SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – PHYSICS - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

SEMESTER –I

S. No.	Sub.code	Nature	Sub.Title	Hrs/ week	Exam Hrs	CA	SE	Tot	Crd
1	17UACT11/ H11/S11	Part – I	Tamil/Hind/Sanskrit	6	3	25	75	100	3
2	17UACE11	Part - II	English	6	3	25	75	100	3
3	17UPSC11	Part-III Core	MECHANICS & PROPERTIES OF MATTER	4	3	25	75	100	4
4		Part-III Core	Core Practicals- I	3	-	-	-	-	0
5	17UPSS11	Part-IV SBS	LASER AND SPECTROSCOPY	3	3	25	75	100	3
6	17UPSA11/ 17UPS A31	Part-III Ancillary	MECHANICS, PROPERTIES OF MATTER AND THERMAL PHYSICS	4	3	25	75	100	4
7		Part-III Ancillary	Ancillary practical-I	2	-	-	-	-	0
8	14 UAC VE1	Part-IV	Value Education	2	3	25	75	100	2
			Total	30					19

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – PHYSICS - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III CORE	**Title : MECHANICS & PROPERTIES OF MATTER**	**Subject Code : 17 UPS C11**
Semester : I	**HOURS : 4 hours / Week**	**CREDITS : 4**

Objectives:

To understand the basic concepts in Mechanics.

To learn the various properties of matter

. To gain knowledge about Earth's gravity.

UNIT I Newton's laws of motion – momentum and impulse – Law of conservation of linear momentum – collision – Elastic and Inelastic collision – Newton's law of impact – coefficient of restitution – impact of moving sphere on a fixed plane – Direct and Oblique impact of moving two smooth spheres – calculation of final velocity of the spheres – loss of kinetic energy.

UNIT II Moment on Inertia – parallel and perpendicular axes theorems – moment of inertia of circular disc, solid cylinder about an axis passing through its centre and perpendicular to its own axis – moment of inertia of a solid sphere about all axes – Angular momentum and torque – Relation between angular momentum and torque – kinetic energy of rotation – kinetic energy of a body having both translatory and rotatory motion – Expression for the acceleration of a body rolling down an inclined plane.

UNIT III Elastic moduli — relation between them – Poisson's ratio- Bending of beams – Expression for bending moment – Determination of Young's modulus by uniform and non uniform bending – cantilever – Theory and Experiment – Torsion – Expression for torque per unit twist – Torsional oscillations of a body – Rigidity modulus of the wire by torsion pendulum(dynamic torsion).

UNIT IV Viscosity – coefficient of viscosity – Streamline flow and turbulent flow – Derivation of Poiseuille's formula – Comparison of viscosities – Ostwald's Viscometer – Motion of a body in a viscous medium – Stoke's formula – Expression for terminal velocity - Stoke's method for the coefficient of viscosity of liquid.

UNIT V Newton's law of gravitation – Kepler's laws of motion – mass and density of the earth – Determination of Gravitational constant G by Boy's method – variation of g with altitude, depth and latitude – Compound Pendulum – Theory and experiment to find the value of 'g' at a given place.
To gain knowledge about Earth's gravity.

BOOKS FOR STUDY

Mechanics: Unit 1&Unit 2

Properties of Matter-Unit 3,Unit 4& Unit 5

Unit: 1. Chapter. 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.10.
Unit: 2. Chapter. 5.1, 5.2, 5.3, 5.4, 5.5, 5.8, 5.10, 5.11, 5.12, 5.15.
Unit: 3. Chapter.1.1, 1.5, 1.6, 1.7, 1.8, 1.9, 1.10, 1.12, 1.13, 1.14.
Unit: 4. Chapter. 3 Full except Viscosity of Gases.
Unit: 5. Chapter .5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8..

REFERENCE BOOKS:

1. Mechanics By D.S.Mathur, S.Chand & Sons, New Delhi
2.Properties of Matter By Brijlal and Subramanian, S.Chand &Sons. New Delhi.

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – PHYSICS - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - IV SKILL BASED	**Title : LASER AND SPECTROSCOPY**	**Subject Code : 17 UPS S11**
Semester : I	**HOURS : 3 hours / Week**	**CREDITS : 3**

Objectives:

To understand the basic information in laser
To learn the properties and various application in laser
. To perceive the basic concept of spectroscopy
To gain the theory concept of photo electricity and related applications

UNIT Introduction – characteristics of laser – Difference between light and laser – Principle of laser action – population inversion – pumping methods – Optical resonator.

UNIT II Types of Laser – Ruby laser – construction and its application – He – Ne laser – construction and its application – Theory of LED – LED materials – Laser diode – Homo junction semiconductor laser (Ga As laser)

UNIT III Application of lasers – Holography – Theory and its application –Difference between holography and photography.

UNIT IV Introduction – Electromagnetic spectrum – IR radiations – properties, production, detection and uses – UV radiations – properties, production, detection and uses – Raman effect – Theory and experimental study – Applications.

UNIT V Photo electricity – Laws of photo electricity – Einstein's photo electric equation – photo electric cells – Types – application of photo electric cells

BOOKS FOR STUDY:

Engineering Physics – I by G.Senthilkumar VRB publishers (p) ltd; Unit I to III

Unit: 1. Chapter. 2.1, 2.2, 2.3, 2.6, 2.7, 2.8, 2.9
Unit: 2. Chapter. 2.11, 2.13, 2.16
Unit: 3. Chapter. 2.19, 2.20, 2.21
Unit: 4. Chapter. 5.1, 5.2, 5.3, 5.5
Unit: 5. Chapter. 4.9,4.10,4.11,4.12,4.13,4.14

2. Optics and Spectroscopy by R.Murugeshan, S.Chand & Sons,New Delhi ,Unit IV
3. Modern Physics R.Murugeshan, S.Chand & Sons, New Delhi, Unit V

REFERENCE BOOKS:

1. Optics and Spectroscopy By Brijlal and Subramanian, S.Chand &Sons.New Delhi
2. Engineering Physics –I by Dr. P. Mani Dhanam Publications, Chennai.

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – PHYSICS - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III ALLIED	**Title : Mechanics, properties of matter and thermal physics ANCILLARY FOR: Maths I yr Chem II yr**	**Subject Code : 17 UPS A11/ 17 UPS A31**
Semester : I& III	**HOURS : 4 hours / Week**	**CREDITS : 4**

Objectives:

To understand the basic concepts in Mechanics.

To learn the various properties of matter

. To gain knowledge about Earth's gravity.

To Understand the concept of heat

Unit I – Mechanics: Uniform circular motion – Normal acceleration and centripetal force (no derivation) – Torque – Work and power in rotational motion – Torque and angular acceleration – Angular momentum and angular impulse – Kinetic energy of rotation – Motion along the inclined plane.

Unit II – Properties of matter: Elastic moduli – Bending of beams – Expression for bending of beams – Young's modulus by uniform bending and non uniform bending (theory and experiment) – I Section griders – Torsion – Expression for couple per unit twist – Work done in twisting – Torsion pendulum (theory and experiment) – Compound pendulum – Expression for period – Experiment to determine "g".

Unit III – Thermal Physics: Expansion of solids – Expansion of crystals – Determination of linear expansion of solids by air wedge method – Solids of low expansivity and their uses – thermostat – hotwire ammeter – Isothermal and adiabatic changes – Derivation of equation for both C_p and C_v of a gas – Experimental determination of C_v by Joly's method – Determination of Cp by Regnault's method.

Unit IV – Heat Transfer: Conduction – Lee's disc method for conductivity of bad conductor – Analogy between heat flow and current flow – Convection in atmosphere – Stability of the atmosphere – Lapse rate – Radiation – Determination of Stefan's constant – Filament heating method.

Unit V – Thermodynamics: Isothermal process – Adiabatic process – Equation to an adiabatic change – Work done during an isothermal change, adiabatic change – Laws of thermodynamics – Zeroth law – First law – Second law – Carnot's theorem – Entropy – Change of Entropy in Carnot's cycle – Change of entropy when ice is converted into steam.

Books for study:

1. Ancillary Physics – Thermal Physics by N. Venkatachalam, Year of Publication Sep 2000.
2. Mechanics Properties of matter by R. Murugesan, First edition 1994.

Reference books:

1. Heat and Thermodynamics by Brijlal & N. Subramanian
2. Mechanics by D.S. Mathur

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – PHYSICS - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

SEMESTER –II

S. No.	Sub.code	Nature	Sub.Title	Hrs/ week	Exam Hours	C A	SE	Tot	Crd
1	17UACT21/ H21/S21	Part – I	Tamil/Hindi/ Sanskrit	6	3	25	75	100	3
2	17UACE21	Part - II	English	6	3	25	75	100	3
3	17UPSC21	Part-III Core	THERMAL PHYSICS	4	3	25	75	100	4
4	17 UPS CP1	Part-III Core	Core Practicals- I	3	3	40	60	100	3
5	17UPSS21	Part-IV SBS	ENERGY SCIENCE	3	3	25	75	100	3
6	17UPS A21/ 17UPS A41	Part-III Ancillary	OPTICS, ELECTRICITY & ELECTRONICS	4	3	25	75	100	4
7	17 UPS AP1	Part-III Ancillary	Ancillary Practical-I	2	3	40	60	100	2
8	14UACES1	Part-IV	Environmental Studies	2	3	25	75	100	2
			Total	30					24

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – PHYSICS - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III CORE	Title : THERMAL PHYSICS	Subject Code : 17 UPS C21
Semester : II	HOURS : 4 hours / Week	CREDITS : 4

Objectives:

To understand the basic concepts in Heat.

