Volume I* ,Books and Allied (P) Ltd, Kolkata, First edition, 2011.

3.Murugesan.R, *Mechanics and Mathematical Methods*, S.Chand and Co, New Delhi, Third edition, 2010

4.Mathur.D.S , *Elements of properties of matter*, S.Chand and Co New Delhi ,First Edition,Reprint,2012.

5.Paul.A.Tipler, *Physics, Volume I,* CBS Publishers and Distributors, New Delhi, second edition 2003.

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DEPARTMENT OF PHYSICS-UG

(w.e.f. 2021-2022 onwards)

ANCILLARY PHYSICS(for B.Sc Maths & Chemistry)

Title of the Paper : Thermal Physics
Semester : II/IV **Contact Hours: 4**
Subject Code : 21AP2 **Credits : 4**

Objectives:

To understand the phenomena connected with Conduction, thermal radiation, heat transfer, Kinetic theory of gases and thermodynamics.

UNIT: I Thermal expansion: Linear expansion of solids- Linear expansivity of crystals-Determination of α by Air Wedge method- Expansion of anisotropic solids- Solids of low expansivity and their uses-Anomalous expansion of water –Thermostat- Bimetallic thermostat -Isothermal change-Adiabatic change-Equation for the adiabatic change of a perfect gas-The two specific heat capacities of a gas-Difference between the two specific heat capacities–Joly's differential steam calorimeter for finding C_v-Regnault's method to find C_p.

UNIT :II Conduction, Convection: Introduction-Lee's disc method of determining the thermal conductivity of bad conductor-Analogy between heat flow and electric current-Wiedemann -Franz law-Thermal conductivity of air-Lee's disc method-Convection –Convection in the atmosphere- Lapse rate-Stability of the atmosphere- Green house effect-Atmospheric pollution.

UNIT :III Radiation: Introduction-Stefan's law –Determination of Stefan's constant by filament heating method –Solar constant –Determination of solar constant by water flow Pyrheliometer-Temperature of the sun - Temperature of the sun using Wien's Displacement law-Solar spectrum-Energy distribution in black body spectrum- Statement of Planck's law of radiation-Wien's law -Rayleigh Jean's law.

UNIT: IV Kinetic theory of gases: Postulates of the kinetic theory of gases- Expression for the pressure of a gas-Mean free path-Transport phenomena-Expression for the coefficient of

Diffusion and viscosity-Expression for the coefficient of thermal conductivity-Maxwell's law of distribution of molecular speeds-Degrees of freedom-Boltzmann's law of equipartition of energy-Atomicity of gases.

UNIT: V Thermodynamics: Heat engine-Expression for the efficiency of a Carnot's engine- Carnot's theorem -Second law of thermodynamics-Entropy-Changes of entropy in Carnot's cycle-Change of entropy in conversion of ice into steam -Joule Kelvin effect-Porous Plug experiment–Theory of Porous Plug experiment- Adiabatic demagnetization-Superconductivity.

Text Book:

1.Murugeshan.R, *Thermal Physics, shantha publication* , Madurai, First edition, 2012.

Unit : I Chapter 1.1 -1.8, 2.1-2.7

Unit :II Chapter 3.1-3.5,4.2-4.6

Unit :III Chapter 5.1-5.12

Unit :IV Chapter 6.1-6.11

Unit :V Chapter 7.1-7.7,8.1-8.5

Reference Books:

1.Arora C. L. Rajam J. B, *Heat and Thermodynamics for Degree Students*, S. Chand & Company Ltd ,New Delhi, Eigth Edition, 1979.

2.Daniel V. Schroeder, *An Introduction to Thermal Physics*, Pearson Education, New Delhi, First Edition Reprint , 2012.

3. Gupta A.B, Roy A.B, *Thermal Physics* ,Books & Allied(P) Ltd, Kolkata, First Edition, 2002.

4.Panat.P.V, *Thermodynamics and Statistical Mechanics*, Narosa Publishing House, Kolkata, First Edition Reprint,2011

5.Saxena.A.K, *An Introduction to Thermodynamics and Statistical Mechanics,* Narosa Publishing House, Kolkata, First Edition, 2010.

