B. Sc., PHYSICS

Syllabus

Programme Code : 3USPHY

2022-2023

SENGAMALA THAYAAR EDUCATIONAL TRUST

WOMEN'S COLLEGE (AUTONOMOUS)

(Affiliated to Bharathidasan University, Tiruchirappalli)

(Accredited by NAAC) | (An ISO 9001:2015 Certified Institution)

PROGRAMME OUTCOMES FOR B.Sc., DEGREE

PO No.	Program Outcomes (*Upon completion of the B.Sc. Degree Programme, the Undergraduate will be able to)*
PO-1	**Disciplinary knowledge**: demonstrate comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme of study in Bachelor of Science.
PO-2	**Critical thinking and Problem Solving:** think critically about the issues and identify, critically analyze and solve problems from the disciplines of concern using appropriate tools and techniques and the knowledge, skills and attitudes acquired and extrapolate the same to real life situations.
PO-3	***Scientific reasoning:*** analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.
PO-4	**Digital literacy and Effective Communication:** use ICT in a variety of learning situations and speak, read, write and listen clearly in person and through electronic media in English and in one or more Indian languages, and make meaning of the world by connecting people, ideas, books, media and technology.
PO-5	**Individual and Team Work:** effectively accomplish tasks individually as well as work effectively and respectfully as member or leader with diverse teams, facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team.
PO-6	**Environment and Sustainability:** understand the impacts of technology and business practices in societal and environmental contexts, and sustainable development.
PO-7	**Human values and Gender Issues:** understand major ideas, values, beliefs, the nature of the individual and the relationship between self and the community and aware of the various issues concerning women and society
PO-8	**Self directed and Lifelong learning:**acquire knowledge and skills, including learning "how to learn", that are necessary for participating in learning activities throughout life and to engage in independent and life-long learning in the broadest context of socio-technological changes.

PROGRAMME SPECIFIC OUTCOMES (B.Sc. PHYSICS)

PSO No.	Programme Specific Outcomes (*Upon completion of the B.Sc. Degree Programme, the Undergraduate will be able to)*
PSO-1	Understand and Apply the principles and concepts in various fields of physics including Material Science, Mechanics, Acoustics, Optics, Thermal Physics and Electricity.
PSO-2	Perform measurements and analysis of measurements to draw valid conclusions in basic physics, and develop laboratory skills in physics.
PSO-3	Develop the skills for problem solving, scientific reasoning and logical reasoning in physics.
PSO-4	Explain the behavior of materials from atomic level to macroscopic level.
PSO-5	Understand and perform the operation of the different physical and electronic devices.

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SUNDARAKKOTTAI, MANNARGUDI - 614016.

TAMILNADU, INDIA.

B.Sc., PHYSICS COURSE STRUCTURE UNDER CBCS

(*For the candidates admitted in the academic year 2022 –2023)*

ELIGIBILITY: A Pass in 10+2 with Physics and Mathematics**.**

Sem.	Part	Nature of the Course	Course Code	Title of the Course	Inst. Hours/ Week	Credit	Exam Hours	Marks		Total
								CIA	ESE	
I	I	Language Course (LC) –I– Tamil */Other Languages ** #	22LC101	Ikkala Ilakkiyam	6	3	3	25	75	100
	II	English Language Course(ELC) – I	21ELC101	Language through Literature –I (Prose and Communication Skills)	6	3	3	25	75	100
	III	Core Course (CC) – I	22PH101	Properties of Matter and Acoustics	6	5	3	25	75	100
		Core Practical (CP) – I	22PH102P	Physics Practical I	3	3	3	40	60	100
		Allied Course (AC) – I	22AMM101	Calculus	4	3	3	25	75	100
		Allied Course – II (AC)	22AMM102	Algebra and Analytical Geometry, 3D	3	2	3	40	60	100
	IV	Value Education	22UGVED	Value Education	2	2	3	25	75	100
				TOTAL	**30**	**21**	-	-	-	**700**
II	I	Language Course (LC) –II– Tamil*/Other Languages ** #	22LC201	Idaikkala Ilakkiyamum Puthinamum	6	3	3	25	75	100
	II	English Language Course (ELC) –II	21ELC201	Language through Literature – II (Poetry and Communication Skills)	6	3	3	25	75	100
	III	Core Course (CC) – II	22PH203	Mechanics and Theory of Relativity	6	5	3	25	75	100
		Core Practical (CP) – II	22PH204P	Physics Practical II	3	3	3	40	60	100
		Allied Course –III (AC)	22AMM203	Trigonometry and Fourier Series	3	2	3	25	75	100
		Allied Course –IV (AC)	22AMM204	Differential Equations and Laplace Transforms	4	3	3	40	60	100
	IV	Environmental Studies	22UGCES	Environmental Studies	2	2	3	25	75	100
				TOTAL	**30**	**21**	-	-	-	**700**
III	I	Language Course (LC) – III Tamil*/Other Languages ** #	22LC201	Kappiyamum Nadagamum	6	3	3	25	75	100
	II	English Language Course (ELC) – III	22ELC301	Language Through Literature-III(Drama and Communication skills)	6	3	3	25	75	100
	III	Core Course (CC) – III	23PH305	Thermal Physics	6	5	3	25	75	100
		Core Practical (CP) – III	23PH306P	Physics Practical-III	3	3	3	40	60	100
		Allied Course (AC) –I	23ACS301	Introduction To Computer and Office automation	4	4	3	25	75	100
		Allied Practical (AP) –I	23ACS302P	Allied Practical- I (AP) Office Automation lab	3	2	3	40	60	100