To learn the various properties of Heat

. To gain knowledge about Flow of heat

To Understand the concept of Low Temperature

Unit – I Thermometry - Expansion of crystals – Coefficient of expansion of a crystal (Fizeau's method) – Expansion of liquids - Coefficient of expansion of a liquid (Dulong and Petit's method) – Anomalous expansion of water – Isothermal and adiabatic changes – Equations for C_p and C_v of a gas – Relation between them – Experimental determination of C_p by Regnault's method – Determination of C_v by Joly's method.

Unit – II Kinetic theory of gases – Mean free path – Transport phenomena: Thermal conductivity, viscosity and diffusion – Maxwell's law of distribution of molecular speed – Experimental verification – Degrees of freedom – Law of Equipartition of energy – Calculation of C_p, Cv and γ for monoatomic, diatomic and triatomic gases.

Unit – III Thermal conductivity – Lee's disc method for conductivity of bad conductor – air and cardboard / Ebonite – Analogy between heat flow and electric current – Wiedemann – Franz law – Convection in atmosphere – Lapse rate – Stability of atmosphere – Green house effect – Atmospheric pollution.

Unit – IV Radiation – Stefan's law of radiation – Derivation; Newton's law from Stefan's law – Solar constant measurement (Water flow Pyroheliometer and Angstrom's Pyroheliometer) – Temperature of the Sun – Solar spectrum – Energy distribution in black body spectrum – Planck's law of radiation – Derivation of Wien's and Rayleigh Jeans law from Planck's law.

Unit – V Thermodynamics – Zeroth law – I, II and III law of thermodynamics – Entropy – Change of entropy in reversible and irreversible process – Joule Kelvin effect – Porous plug experiment – Theory – Van der waals gas equation - Liquefaction of Oxygen and Helium – Properties of Helium 1 and Helium 2.

Text Book:

Heat and Thermodynamics by Brijlal & Subramaniyam – S. Chand & Co, 1998 edition.

Unit: 1. Chapter. 1.2, 2.13, 2.14, 2.16, 2.20, 2.24, 6.11, 6.12, 3.10, 3.11, 3.12
Unit: 2. Chapter. 5.10, 5.25, 5.26, 5.27, 5.28, 5.23, 5.24, 5.21
Unit: 3. Chapter. 8.2, 8.8, 8.17, 8.24
Unit: 4. Chapter. 8.30, 8.35, 8.37, 8.45, 8.46, 8.44, 8.48, 8.42
Unit: 5. Chapter. 6.1, 6.2, 6.8, 6.25, 6.47, 6.44, 6.45, 6.46, 6.58, 5.44, 5.36, 7.2, 7.4, 7.7, 7.8

Reference Book.

1. Heat and Thermodynamics by D.S. Mathur – S. Chand & Co.
2. Heat and Thermodynamics by R. Murugesan – S. Chand & Co.

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – PHYSICS - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - IV SKILL BASED	**Title : ENERGY SCIENCE**	**Subject Code : 17 UPS S21**
Semester : II	**HOURS : 3 hours / Week**	**CREDITS : 3**

Objectives:

1. To introduce aspects of energy
2. To give basic idea regarding the solar cells
3. To impart knowledge on Conventional and non-conventional sources.
4. To give knowledge on solar thermal systems.

Unit:1 Fundamentals of Energy Science and Technology and Energy Storage

Introduction—Classification of energy resources—Importance of Non-conventional energy sources—Energy Chain—Common forms of energy—Advantages and disadvantages of Conventional and non-conventional energy sources. Necessity of energy storage—Energy Storage methods—Pumped storage—Batteries Storage—Hydrogen Storage—Biological Storage.

Unit:2 Solar Energy--basics

Introduction—The Sun—The Earth—Solar time—Basic Sun Earth angles—Measurement of solar radiation date—Solar cell fundamentals—Charactestics—Solar PV applications.

Unit:3 Solar ThermalSystems

Introduction--Solar collectors—Flat Plate collectors—Solar Water Heaters—Solar cookers(box type and dish type)—Solar furnaces

Unit:4 Wind Energy

Introduction--Origin of winds—Applications of wind power—Environmental aspects—Wind energy programme in India.

Unit:5 Bio-mass Energy

Introduction—Photosynthesis process—Bio-fuels—Bio-mass resources—Biomass gasification—Biomass energy programme in India.

TEXTBOOK:

Non-conventional Energy Resources by B.H.KHAN, Tata McGraw-Hill Publishing Company Limited, New Delhi. Second edition.

UNIT CHAPTERS

I Ch.1: Sections (1.1,1.3,1.5,1.6,1.7,1.8 1.9), Ch.3: Sections (3.1, 3.2, 3.2.1a, 3.2.2 a,b, 3.2.6)
II Ch:4: Sections(4.1,4.2,4.3,4.7,4.8 4.10), Ch:6 Sections (6.1,6.2.1,6.2.2, 6.4.2,6.4.3, 6.4.4)
III Ch:5: Sections(5.1,5.2,5.6,5.7)
IV Ch:7: Sections(7.1, 7.4,7.12, 7.13)
V Ch:8: Sections (8.1, 8.2, 8.3, 8.6, 8.11)

REFERENCE BOOK:

1. Solar Energy Utilisation by G.D.Rai – Vth edition.
2. Solar energy by S.P.Sukhatme Tata McGraw-Hill Publishing Company 1997.

Passed in the BOS Meeting held on 15-3-2017 Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – PHYSICS - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III **ALLIED**	**Title : Optics, Electricity & Electronics** **ANCILLARY FOR: Maths I yr** **Chem II yr**	**Subject Code : 17 UPS A21/** **17 UPS A41**
Semester : II& IV	**HOURS : 4 hours / Week**	**CREDITS : 4**

Objectives:

1. To introduce aspects of Light and Electricity
2. To give basic idea regarding the semiconductor devices
3. To impart knowledge on properties of light and current.

UNIT I Geometrical optics: Deviation produced by a thin lens – focal length of two lenses in and out of contact - chromatic aberration in lenses and its removal - spherical aberration in lenses and its removal - refraction through a thin prism - dispersion - dispersive power -combination of thin prisms to produce deviation without dispersion and dispersion without deviation.

UNIT II Physical optics: Interference in thin films - Air wedge - Newton's rings (reflected beam only)– Theory of plane transmission grating – (normal incidence only) – experiment to determine wavelength – double refraction – Nicol prism – optical activity (no theory).

UNIT III Electrostatics: Electric field – flux – Gauss's law – application of Gauss's law – field due to a charged sphere – electric potential – equipotential surface – relation between electric field and electric potential – electric potential energy – capacitors – principle of a capacitor – capacitance of a spherical capacitor – energy stored in a capacitor.

UNIT IV Current Electricity and Magnetic effect: Kirchoff's laws--Carey Foster bridge – measurement of resistance and temperature coefficient of resistance – potentiometer – principle of a potentiometer – calibration of low range voltmeter – calibration of ammeter - torque on a current loop – mirror galvanometer – dead beat and ballistic – experiment to determine current sensitiveness.

UNIT V Electronics: Junction diodes – forward and reverse bias – diode characteristics – types of diodes – (LED and Zener diodes) – bridge rectifier using junction diodes – transistor characteristics (CE mode only) – binary number systems – reason for using binary numbers – binary to decimal , decimal to binary – Boolean algebra, De Morgan's theorem – basic logic gates (AND, OR, NOT) – NAND and NOR as Universal gates.

BOOKS FOR STUDY:

Optics and spectroscopy – R.Murugesan

Electricity and Electronics – R.Murugesan

REFERENCE BOOKS:

Optics and spectroscopy – Brijlal and Subramaniam

Electricity and Electromagnetism – Brijlal and Subramaniam

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – PHYSICS - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III CORE	**Title : CORE PRACTICALS- I**	**Subject Code : 17 UPS CP1**
Semester : II	**HOURS : 3 hours / Week**	**CREDITS : 3**

LIST OF EXPERIMENTS

Any Fourteen experiments:

1. Young's Modulus of Elasticity by Uniform Bending (Pin & Microscope)
2. Young's Modulus of Elasticity by Non-Uniform Bending (Optic Lever)
3. Young's Modulus of Elasticity by Cantilever (Pin & Microscope)
4. Young's Modulus of Elasticity by Cantilever (Dynamic Method)
5. Rigidity Modulus of Elasticity by Static Torsion (Searl's Method)
6. Rigidity Modulus of Elasticity by using Torsion Pendulum (with loads)
7. Moment of Inertia of circular disc by Torsion Pendulum
8. Determination of viscosity of water by Poiseuilles method
9. Specific heat capacity of solid by method of mixtures.
10. Thermal conductivity of a bad conductor by Lee's disc method.
11. q,n, σ by Searl's method.
12. Specific heat capacity of liquid by Joule heating method.
13. Calibration of Low Range voltmeter using potentiometer
14. Calibration of Ammeter using potentiometer.
15. Determination of acceleration due to gravity by using compound pendulum.
16. Surface Tension by Drop Weight method.
17. Refractive index of a Prism
18. Wavelength of the Spectral lines by using Grating.

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – PHYSICS - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III **ALLIED**	**Title : Ancillary Practical - I** **ANCILLARY FOR: Maths I yr** **Chem II yr**	**Subject Code : 17 UPS AP1**
Semester : II& IV	**HOURS : 2 hours / Week**	**CREDITS : 2**

LIST OF EXPERIMENTS

Any Fourteen Experiments

1. Non – Uniform Bending – Optic lever.
2. Uniform Bending – Pin & Microscope.
3. Determination of 'g' – Compound Pendulum.
4. Thermal Conductivity – Lee's disc
5. Calibration of Low - Range Voltmeter by Potentiometer.
6. Comparison of Capacities by Spot Galvanometer.
7. Resistance and Resistivity – Carey – Foster's bridge.
8. Refractive index of a prism – Spectrometer.
9. Grating N and λ – Spectrometer.
10. LCR – Series Resonance.
11. Newton's Ring's - Radius of curvature of a lens.
12. Bridge Rectifier.
13. Logic Gates OR, AND, NOT – Discrete components.
14. Zener diode – Characteristics.
15. Logic gates OR, AND, NOT using IC
16. Air Wedge – Thickness of a wire.