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DEPARTMENT OF PHYSICS-UG

(w.e.f. 2021-2022 onwards)

ANCILLARY PHYSICS(for B.Sc Maths & Chemistry)

Title of the Paper : Allied Physics practical-I
Semester : I-II/III-IV **Contact Hours: 2**
Subject Code : 21AP2P **Credits : 1**

Any Twelve:

1. Young's modulus-uniform bending using Pin & Microscope method.
2. Young's modulus-uniform bending using optic lever method
3. Young's modulus-non-uniform bending using Pin & Microscope method.
4. Young's modulus-non-uniform bending using optic lever method
5. Rigidity modulus by Torsion pendulum.
6. Rigidity modulus by Searle's method.
7. Compound pendulum-To find g and K
8. Potentiometer- low range-voltmeter calibration
9. Potentiometer-ammeter calibration
10. Sonometer-To determine A.C frequency
11. Sonometer- To determine the unknown frequency
12. Sonometer- Verification of Laws
13. Melde's string –To determine frequency of the vibrator
14. Lee's Disc method-To determine the thermal conductivity of Bad conductor

Annexure -12a

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(w.e.f. 2021-2022 onwards)

ADD ON COURSE

Fundamentals of photography

1. This Course is taken up by first year physics students
2. Period of study : I Semester

COURSE STRUCTURE

Contact hours: 30 hrs
Credit : 1

S.No	Sem	Subject code	Title of the paper
1.	I	21PAOC	**Theory :**Fundamentals of photography
2	I	21PAOCP	**Practical :** Lab in Fundamentals of photography

Annexure -12a

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(w.e.f. 2021-2022 onwards)

ADD ON COURSE

Title of the paper : Fundamentals of Photography **Contact hours: 30 hrs**
Semester : I
Subject Code : 21PAOC

Objectives

1.Understand the basics of camera

2. learning the different types of lens

3.Gain the knowledge about the modern techniques

4. To know more about the adobe photoshop

5. To study the more techniques using photoshop

Unit- I CAMERA

Camera-Basic parts of Camera- Important controls of Camera-Types of Camera- Video Camera- Digital Camera.

Unit-II THE LENS & FOCUSING

Focal length –wide angle lens-Telephoto lens- Close up lens-m Zoom lens- f- number-Lighting-contrast-exposure-illumination and use of Flash light.

Unit-III MODERN TECHNIQUES

Using digital camera- Charge coupled device- transfer to computer –-Handling a Video Camera – Composition – Initial Preparation – Lighting – Panning – Starting & ending.

Unit-IV Adobe photoshop I

Navigation and zoom-Pixels and Image resolution-cropping-Rotating-Image adjustments

Unit-V Adobe photoshop II

Image Adjustments (Black and white balance)- Colour correction-Dodhge and burn-Selection tools-Clone stamp tool-filters

Text Books:

1.Practical Photography by Thiagarajan 4th Edition ENNES publications. [unit I,II and III]

2.Begining Photoshop by Professor Brad Shirakawa , San Jose State University [unit IV and V]

Reference books:

1. DSLR for Beginners, 2015, Well Being Publishing House, Kindle Edition
2. Al Judge, 2014,Understanding DSLR Lenses, Subtle Vision Media, Kindle Edition
3. Al Judge, 2013,The Art of Photography, Subtle Vision Media, Kindle Edition
4. Al Judge, 2014,Mastering Digital Cameras, Subtle Vision Media, Second Edition
5. Scott Kelby, 2013,The Digital Photography, Second Edition, Peach pit Press, USA
6. Adobe Photoshop cc Classroom in a book (2018 release) Kindle Edition. 22 December 2017.