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – PHYSICS - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

III SEMESTER

S. No	Sub. Code	Nature	Subject Title	Hrs / Week	Exam Hrs	CA	SE	Tot	Crd
1	17UACT31/ H31/S31	Part – I	Tamil/Hindi/Sanskrit	6	3	25	75	100	3
2	17UACE31	Part - II	English	6	3	25	75	100	3
3	17 UPS C31	Part-III Core	Electricity and Electromagnetism	5	3	25	75	100	5
4	17 UPS S31	Part-IV SBS	Mathematical methods	3	3	25	75	100	3
5	17 UPS N31	Part-IV NME	Basic Physics -I	2	3	25	75	100	2
6	17 UPS A11/ 17UPS A31	Part-III Ancillary	Mechanics, Properties of Matter & Thermal Physics	4	3	25	75	100	4
7		Part-III Core	Core Practical	2	-	-	-	-	0
8		Part-III Ancillary	Ancillary Practical	2	-	-	-	-	0
			Total	30					20

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – PHYSICS - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III CORE	**Title : ELECTRICITY AND ELECTROMAGNETISM**	**Subject Code : 17 UPS C31**
Semester : III	**HOURS : 5 hours / Week**	**CREDITS : 5**

Objectives: **1.** To understand the fundamentals of electrostatics
2. To learn the importance of capacitors
3. To gain knowledge about transient currents.

Unit – I

Coulomb's Law – Electric field – flux of electric field - Gauss law – its proof – Applications of Gauss's law – Electric field due to charged sphere (a) at a point outside (b) at a point inside (c) at a point on the surface of the sphere. Electric field due to plane sheet of charged conductor – Coulomb's theorem – Mechanical force on the surface of charged conductor —Electric potential - relation between electric field and potential – Potential due to charged spherical conductor at a point (a) outside (b) on the surface and (c) inside.

Unit – II Capacitance – Principle of capacitor – expressions for the capacitance - Spherical capacitor – Cylindrical Capacitor – Parallel Plate Capacitor with and without partly filled dielectric – Energy of capacitor – Loss of energy, when two charged conductors share the charges – Types of capacitors, fixed capacitor, variable capacitor, electric capacitors and sliding capacitor.

Unit – III Kirchoff's laws in AC circuits – applications of Kirchoff's in AC bridges (Owen's bridge,Anderson,s bridge,Maxwell's bridge- Carey Foster's Bridge – Determination of the resistance of the given wire with the necessary theory – Principle of Potentiometer – Determination of internal resistance of the cell using Potentiometer – calibration of ammeter and voltmeter – low & high range.

Unit – IV Biot – Savart's Law – Its application - long straight wire of infinite length- Ampere's Theorem – magnetic field along the axis of a coil carrying current – solenoid – Ballistic Galvanometer-theory – Damping correction – Comparison between deadbeat and Ballistic galvanometer-determination of the absolute capacity of condenser, using B.G. (theory) and experiment.--Determination of high resistance by leakage.

Unit –V Mean value of alternating emf-RMS value of the alternating current/voltage – Alternating current applied to LR,CR and LCR circuits – Series resonance circuit and parallel resonance circuit - Power in an ac circuit – Wattless current – Power factor – Q factor – Choke coil.

TEXT BOOK

Electricity and electromagnetism -RMURUGESAN First edition –July2007.

Unit -1: 1.1-1.19(page no.1-87)
Unit-2: 2.9-2.9 (page no.38-60)
Unit-3: 3.14-3.17(page no.237-241),3.5-3.10(page no.73-80)
Unit-4: 4.4.5, 4.10, 4.12,4.16,4.19(Page no.86-123)&2.4(Page no.87,88)
Unit-5 :3.1,3.2,3.3,3.5,3.6-3.9(Page no.204-231)

REFERENCE BOOKS:

1. Electricity and Magnetism -Brijlal N Subramanian- First edition 1964
2. Electricity and Magnetism -Dr.K.K.Tiwari S.Chand&Co.2002

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – PHYSICS - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - IV SKILL BASED	**Title : MATHEMATICAL METHODS**	**Subject Code : 17 UPS S31**
Semester : III	**HOURS : 3 hours / Week**	**CREDITS : 3**

Objectives:

To understand the fundamentals of vectors.

To learn the application of mathematical methods.

. To gain knowledge about Mathematical methods.

Unit I: Vector analysis: Scalar and Vector fields – Gradient of scalar field – Line, Surface and Volume integrals – Divergence of a vector function – expression in Cartesian coordinates – Curl of a vector function – expression in Cartesian coordinates – physical significance of curl – important vector identities – simple problems.

Unit II :Vector theorems: Gauss divergence theorem – statement and proof – Stoke's theorem – statement and proof – Green's theorem – statement and proof – Applications – equation of continuity – Euler's equation of motion – Bernoulli's equation

Unit III: Matrices: Eigen values and eigen vectors – Cayley Hamilton theorem – Theorems on eigen values and eigen vectors – diagonalisation of matrices – simple problems

Unit IV: Beta and gamma functions: Definitions of beta and gamma functions – symmetry property of beta function – evaluation of beta function – other forms of beta function – evaluation of gamma function – value of gamma ½ - other forms of gamma function – Relation between beta and gamma function - simple problems

Unit V :Centre of gravity: Introduction – distinction between C.G and C.M – centre of gravity of a right solid cone – hollow right circular cone – solid hemisphere – hollow hemisphere – solid tetrahedron – compound body – simple examples.

Books for study :

1. Mechanics and Mathematical methods by R.Murugeshan – S.Chand & co.Ltd.

Unit I: Chapter 7 (Section 7.1 to 7.9)
Unit II: Chapter 7 (Section 7.10 to 7.13)
Unit III: Chapter 8 (Section 8.1 to 8.4)
Unit IV: Chapter 9 (Section 9.1 to 9.8)
Unit V: Chapter 3 (Section 3.1 to 3.8)

Reference Books:

1.Mathematical Physics by B.S.Rajput, Himalaya Publications.
2. Mathematical Physics by H.D.Das, Sultan Chand & sons Co.,
3. Mathematical Physics by Satya Prakash by Sultan Chand & Sons Co.,

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – PHYSICS - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - IV NME	**Title : BASIC PHYSICS - I**	**Subject Code : 17 UPS N31**
Semester : III	**HOURS : 2 hours / Week**	**CREDITS : 2**

Objectives:

To get basic idea about household wiring system
To get training for handling domestic devices
To understand the involvement of physics in daily life.

Unit I FUNDAMENTALS OF ELECTRICITY

Electric Current -A.C. Voltage- rms voltage-conductor and insulator- resistor-resistors in series and parallel combination- inductor- ohm's law

Unit II HOUSE WIRING

Switches- plug wires –phase neutral and earth wire cables- fuse- lamp holders- distribution of electricity in a house- transformer- inverter-UPS

Unit III WORKING PRINCIPLE OF BULB AND MOTORS

Working principle of CFL- tube light-electric motor- mixer and grinder

Unit IV HOME APPLIANCES

Electric cooker-iron box-water heart-washing machine-refrigerator

Unit V PRINCIPLES OF TROUBLE SHOOTING AND REPAIRING

Use of multimeter and line tester-tube light circuits-iron box connection- switches board wiring – fan-regulator condition.

REFERENCE

1. Haper, How things work vol I and II. The universal encyclopedia of machines, Collin. Pub. India PVT. Ltd (1992).
2. Manahar Lottia, Modern mobile phone service system, BPB Publication, New Delhi (2001)
3. Anwani I.M, Electrical Appliances: Theory and Repair, R.B. Publication, Enlarged and new Edition, Delhi (1981)

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – PHYSICS - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III **ALLIED**	**Title : MECHANICS, PROPERTIES OF MATTER AND THERMAL PHYSICS**	**Subject Code : 17 UPS A11/** **17 UPS A31** **Ancillary**
Semester : III	**HOURS : 4 hours / Week**	**CREDITS : 4**

Objectives:

- **To understand the basic concepts of Physics.**
- **To know the basic ideas regarding heat.**

Unit I - Mechanics:

Uniform circular motion-Normal acceleration and centripetal force (no derivation)-Torque-Work and power in rotational motion- Torque and angular acceleration-Angular momentum and angular impulse-Kinetic energy of rotation-Motion along the inclined plane

Unit II – Properties of matter:

Elastic moduli-Bending of beams-Expressions for bending of beams-Young's modulus by uniform bending and non uniform bending(theory and experiment)-I section girders-Torsion-expression for couple unit-work done in twisting –Torsion pendulum(theory and experiment)-compound pendulum-expression for period- experiment to determine "g".

Unit III –Thermal Physics:

Expansion of solids-expansion of crystals-Determination of linear expansion of solids by air wedge method-solids of low expansivity and their uses- thermostat- hotwire ammeter-Isothermal and adiabatic changes-Derivation of equation for both Cp and Cv of a gas-experimental determination of Cv by Joly's method-determination of Cp by Regnault's method.

Unit IV –Heat Transfer:

Conduction – Lees's disc method for conductivity of bad conductor –analogy between heat flow and current flow –Convection in atmosphere – stability of the atmosphere-Lapse rate- radiation-determination of Stefan's constant-filament heating method.

Unit V- Thermodynamics :

Isothermal process- adiabatic process –equation to an adiabatic change –work done during an isothermal change, adiabatic change- Law's of thermodynamics-zeroth law-First law –Second law-carnot's theorem-Entropy-change of entropy in carnot's cycle-change of entropy when ice is converted into steam.

Books for study:

1) Thermal Physics by N.Venkatachalam, , Year of publication Sep 2000
2) Mechanics& Properties of matter by R .Murugasen, First edition 1994

Reference books:

1)Heat and Thermodynamics by Brijlal & N Subramanian
2) Mechanics by D.S.Mathur

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

IV SEMESTER

S. No	Sub. Code	Nature	Subject Title	Hours / Week	Exam Hrs	C A	S E	Tot	Crd
1	17UACT31/ H31/S31	Part – I	Tamil/Hindi/ Sanskrit	6	3	25	75	100	3
2	17UACE41	Part - II	English	6	3	25	75	100	3
3	17 UPS C41	Part-III Core	Optics	5	3	25	75	100	5
4	17 UPS S41	Part-IV SBS	C-Programming	3	3	25	75	100	3
5	17 UPS N41	Part-IV NME	Basic Physics -II	2	3	25	75	100	2
6	17 UPS A21/ 17UPS A41	Part-III Ancillary	Optics, Electricity & Electronics	4	3	25	75	100	4
7	17 UPS CP2	Part-III Core	Core Practical	2	3	40	60	100	2
8	17 UPS AP2	Part-III Ancillary	Ancillary Practical	2	3	40	60	100	2
9		Part-V	Extension activities					100	1
			Total	30					25

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – PHYSICS - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III CORE	**Title : OPTICS**	**Subject Code : 17 UPS C41**
Semester : IV	**HOURS : 5 hours / Week**	**CREDITS : 5**

Objectives:

1. To introduce the aspects of Light.
2. To understand the basic concepts in Geometrical and Physical Optics.
3. To impart knowledge on properties of light.
4. To give an idea about interference, diffraction and polarization

.

Unit I Lenses - Refraction through lenses – equivalent focal length of the system of two thin lenses in and out of contact – cardinal points of the lens system – Aberrations – Spherical aberration and chromatic aberration in lenses – Method of removal of aberrations – Achromatism in lenses – in and out of contact – Rainbow – Theory of Primary and Secondary rainbows.

Unit II Refraction through a thin prism – Dispersion – Dispersive power – Deviation without dispersion – dispersion without deviation – Direct vision spectroscope – Eye pieces – Ramsden's eyepiece and Huygen's eyepieces- Comparison.

Unit III Interference – Theory of interference fringes – Colors in thin films – Air Wedge – Determination of diameter of a thin wire - Newton's Rings – Determination of refractive(interference by reflection & transmission) index of liquid – Michelson's interferometer – Applications – Determination of wavelength – Resolution of spectral lines.

Unit IV Diffraction – Fresnel and Fraunhofer diffractions – Fresnel's explanation of rectilinear propagation of light – Zone plate – Theory – comparison of zone plate with convex lens – Fresnel's diffraction at a straight edge – Theory of plane transmission grating – determination of wavelength – dispersive power – Rayleigh's criterion for resolving power of grating - comparison of prism and grating spectra.

Unit V Polarization – Polarizer and analyzer – Polaroid's and its applications – Double refraction – Nicol prism – Huygen's explanation of double refraction – Production, detection and analysis of plane ,circularly and elliptically polarized light – QWP and HWP – Optical activity – Specific rotation – Laurent's half shade polarimeter.

Book for Study:

Optics and spectroscopy by R.Murugesan, S.Chand & Co.

Unit: 1. Chapter.1 Sections (1.1 to 1.12, 1.29 to 1.31)
Unit: 2. Chapter.1 Sections (1.21 to 1.24, 1.17 to 1.20)
Unit: 3. Chapter. 2 Sections (2.8 to 2.17)
Unit: 4. Chapter. 3 Sections (3.1 to 3.15)
Unit: 5. Chapter. 3 Sections (3.16 to 3.29, 3.33, 3.34, 3.35)

Reference Books:

1. A text book of Optics by Brijlal and Subramanian S.Chand & Co.
2. Optics by M.Nagaratnam and V.Gosakan, National publishing company,1990.

Passed in the BOS Meeting held on 15-3-2017 Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – PHYSICS - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - IV SKILL BASED	**Title : C - PROGRAMMING**	**Subject Code : 17 UPS S41**
Semester : IV	**HOURS : 3 hours / Week**	**CREDITS : 3**

Objectives: **1.**. To introduce the Programming language
2. To understand the basic concepts in C-Language.
3. To impart knowledge on solving problems with C

Unit –I: Introduction Introduction to C – Character set, identifiers and keywords – Date Types – Variables and constants – Various types of Operators – Arithmetic – Expressions – Input and Output operations. Simple programs - To find the volume of sphere, Area of the taingle and circule.

Unit – II: Control Statements Simple IF statement – simple IF, ELSE statement – Block IF statement – Block IF ELSE statement - The ELSE if ladder statement - looping operation using while statement – for statement – Break statement – Continue statement – Switch statement – Goto statement – exit function - To find the factorial of a number – To find the Fibonacci series – To evaluate sin x- To find the roots of a quadratic equation $ax^2+bx+c=0$.

Unit – III: Arrays Defining an Array – Processing an array – one dimensional array, two dimensional arrays – Multidimensional arrays. To multiply two matrices of order (1xm) and (mxn) – To add and subtract two matrices – To arrange the given set of numbers in ascending order – To arrange given set of numbers in descending order. To find the arithmetic mean, geometric mean and harmonic mean of a given set of Numbers.

Unit – IV: Functions Defining a function - Accessing a function - Category of functions – Passing arguments to function – Recursion – Library functions – Storage class modifiers – Auto, Global, Static and Register types –Using function to sort in the ascending and descending order of magnitude of a given set of numbers – Using function to sum integer values between 1-N recursion technique – To find binomial coefficient – to check whether a given number is odd or even – To sort names in a alphabetical.

Unit – V : Structures and Unions Defining a structure – Processing a structure – Arrays of Structures – Arrays within structures – Unions – bit fields – programmes using structure – to print currently date and time using functions. Pointers- fundamentals – Pointer declarations – pointers and simple variables.

Book for Study 1. Programming in C – E. Balagurusamy – Third Edition – Tata Mcgraw Hill 2004

Unit I: Chapter 2 (2.1 to 2.8)
Chapter 3 (3.1 to 3.11)
Chapter 4 (4.4 to4.5)
Unit II: Chapter 5 (5.1 to 5.9)
Chapter 6 (6.1 to 6.5)
Unit III: Chapter 7 (7.1 to 7.5)
Unit IV: Chapter 9 (9.4.9.6,9.13&9.15)
Unit V: Chapter 10 (10.1 to 10.7 and 10.10 to 10.12)

2. Programming in C by S. Ramasamy and P. Radhaganesan, Scitech Publications (India) Private Limited, Chennai and Hyderabad 2006.

Reference Books Theory and problems of Programming with C – By Byron Gottfried – Second edition – Tata Mcgraw Hill 2006.

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – PHYSICS - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - IV NME	**Title : BASIC PHYSICS - II**	**Subject Code : 17 UPS N41**
Semester : IV	**HOURS : 2 hours / Week**	**CREDITS : 2**

Objectives:

To gain knowledge of measurement systems
To know the significant about energy science
To study about various state of matter

Unit – I

S.I. Units – measurements of length, mass time and other Physical quantities – Dimensional formula for area, volume, density and force – Uses of dimension- measurement conversion

Unit – II

Matter – Solid, Liquid, Gas and Plasma – change of state – specific heat capacity - specific latent heat of ice and steam.

Unit – III

Kinds of energy – Mechanical energy, Thermal energy, Optical energy, Sound energy, Electrical energy, Atomic and Nuclear energy. (Examples) – Conservation of energy.

Unit – IV

Renewable and non-renewable energy – Fossil fuel – coal- Oil - Solar – Wind – Biomass – OTEC.

Unit – V

Alternating current generating by hydro, thermal and atomic power stations- measurement of electric current by wattmeter- wattless current- power factor

Book for Study

1 First Year B.Sc Physics – B.V. Narayan Rao, New Age International (P) Ltd, 1998.

Reference Books

1 Mechanics – D.S. Mathur – S.Chand & Co.,2002
2 Properties of matter - D.S. Mathur- S.Chand & Co., 2002.
3 Properties of matter – Brijlal Subramanian – S.Chand & Co., 2006.
4. Electricity and magnetism – R. Mururgesan- S. Chand & Co 2004

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – PHYSICS - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III **ALLIED**	**Title : OPTICS, ELECTRICITY AND ELECTRONICS**	**Subject Code : 17 UPS A21 /** **17 UPS A41**
Semester : IV	**HOURS : 4 hours / Week**	**CREDITS : 4**

Objectives:

1. To introduce aspects of Light and Electricity
2. To give basic idea regarding the semiconductor devices
3. To impart knowledge on properties of light and current.

UNIT I: Geometrical optics

Deviation produced by a thin lens –focal length of two thin lenses in and out of contact –chromatic aberration in lenses and its removal –spherical aberration in lenses and its removal –refraction through a thin prism- dispersion –dispersive power –combination of thin prisms to produce deviation without dispersion and dispersion without deviation

UNIT II: Physical optics

Interference in thin films –air wedge –Newton's rings (reflected beam only) –principle and uses –theory of plane transmission grating –(normal incidence only) –experiment to determine wavelength –double refraction –Nicol prism –optical activity(no theory)

UNIT III: Electrostatics

Electric field -flux –Gauss's law –application of Gauss's law –field due to a charged sphere – electric potential equipotential surface –relation between electric field and electric potential –electric potential energy –capacitors principle of a capacitor –capacitance of a spherical capacitor –energy stored in a capacitor.