PRACTICAL

Title of the Paper : Lab in Fundamentals of photography
Subject Code : 21PAOCP

List of Experiments

1. Adjust the image for levels and color. Change modes from RGB to grayscale and create duotones.
2. Dodge and burn specific areas of a photo.
3. Use selection tools to further adjust and enhance the image.
4. Use the clone tool to repair and manipulate the image.
5. Use filters to change the image in artistic and unreal ways.

Annexure -12b

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(w.e.f. 2021-2022 onwards)

VALUE ADDED COURSE

Mobile communication

1. This Course is taken up by third year Physics students
2. Period of study : V Semester

COURSE STRUCTURE

Contact hours: 30 hrs
Credit: 1

S.No	Sem	Subject code	Title of the paper
1.	**V**	**21PVAC**	**Theory :**Mobile communication
2	**V**	**21PVACP**	**Practical:** Lab in Mobile communication

Annexure -12b

E.M.G. YADAVA WOMEN'S COLLEGE, MADURAI -14.

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DEPARTMENT OF PHYSICS-UG

(w.e.f. 2021-2022 onwards)

VALUE ADDED COURSE

Title of the paper : Mobile communication **Contact hours : 30 hrs**
Semester : V
Subject Code : 21PVAC

Objectives:

1. Understand the fundamentals of Mobile Communication
2. Gain the knowledge about Global system for Mobile Communication

Unit I - Mobile Communication

Need for Mobile Communication – Requirements of mobile communication – History of Mobile Communication – Properties of Wireless Medium – Radio Propagation – Propagation Coverage Calculations.

Unit II - Introduction to Cellular Mobile Communication

Cellular structure – Frequency Reuse – Traffic and Switching Techniques – Cellular Mobile Communication Switching.

Unit III – Cellular Mobile Communication System Architecture

System Architecture – Authentication Centre – Home Location Register – Visiting Location Register – Equipment Identify Register – Base Station System.

Unit IV – Mobile Communication Standards

Generation of Wireless Networks – First Generation Wireless Standards – Second Generation Wireless System – Third Generation and Beyond Wireless Systems – Standards Organization – Implementation Organization – Regional Organization – Global Organization.

Unit V – Global System for Mobile Communication

Global System for Mobile Communication (GSM) – GSM Architecture – Advanced Mobile Phone Service(AMPS).

Text Book

T.G. Palanivelu, R. Nakkeeran Wireless and Mobile Communication. PHI learning private limited, New Delhi -June 2011.

Unit I	Chapter 3 – 3.1 – 3.4, 3.4.1, 3.4.2
Unit II	Chapter 4 – 4.1, 4.2, 4.4, 4.4.1
Unit III	Chapter 4 – 4.3, 4.3.1- 4.3.5
Unit IV	Chapter 5 – 5.1, 5.1.1- 5.1.3, 5.2, 5.2.1- 5.2.3
Unit V	Chapter 5 – 5.3, 5.4, 5.5

Reference Books:

1. Jochen H. Schiller, mobile communications, second edition, Pearson education limited, New Delhi-2000
2. Sanjeev Kumar, Wireless and Mobile Communications, New Age International, Private limited,2008
3. Prakash C. Gupta, Data Communications and Computer Networks, PHI learning private limited, New Delhi- 2009
4. David Tse, Pramod Viswanth, Fundamentals of Wireless Communications, Cambridge university press, 2005
5. Afif Osseiran, Patrick March, Mobile and Wireless Communications Technology, June – 2016

PRACTICAL

Title of the paper : Lab in Mobile communication
Subject Code : 21PVACP

List of Experiments

1. Finding mobile model
2. Use of various Tools& Instruments used in mobile phone repairing
3. Assembling & Disassembling
4. Testing of various parts with Multimeter
5. Touch /Display Replacement

6. Mic, Speaker, Ringer trouble shooting Solutions
7. Insert SIM /No signal solution
8. Charging Solution
9. IC Replacement
10. Keypad Problem
11. Touch Screen Problem
12. Network Problem
13. Charging Connecter pin Replacement