UNIT IV : Current electricity and magnetic effect

Kirchhoff's law - Carey Foster bridge –measurement of resistance and temperature coefficient of resistance –potentiometer –principle of a potentiometer –calibration of low range voltmeter –calibration of ammeter – torque on a current loop –mirror galvanometer –dead beat and ballistic –experiment to determine current sensitiveness.

UNIT V: Electronics

Junction diodes –forward and reverse bias –diode characteristics –types of diodes –(LED and Zener diodes) –bridge rectifier using junction diodes –transistor characteristics (CE mode only) –binary number systems-reason for using binary numbers -binary to decimal decimal to binary –addition and subtraction of binary numbers –Boolean algebra De Morgan's theorem – basic logic gates(AND ,OR ,NOT) NAND & NOR gates.

BOOKS FOR STUDY:

1. Optics and spectroscopy – N.Venkatachalam
2. Electricity and Electronics --N.Venkatachalam

REFERENCE BOOKS:

1. Optics and spectroscopy –Brijlal & N Subramanian, Sultan Chand & Co.,
2. Electricity and electromagnetism –Brijlal N Subramanian, Sultan Chand & Co.,

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – PHYSICS - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III CORE	**Title : CORE PRACTICALS**	**Subject Code : 17 UPS CP2**
Semester : IV	**HOURS : 2 hours / Week**	**CREDITS : 2**

LIST OF EXPERIMENTS

Any Fourteen experiments

1. Determination of M and B_H – Tan C Method
2. Potentiometer – Comparision of EMFs
3. Figure of Merit – Spot Galvanometer
4. Comparision of Capacities – Spot Galvanometer
5. Refractive index of a Prism – Spectrometer
6. Grating N and λ – Spectrometer
7. Air-Wedge – Thickness of a wire
8. Newton's Rings – Radius of curvature of a lens
9. LCR – Series Resonance
10. LCR – Parallel Resonance
11. Determination of Mutual Inductance – Spot Galvanometer
12. High Resistance by leakage – Spot Galvanometer
13. Self Inductance – Anderson's Bridge.
14. Determination of resistance and resistivity- Carey Foster Bridge.
15. A.C Frequency by Sonometer.
16. Melde's string – Frequency of tuning fork.

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – PHYSICS - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III **ALLIED**	**Title : Ancillary Practical** **Ancillary Practical for I Maths &II chem**	**Subject Code : 17 UPS AP2**
SEMESTER: IV	**HOURS : 2 hours / Week**	**CREDITS : 2**

ANCILLARY PRACTICAL

List of Experiments

Any Fourteen experiments.

1. Non-Uniform Bending – Optic Lever
2. Uniform Bending – Pin and Microscope
3. Determination of 'g' – Compound Pendulum
4. Thermal Conductivity – Lee's disc
5. Calibration of Low – Range Voltmeter by Potentiometer
6. Comparison of Capacities by Spot Galvanometer
7. Resistance and Resistivity – Carey-Foster's bridge
8. Refractive index of a prism – Spectrometer
9. Grating N and λ – Spectrometer
10. LCR – Series Resonance
11. Newton's Rings – Radius of curvature of a lens
12. Bridge Rectifier
13. Logic Gates OR,AND, NOT – Discrete components
14. Zener diode – Characteristics.
15. Logic Gates OR,AND, NOT using IC.
16. Air-Wedge- Thickness of a wire.

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – PHYSICS - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

V SEMESTER

Sl. No	Sub. Code	Nature	Subject Title	Hrs / Week	Exam Hrs	CA	SE	Tot	Crd
1	17 UPS C51	Part – III Core	Nuclear Physics	4	3	25	75	100	4
2	17 UPS C52	Part – III Core	Bio Physics	4	3	25	75	100	4
3	17 UPS E51	Part – III Elective	Atomic Physics & Quantum Mechanics*	5	3	25	75	100	5
4	17 UPS E52	Part – III Elective	Analog Electronics*	5	3	25	75	100	5
5	17 UPS E53	Part – III Elective	Microprocessors 8085*	5	3	25	75	100	5
6	17 UPS CP3	Part – III Core	Core Practicals- Analog Electronics	6	3	40	60	100	4
7	17 UPS CP4	Part – III Core	Core Practicals- Bio Physics / Project	6	3	40	60	100	4
8	16USS S51	Self Study	Soft Skills		-	-	-	100	-
			Total	30					26

***Two papers to be chosen out of three elective papers**

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – PHYSICS - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III CORE	Title : NUCLEAR PHYSICS	Subject Code : 17 UPS C51
Semester : V	HOURS : 4 hours / Week	CREDITS : 4

OBJECTIVES : **1.** To introduce the concept of Nucleus
2.To impart knowledge on Accelerators and detectors
3. To introduce the origin of Cosmic rays
4. To give an idea of Nuclear Fission and Fusion.

Unit: 1 Introduction to Nucleus

Introduction—Classification of Nuclei—General Properties—Binding Energy—Nuclear Stability—Proton-Electron Hypothesis—Proton-Neutron hypothesis—Nuclear Forces—Meson theory(no derivation)—Mass of Meson—Liquid drop model—The Shell Model.

Unit:2 Particle Accelerators and Detectors:

Introduction—The Linear accelerator—Energy of the ion--Cyclotron—Betatron—Wilson cloud Chamber—Advantages and limitations—Bubble Chamber—Advantages —Nuclear Emulsions.

Unit:3 Radioactivity:

Introduction—Natural Radioactivity—Properties of alpha, beta and gamma rays—Velocity and Range of alpha paticles—Experimental determination –Geiger Nuttal experiment—Geiger law—Geiger-Nuttal law—Alpha particle disintegration energy—e/m ratio of beta particles using Kaufmann's experiment—Origin of line and continuous spectrum—Neutrino theory--K-electron Capture—Wavelength of Gamma rays— Origin of gamma rays -- Internal Conversion.

Unit: 4 Nuclear Fission and Fusion

Introduction—Nuclear Fission—Energy released—Bohr and Wheeler theory—Atom bomb—Nuclear Fusion—Source of Stellar energy—Thermo nuclear reaction—Hydrogen Bomb—Transuranic elements—Nuclear Reactors.

Unit:5 Neutrons, Cosmic rays and Elementary Particles:

Discovery of neutrons—Basic Properties—Classifications—Neutron detection—Cosmic Rays—Latitude Effect—East-West effect—Altitude effect—longitude effect—Primary and Secondary Cosmic rays—Cosmic Ray Showers—Elementary particles—Particles and Anti-particles.

Books for Study:

1. **MODERN PHYSICS** by **R.MURUGESHAN & KIRUTHIGA SIVAPRASATH,** S.Chand & Company Ltd., Fifteenth Revised Multicolored Edition 2010.

Unit :1 Ch: 27: Sections (27.1 To 27.5, 27.7 to 27.11)
Unit : 2Ch:30: Sections (30.1, 30.3, 30.4, 30.6) **Chapter 29:** Sections (29.7, 29.9, 29.1
Unit : 3Ch: 31: Sections (31.1 To 31.6 31.9, 31.10,31.11 (ii**),** 31.12,31.17, 31.21 To31.25 and 31.27)
Unit ; 4Chapter 35: Sections (35.1 to 35.3, 31.5 to 35.10)
Unit: 5Chapter 34 : Sections (34..12 To34.16)
Chapter 37: Sections (37.1 To37.7)
Chapter 38: Sections (38.1 and 38.2)

Reference Books:

1. Perspective of Modern physics by Arther Beiser, Tata McGraw Hill Ltd., 1969.
2. Nuclear Physics by D.C.Tayal- Himalaya publishing House, New Delhi,1998.
3. Introduction to Modern Physics by Ritchmer, Kennard and Cooper, Tata McGraw Hill Ltd., 1998.

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – PHYSICS - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III CORE	Title : BIO PHYSICS	Subject Code : 17 UPS C52
Semester : V	HOURS : 4 hours / Week	CREDITS : 4

OBJECTIVES

- To create the basic knowledge in Bio-Physics.
- To understand the activity of living organisms with physics concepts.
- To give an awareness of environmental issues.

Unit I Bio-Mechanics:

Introduction – Biostatics – forces and torques – Bio physics of muscles – Muscle power – Mass specific muscle power – Strength of bones – Bio dynamics – Newton's Laws – Frictional forces and Stokes law – Locomotion on land – walking, jumping and propelling

Unit II Bio physics and fluid flow:

Introduction – Steady laminar flow - Coefficient of viscosity – temperature dependence – Poiseuilli's formula – velocity profile – continuity equation – energetics of fluid flow – fluid flow in plants – Xylem transport – resistivity – pressure gradient – negative pressure – Phloem transport.

Unit III Bio physics and gas transport

Introduction – Ideal gas – Solutions and Henry's law - convective transport of gases – Airway resistance – transport of O_2 in Blood – transport of CO_2 in blood – diffusion of gases – gas exchange in lungs, tissues – Physiology of respiration – Physics of Alveoli

Unit IV Bio physics and Audition

Introduction - transverse and longitudinal waves – pressure waves – wave velocity – Intensity of waves – physiological characteristics of sound – Human ear – Phase sensitivity and determination of direction – Non linearity of ear response - Doppler effect

Unit V Bio physics and Vision

Introduction – wave nature of light – Geometrical optics – Refraction – Gradient - index lens – Spherical aberration – Chromatic aberration - refractive power of eye – refractive errors – retina and photoreceptors – photoreceptors and Fibre optics – Fibre Optics – resolving power of eye – Polarisation and vision

Books for study:

Elementary Biophysics by P.K.Srivastava, Narosa publishing house pvt Ltd., reprint 2006.

Unit: 1 **Chapter 1:** Sections (1.1, 1.1a, 1.2, 1.2a, 1.2b, 1.3, 1.4a, 1.4b, 1.5)

Unit: 2 **Chapter 2:** Sections(2.1, 2.1a, 2.1b, 2.2, 2.2a, 2.2b, 2.3, 2.6, 2.6a, 2.6b, 2.6c, 2.6d, 2.6e)

Unit: 3 **Chapter 3:** Sections (3.1, 3.1c, 3.2, 3.2a, 3.2b, 3.2c, 3.3, 3.3a, 3.3b, 3.4, 3.4a)

Unit: 4 **Chapter 4**: Sections (4.1, 4.1a, 4.1b, 4.1c, 4.2, 4.3, 4.4a, 4.4b, 4.5)

Unit: 5 **Chapter 5**: Sections (5.1, 5.1a, 5.1b, 5.2, 5.2a, 5.2b, 5.2c, 5.2d, 5.3a, 5.3d, 5.4, 5.5, 5.5a, 5.6, 5.7, 5.7a, 5.7b)

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – PHYSICS - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III ELECTIVE	**Title : ATOMIC PHYSICS AND QUANTUM MECHANICS**	**Subject Code : 17 UPS E51**
Semester : V	**HOURS : 5 hours / Week**	**CREDITS : 5**

Objectives:

1. To give an introductory account of the basic principles of atomic physics.
2. To impart knowledge on the structure of the atom.
3. To introduce the origin of Quantum theory.

Unit I

Introduction – Thomson's atom model – Rutherford model of the atom – Theory of alpha particle scattering – Rutherford scattering formula - Bohr atom model –Bohr's theory of Hydrogen atom – Energy levels and Excitation potential and Ionization potential – Davis and Goucher's method –Bohr Sommerfield theory - Sommerfield's relativistic atom model – Explanation for the fine structure of Hα line – vector atom model - Relativistic variation of atomic mass – application to fine structure of spectral lines – Vector atom model– Quantum numbers – coupling schemes – Pauli's exclusion principle – Arrangement of electrons in atoms

Unit II Magnetic dipole moment due to orbital motion of the electron – magnetic dipole moment due to electron spin - Stern and Gerlach experiment - Optical spectra – spectral terms and notations – selection rules -Fine structure of sodium D lines –Zeeman effect – theory and experiment – quantum theory of Zeemann effect – Anamolous Zeemann effect – Stark effect – Paschen Back effect

Unit III Planck's quantum theory of radiation – Dual nature of matter and radiation – De-Broglie's hypothesis of matter waves – Expression for wavelength – Davisson's and Germer experiment – G.P.Thomson experiment with relativistic correction – concept of wave packet – Group velocity and wave velocity and their relation – Heisenberg's Uncertainty principle – Experimental illustration – Determination of position with γ – Ray microscope- Diffraction of an electron beam by a single slit.

Unit IV Basic postulates of quantum mechanics – Derivation of time dependent and time independent Schrodinger's equations –properties of wave function - Physical significance of wave function– orthogonal and normalized wave functions– Eigen functions and Eigen values.

Unit V Simple applications of Schrodinger wave equation- The particle in a Box – Infinite square well potential – The Barrier penetration problem - Linear harmonic oscillator – The rigid rotator .

Text Book:

Modern Physics (sixth revised edition 1998 – S.Chand & Company Ltd.) by R.Murugeshan

Unit: 1. Chapter.4 Sections (4.1 to 4.5, 4.8, 4.10(2), 4.11 to 4.16)
Unit: 2. Chapter.4 Sections (4.18 to 4.20, 4.22, 4.23, 4.26 to 4.28)
Unit: 3. Chapter. 7 Sections (7.1 to 7.4)
Unit: 4. Chapter. 7 Sections (7.7 to 7.9)
Unit: 5. Chapter. 7 Sections (7.10, 7.12, 7.13, 7.15)

Reference Books:

1. Modern Physics by Seighal Chopra and Seighal
2. Quantum Mechanics by Satyaprakash

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – PHYSICS - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III ELECTIVE	**Title : ANALOG ELECTRONICS**	**Subject Code : 17 UPS E52**
Semester : V	**HOURS : 5 hours / Week**	**CREDITS : 5**

Objectives:

To understand the basic concepts in Analog Electronics.

To learn about the principles of oscillators and amplifiers.

. To gain knowledge about electronic equipments.

Unit – I

Voltage and Current sources – Conversion of voltage source into current source - Thevenin's theorem – Norton's Theorem – Two port Network – Analysis – 'h' parameters only - Filter circuits – General theory – low pass, high pass, Band pass and band elimination filters.

Unit – II

Transistor – three types of configuration – relation between α, β, and γ – Load line (DC & AC) and operating point – Biasing circuits – base bias – collector feedback bias – Voltage divider bias – emitter bias – FET static characteristics – Determination of FET parameters.

Unit – III

Small signal CE amplifier – calculation of voltage gain, current gain and power gain – input & output impedance using h parameters – frequency response of an amplifier – Single stage amplifier – push pull amplifier – OP AMP characteristics – Gain of an OPAMP inverting mode - application as adder, subtractor – integrator & differentiator.

Unit – IV

Feedback – Positive & Negative feedbacks – Principle of negative feedback in amplifiers – Advantages of negative feedback - Barkhausen's criterion – transistor oscillators – Hartley , Colpitt & phase shift oscillator with mathematical analysis .

Unit – V

Modulation – types of modulation – amplitude modulation – Percentage of modulation - modulated power output – modulation index – frequency modulation (qualitative) – digital modulation (qualitative) – Types of Antenna - block diagram of AM & FM transmitters.

Books for Study

1. Principles of Electronics - V.K. Metha- S. Chand & Co., 2012.
   Unit-I: Chapter: 1 Section - 1.8, 1.9, 1.10, 1.11, 1.13, 1.14, 1.15, 1.16
   Unit II:Chapter:8 Section-8.1-8.4,8.7-8.10,8.12-8.14,8.17,8.18
   Chapter:9 Section- 9.2,9.4,9.6,9.7-9.12.
   Chapter :19 Section -19.1,19.2,19.3,19.8,19.9,19.10
   Unit.III: Chapter 10:Section --10.1,10.2,10.4.
   Chapter 12:12.2,12.7
   Chapter 25: 25.1-25.4,25.7,25.15,25.24,25.26,25.33,25.34,25.35.
2. Basic Electronics & Applied Electronics- A. Ubald Raj & G. Jose Robin 2004 Indira Publications
   Unit-1: Chapter: 2 Page No. 85-88, Unit-IV: Chapter: 2 Page No. 168-171, 184-199
   Unit-V:Chapter: 3 Page No.244-251.
3. Basic Electronics - B.L. Theraja – S. Chand & Co.,2003.
   Unit-I: Chapter: 12 Section – 12.14 to12.19
4. Electronics Devices & Circuits- Salivahanan, Sureshkumar, Vallavaraj,Tata Mc Graw Hill- 2004.
   UNIT -III:Section 9.41-9.49.

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – PHYSICS - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III ELECTIVE	**Title : MICROPROCESSOR 8085**	**Subject Code : 17 UPS E53**
Semester : V	**HOURS : 5 hours / Week**	**CREDITS : 5**

Objectives:

1) To understand working of digital computer
2) To gain knowledge about types of computer languages.
3) To gain knowledge about microprocessor
4) To clarify the concepts of peripherals and interfaces.

Unit I Introduction to digital computers:

Introduction – The history of computers- Computer generation – Computer classification - Components of digital computer –Typical microcomputer organization.

Unit II Computer languages:

Machine language – Assembly language – High level language – Compiler – interpreter – types of software – Computer applications.

Unit III Microprocessors:

Introduction and evolution – Microprocessor architecture – Microprocessor bus organization – Functional block diagram of 8085 Microprocessor – pin out diagram of 8085 – Microprocessor programming.

Unit IV Instruction set of 8085:

Data transfer group – Arithmetic group – Logic group –Branch group – Stack, I/O and Machine control group.

Unit V Peripherals and Interfaces:

Input/output ports – Intel's 8212 – Programmable I/O ports and timer 8155 chip – Programmable peripheral interface 8255A – Programmable communication interface USART 8251A – Programmable keyboard/display interface 8279.

Text Book:

Digital Electronics Circuits and systems (third reprint 2001 – Tata McGraw-hill publishing company Ltd.) by V.K. Puri.

Unit I: Chapter 10.1 to 10.6 , Unit II: Chapter 10.7 to 10.9
Unit III: Chapter 11.1 to 11.6 Unit IV: Chapter 11.7
Unit V: Chapter 11.11

Reference Books:

1) Microprocessor/Architecture Programming and applications with 8085 by Ramesh Gaonkar. III Edition.
2) Microprocessors and Micro controllers – A Nagoor Kani.
3) Fundamentals of Microprocessors and Microcontrollers – B. Ram.

Passed in the BOS Meeting held on 15-3-2017 Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – PHYSICS - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III CORE	**Title : ANALOG ELECTRONICS CORE PRACTICAL**	**Subject Code : 17UPS CP3**
Semester : V	**HOURS : 6 hours / Week**	**CREDITS : 5**

LIST OF EXPERIMENTS

1. Transistor characteristics CE mode
2. FET characteristics
3. Zener diode characteristics
4. Bridge rectifier with II section filter
5. Zener Voltage regulator
6. Voltage doubler and Trippler
7. Single stage amplifier – Gain and bandwidth
8. Two stage amplifier without feedback
9. Hartley Oscillator
10. Colpitt's Oscillator
11. Astable multivibrator using discrete components
12. Clipper and Clamper circuit using discrete components
13. Differentiator and Integrator using discrete components
14. Phase shift oscillator
15. Logic gates – Discrete components

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – PHYSICS - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III CORE	**Title : BIO-PHYSICS CORE PRACTICALS**	**Subject Code : 17UPS CP4**
Semester : V	**HOURS : 6 hours / Week**	**CREDITS : 5**

MAJOR PRACTICALS –Bio Physics/Project

LIST OF EXPERIMENTS

1. Determine the refractive index of different Bio-fluids using a hollow prism
2. Effect of temperature on viscosity using Ostwald viscometer.
3. Measurement of blood pressure –demonstration and interpretation.
4. Determination of velocity of Bio-fluids using Ultrasonic interferometer.
5. Draw equipotential lines for a bio fluid.
6. Polari meter experiment – Determination of specific rotatory power of glucose solution.
7. Comparison of S.T. of Bio-fluid using capillary rise method.
8. Surface Tension of a Bio-fluid using drop weight method.
9. Determination of Co-efficient of viscosity using Poiseuile's flow method.
10. Determination of relative density of a Bio-fluid using Melde's apparatus.
11. Electrolytic conductivity of a Bio-fluid using Kohlraush Bridge.
12. Interfacial S.T. of a bio-fluid by the method of drops.
13. Refractive index of a solid and a liquid using vernier microscope.
14. Specific heat capacity of a liquid using Newton's law of cooling.
15. Coefficient of viscosity of a liquid using Stokes method.

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – PHYSICS - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

VI SEMESTER

S. No	Sub. Code	Nature	Subject Title	Hrs / Week	Exam Hrs	CA	SE	Tot	Crd
1	17 UPS C61	Part – III Core	Solid State Physics	4	3	25	75	100	4
2	17 UPS C62	Part – III Core	Classical and Statistical Mechanics	4	3	25	75	100	4
3	17 UPS C63	Part – III Core	Bio- Medical Instrumentation	3	3	25	75	100	3
4	17 UPS E61	Part – III Elective	Digital Electronics**	5	3	25	75	100	5
5	17 UPS E62	Part – III Elective	Nano materials**	5	3	25	75	100	5
6	17 UPS CP5	Part – III Core	Core Practicals-Digital	6	3	40	60	100	4
7	17 UPS CP6	Part – III Core	Core Practicals-General	6	3	40	60	100	4
8	17UPS VV1	Part – III Core	Viva-voce	2	3	50	50	100	2
9	16UGKB61	Self Study	General Knowledge	-	-	-	-	100	-
			Total	30					26

****One paper has to be chosen out of two elective papers**

Passed in the BOS Meeting
held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – PHYSICS - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III CORE	**Title : SOLID STATE PHYSICS**	**Subject Code : 17 UPS C61**
Semester : VI	**HOURS : 4 hours / Week**	**CREDITS : 4**

OBJECTIVES

- To create the basic knowledge in Crystallography
- To understand the scientific perspective of crystals.
- To identify the techniques suitable for crytal structure.
- To know the significance of Magnetic and dielectric materials

Unit I : Bonding in solids – Types of bonds – ionic, covalent, metallic and vander wall's bonds – Binding energy of ionic crystals – Crystal structure – crystal lattice and Unit cell - Bravais lattice – Classification of crystals – Miller indices – simple structures – packing factor - structure of diamond and zinc blende – lattice vibrations – thermal properties – concept of phonons – Heat capacity of solids – classical theory – Limitations - Einstein's and Debye's theories of lattice specific heat capacity.

Unit II : X-rays - production and properties – continuous and characteristic x-ray spectra – main features – Duane and Hunt law – Mosley's law and its importance – Compton effect – theory and experiment – X-ray diffraction – Laue pattern – Bragg's law – Bragg's x-ray spectrometer for wavelength measurement – Powder crystal method.

Unit III : Free electron theory of metals – Drude-Lorentz theory – Drift, mobility, mean free path, relaxation time of free electrons – electrical and thermal conductivities of metals – Weidemann and Franz law – sources of resistivity of metals – superconductivity – Types – Meissner effect – BCS theory – applications.

Unit IV : Magnetic materials – Types – properties and applications – Hard and soft magnetic materials – Different types of magnetism – dia, para, ferro, antiferro and ferri magnetism – Langevin's theory of dia and para magnetism – Weiss theory of ferromagnetism – magnetostriction materials.

Unit V : Dielectrics – polarization – Polar and non-polar dielectrics – Different types of polarization – electronic, ionic, orientational and space charge – Polarisability – Clasius-Mossotti relation – dependence of polarization on frequency and temperature – Dielectric materials – properties and applications – active and passive materials – Ferro electric and Piezo electric materials.

BOOK FOR STUDY:

Solid State Physics by Prof. P.K.Palanisamy,Scitech Publications (India) Pvt Ltd. Chennai.2006
Unit: I :Ch:1: Sections (1.1,1.2,1.3,1.4,1.7), **Ch: 6:** Sections (6.1 to 6.10), **Ch: 7:** Sections (7.1 to 7.3)
Unit III :Chapter 8: Sections (8.1 to8.3, 8.9,8.10), **Unit: IV :Ch.4**: Sec. (4.1 to 4.6, 4.8 and 4.8.3)
Unit: V :Chapter 5: Sections (5.1 to 5.7)
Modern Physics by R.Murugeshan, S.Chand and company Ltd, RamNagar, New Delhi
Unit: IIChapter 5: Sections (5.1 to 5.14)
Solid state physics by Saxena Gupta and Saxena from Prakati Prakashan Publications Pvt Ltd.,
Unit: III Chapter 8: Pages from 259 to 264

REFERENCE BOOKS: 1. Introduction to solid state physics by C.Kittel V edition
2.Solid State Physics by V.K. Puri and Babber

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – PHYSICS - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III CORE	**Title : CLASSICAL AND STATISTICAL MECHANICS**	**Subject Code : 17 UPS C62**
SEMESTER : VI	**HOURS : 4 hours / Week**	**CREDITS : 4**

Objectives:

1. To understand the basic concepts in Classical and Statistical Mechanics
2. To apply classical mechanics to solve problems.
3. To impart knowledge on electron and photon gas.

Unit:1 Mechanics of particles and system of particles:

Introduction—Mechanics of a particle—Conservation of linear momentum—conservation of angular momentum—Conservation of energy—mechanics of a system of particles--Conservation of linear momentum—conservation of angular momentum—Conservation of energy.

Unit:2 Constraints and Lagrangian Formulation:

Constriants—Types with examples—degrees of freedom—Generalized co-ordinates—generalized displacement—generalized velocity and momenta—Principle of virtual work—D'Alembert's principle—Lagrangian equation of motion from D'Alembert's principle—applications to simple pendulum, compound pendulum, linear harmonic oscillator and Atwood's machine.

Unit:3 Hamiltonian formulation of Mechanics:

Hamilton's principle—Hamilton's canonical equations of motion—Physical significance of H—Deduction of canonical equations from a variational principle—applications to simple pendulum, compound pendulum, linear harmonic oscillator and particle in a central force of field.

Unit:4 Statistical Thermodynamics:

Introduction—Statistical Mechanics—Statistical Equilibrium—Probability theorems—Maxwell-Boltzmann distribution law—M.B. law in terms of temperature—application to ideal gas.

Unit:5 Quantum Statistics:

Introduction—Phase Space—Fermi-Dirac distribution law—Application to electron gas—Bose-Einstein distribution law—application to photon gas--Comparison of three Statistics.

Books for study:

1. Classical Mechanics by **Gupta, Kumar and Sharma**, Pragati prakashan Seventeenth edition 2000. (For first three units)

2. Heat and thermodynamics by **Brijlal and N.Subramanyam**, S.Chand & company Ltd reprinted 1998 edition. (For last two units)

Unit:1	**Chapter:1**	Sections (1.1, 1.3 and 1.4)
Unit:2	**Chapter:1**	Sections (1.5, 1.6 and 1.7)
	Chapter:2	Sections (2.5, 2.9.1, 2.9.2, 2.9.9 and 2.9.10)
Unit:3	**Chapter:3**	Sections (3.3, 3.4, 3.5, 3.7, 3.9.1, 3.9.2 and 3.9.6)
Unit:4	**Chapter:9**	Sections (9.1, 9.2, 9.3, 9.4, 9.5, and 9.6)
Unit:5	**Chapter:9**	Sections (9.7, 9.8, 9.9, 9.10, 9.11, 9.12 and 9.13)

Books for reference:

1. Classical Mechanics by Goldstein, Narosa Publishing House, New Delhi.
2. Classical Mechanics by Biswas, Books and Allied (P) Ltd., Calcutta.
3. Statistical and Thermodynamics by Agarwal, S.Chand and Co., New Delhi.

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – PHYSICS - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III CORE	**Title : BIOMEDICAL INSTRUMENTATION**	**Subject Code : 17 UPS C63**
SEMESTER : VI	**HOURS : 3 hours / Week**	**CREDITS : 3**

OBJECTIVES

- To understand the physics concepts involving in biomedical instruments.
- To create the knowledge about biomedical tool for major disease diagnosis.
- Try to correlate the ECG output
- To know the lead position of ECG and EEG

Unit I:

Transducer – performance of characteristics of transducer – static and dynamic active transducer – (a) magnetic induction type (b) piezo – electro type (c) photo voltaic type (d) thermo electric type.

Unit II: Passive transducer – (a) resistive type – effect and sensitivity of a bridge (b) capacitive transducer – (c) linear variable different transformer – LVDT

Unit III: Characteristics of basic recording system – origin electro cardio graphy (ECG) – block diagram – ECG Leads – unipolar and bipolar – ECG recording setup

Unit IV: Electro Encephalo Graph (EEG) – Origin – Block diagram of EEG unit – Electro Myograph (EMG) – Block diagram EMG records

Unit V: Digital Thermometer – Computer Tomography (CT) principle – Block diagram of CT Scanner.

Book for study:

Biomedical Instrumentation, ED II, 1994, Dr. M.Arumugam
Anuradha Agencies Revised Edition 1997

Unit:1	**Chapter:2**	Sections (2.5, 2.5.1, 2.5.2, 2.5.3, 2.5.4, 2.5.5)
Unit:2	**Chapter:2**	Sections (2.5.6, 2.5.7, 2.5.8, 2.5.13, 2.5.15)
Unit:3	**Chapter:4**	Sections (4.2, 4.3, 4.3.2, 4.3.3)
Unit:4	**Chapter:4**	Sections (4.4, 4.4.1, 4.4.4, 4.5, 4.5.1)
Unit:5	**Chapter:7**	Sections (7.6)
	Chapter:10	Sections (10.7)

Reference Books:

Handbook of Biomedical Instrumentation, R.S.Khandpur, 1999, Tata McGraw Hill.

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – PHYSICS - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III ELECTIVE	**Title : DIGITAL ELECTRONICS**	**Subject Code : 17 UPS E61**
SEMESTER : VI	**HOURS : 5 hours / Week**	**CREDITS : 5**

Objectives:

To understand the basic concepts in Digital Electronics.

To learn the number systems and their applications.

. To acquire the basic ideas about Boolean algebra, Logic gates and Karnaugh mapping.

Unit – I Number system – Binary, decimal , Octal , hexadecimal – Conversion from one another – Binary addition, subtraction, multiplication, division – Binary subtraction by 1's and 2's complement – Basic laws of Boolean Algebra – Boolean Addition – Laws of Boolean Algebra – De Morgan's theorem - Statement and proof.

Unit – II Positive and Negative logic – Logic gates – OR, AND ,NOT, NOR NAND and EX-OR- Universality of NAND and NOR gates (7400 & 7402) – Logic families using discrete components – Sum of products(SOP) and Product of sums(POS) – Karnaugh map – 2variable , 3variable and 4 variable – simplification using K-map.

Unit – III Half adder – Full adder – 4bit binary adder – Half subtractor – Full subtractor – 4 bit parallel subtractor – BCD adder - Multiplexer (MUX) – 4 to 1 MUX - De multiplexer (DMUX) – 1 to 4 DMUX – Encoder – 8 to 3 encoder – Decimal to BCD encoder – Decoder – 3 to 8 decoder, BCD to decimal decoder – BCD to seven segment decoder.

Unit – IV Timer circuit – Theory - IC 555 mono and astable multivibrators Schmitt trigger – Flip Flops – R-S Flip flops- clocked R-S flip flop- J-K flip flop – J-K master Slave flip flop – D flip flop- T Flip flop - application of flip flops.

Unit – V Register – Shift register – Classification – Serial in – Serial out (SISO), Serial in –parallel out shift registers- Counters – Ring Counter, 4 bit binary ripple counter – decade counter – Digital to Analog converter (D/A) – Binary ladder type – Analog to Digital converter (A/D)- Successive approximation type.

Books for Study

1 **Digital Fundamentals**; V. Vijayendran , S. Viswanathan Publication – 2007.
Unit1:Chapter 1: Page no: 1-17, Chapter 2: Page no:21-30, Chapter5: Page no:92-111
Unit :3:Chapter8: Page no:200-209,216-224, Chapter 9: Page no: 230-251
Unit 4: Chapter 10: Page no:272-287
Unit :2 Chapter : 4 Section : 4.4, 4.5,4.6, Chapter :6 Section : 6.2,6.3,6.4, 6.5

2. Basic Electronics & Applied Electronics- A. Ubald Raj & G. Jose Robin 2004 Indira Publications
Unit :2 Chapter : 5B Page No. 357-376, 386-391,402-407
Unit :5 Chapter : 5B Page No. 453-456, 459-471

3**.Digital Principles and applications** 4th Edition ; Leech , Malvino and Saha.
Fourth Edition Tata Mc-Graw Hill 1995.
Unit :5 Chapter : 10 Section : 10.1, 10.2

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – PHYSICS - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III ELECTIVE	**Title : NANO MATERIALS**	**Subject Code : 17 UPS E62**
Semester : VI	**HOURS : 5 hours / Week**	**CREDITS : 5**

OBJECTIVES

- To create the basic knowledge in nanomaterials.
- To understand the scientific perspective of nanomaterials.
- To identify the techniques suitable for nanomaterial synthesis.
- To know the significance of nanomaterials.

Unit I Introduction to Nanomaterials

History of Nanoscience – Definition of Nanometer, Nanoscience and Nanotechnology – Classification of Nanomaterials – Examples of nanostructured materials - Wigner-Seitz cell – Two dimensional lattice type – Primitive cells of three dimensional lattices.

Unit II Nano scale properties: Effect of size reduction on Bulk properties – Opto electronic property of bulk and nanostructures – Electronic structure of Nanomaterials and the Fermisurface – Fermisurface – Size effect on Electron- Phonon coupling – Size effect on physical properties.

Unit III Synthesis and Processing of nanomaterials Synthesis techniques for the preparation of nanoparticles – Bottom-up approach – Sol-Gel synthesis – Hydrothermal Growth – Thin film growth – Physical Vapour Deposition (PVD) – Chemical Vapour Deposition (CVD) – Top-Down approach – Ball Milling – Microfabrication – Lithography.

Unit IV Characterization tools Introduction – X-ray diffraction and Scherrer method – Calculation of lattice parameter – Size/Strain analysis: Peak broadening – Scanning Electron Microscopy (SEM) – Electron interaction with matter – Mechanism involved in imaging with SEM – Transmission Electron Microscopy (TEM) – Stoichiometry study by Energy-Dispersive X-ray analysis (EDAX).

Unit V Application of nano materials Introduction – Applications in Materials Science – Applications in Biology and Medicine – Biocompatibility and toxicity in nanoparticles – Cytotoxicity in Nanoparticles – Neurotoxicity in nanoparticles – Applications in surface science – Applications in Energy and Environment – Applications in nanostructured thin film.

Book for study:

Nanoscience and Nanotechnology: Fundamentals to Frontiers by M.S. Ramachandra Rao, Shubra Singh, Wiley India pvt. Ltd., New Delhi. (2013).

Unit: 1 Chapter 1: Sections (1.1, 1.2, 1.3, 1.3.1)
Chapter 2: Sections (2.2.2, 2.2.3, 2.2.4)
Unit: 2 Chapter 2: Sections(2.7, 2.8, 2.9, 2.9.1, 2.9.2, 2.9.3)
Unit: 3 Chapter 4: Sections (4.4, 4.4.1, 4.4.1.1, 4.4.1.2, 4.4.1.3, 4.4.2, 4.4.2.1, 4.4.2.2, 4.4.2.3)
Unit: 4 Chapter 8: Sections (8.1, 8.2, 8.2.1, 8.2.2, 8.3, 8.3.1, 8.3.2, 8.4, 8.5)
Unit: 5 Chapter 10: Sections (10.1, 10.2, 10.3, 10.3.1, 10.3.2, 10.3.3, 10.4, 10.5, 10.6)

Reference:

1) T. Pradeep, Nano: The Essentials, Tata Mc.Graw Hill company Ltd (2007)
2) C. N. R. Rao, A. Mu¨ller, A. K. Cheetham, *The Chemistry of Nanomaterials :Synthesis, Properties and Applications*, Volume 1, Wiley-VCH, Verlag GmbH, Germany (2004).

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004
(An Autonomous Institution Re-accredited with 'B' grade by NAAC)
B.Sc., – PHYSICS - SYLLABUS
(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III CORE	**Title : Core Practical DIGITAL ELECTRONICS**	**Subject Code : 17 UPS CP5**
Semester : VI	**HOURS : 6 hours / Week**	**CREDITS : 5**

Major Practical Digital

List of Experiments for III year Practical

1. Dual power supply using IC
2. IC 7805 Regulated Power supply
3. OP AMP – Integrator and differentiator
4. OP AMP – Adder and Subtractor
5. Astable multivibrator using OP AMP
6. Astable multivibrator using IC 555
7. Schmitt Trigger using IC 555
8. Universality of NAND and NOR gates
9. Half adder and Full adder using NAND
10. 4-bit Binary Adder and Subtractor
11. Shift Register
12. Ring Counter
13. 4-bit Binary counter
14. BCD counter
15. Verification of De-Morgan's laws

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

B.Sc., – PHYSICS - SYLLABUS

(Under CBCS w.e.f. 2017 – 2018 onwards)

PART - III CORE	**Title : Core Practical - General**	**Subject Code : 17 UPS CP6**
Semester : VI	**HOURS : 6 hours / Week**	**CREDITS : 5**

General– V

List of Experiments for III year Practical

1. Spectrometer – Small angled prism
2. Spectrometer – i-i' curve
3. Spectrometer – Grating minimum deviation
4. Spectrometer – Cauchy's constants
5. Spot Galvanometer – Comparison of Mutual inductances
6. Rayleigh bridge – Self inductance
7. Maxwell's bridge – Self inductance
8. Owen's bridge
9. De-sauty's bridge – Comparison of capacities
10. Impedance and Power factor – LR circuit
11. Impedance and Power factor – CR circuit
12. Spot Galvanometer – comparison of emfs
13. Spot Galvanometer – Thermo emf
14. Potentiometer – Thermo emf

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD

PART - III CORE	**Title : Viva Voce**	**Subject Code : 17UPSVV1**
Semester : VI	**HOURS : 2 hours / Week**	**CREDITS : 2**

Evaluation Procedure:

Questions will be asked from all the semester papers already studied by the students.

Marks : Internal 50
External 50

External examination will be conducted at the end of the VI semester after the external practical

Examination by an external examiner along with the internal examiner.

Passed in the BOS Meeting held on 15-3-2017

Signature of Chairman/HOD