	IV	Non-Major Elective (NME) –I for those who studied Tamil under Part-I a) Basic Tamil for other language students b) Special Tamil for those who studied Tamil upto +2 but opt for other languages in degree Programme	23NMEPH31	Bio Physics	2	2	3	25	75	100
				TOTAL	**30**	**22**	-	-	-	**700**
IV	I	Language Course (LC) –IV - Tamil*/Other Languages ** #	22LC401	Pandaya Ilakkiyam	6	3	3	25	75	100
	II	English Language Course (ELC) – IV	22ELC401	Language Through Literature-IV (Short Stories and Communicationskills)	6	3	3	25	75	100
	III	Core Course (CC) – IV	23PH407	Electricity and Magnetism	5	5	3	25	75	100
		Core Practical (CP) – IV	23PH408P	Physics Practical-IV	3	3	3	40	60	100
		Allied Course – II (AC)	23ACS403	Fundamentals of C Programming	3	2	3	25	75	100
		Allied Practical -II (AP)	23ACS404P	Allied Practical-II (AP) Computer Programming LabUsing 'C'	3	2	3	40	60	100
	IV	Non-Major Elective (NME) – II -for those who studied Tamil under Part I a) Basic Tamil for other language students b) Special Tamil for those who studied Tamil upto +2 but opt for other languages in degree Programme	23NMEPH42	Medical Physics	2	2	3	25	75	100
		Skill Based Elective (SBE) – I	23SBEPH1	Fiber Optic Communication	2	2	3	25	75	100
				TOTAL	**30**	**22**	-	-	-	**800**
V	III	Core Course (CC) – V	R23PH509	Optics	5	5	3	25	75	100
		Core Course (CC) – VI	R23PH510	Atomic and Molecular Physics	5	5	3	25	75	100
		Core Course (CC) – VII	R23PH511	Electronics	6	5	3	25	75	100
		Core Practical (CP) – V	R23PH512P	Physics Practical – V	3	3	3	40	60	100
		Major Based Elective (MBE) – I	R23MBEPH1	Material Science	5	5	3	25	75	100
	IV	Skill Based Elective (SBE) – II	R23SBEPH2	Satellite Communication	2	2	3	25	75	100
		Skill Based Elective (SBE) – III	R23SBEPH3	Mobile Communication	2	2	3	25	75	100
		Soft Skills Development	23UGSDC	Soft Skill Development	2	2	3	25	75	100
				TOTAL	**30**	**29**	-	-	-	**800**
VI	III	Core Course (CC) – VIII	R23PH613	Nuclear Physics	6	5	3	25	75	100
		Core Course (CC) – IX	R23PH614	Theoretical Physics	6	5	3	25	75	100
		Core Practical (CP) – VI	R23PH615P	Physics Practical – VI	5	3	3	40	60	100
		Major Based Elective (MBE) – II	R23MBEPH2	Microprocessor and 'C' Programming	6	5	3	25	75	100
		Core Course (CC) – X	R23PHPW	Project	6	5	3	25	75	100
	V	Extension Activities		Extension Activities	-	1	-	-	-	-
		Gender Studies	23UGGS	Gender Studies	1	1	3	25	75	100
				TOTAL	**30**	**25**	-	-	-	**600**
				G. TOTAL	**180**	**140**				**4300**

CURRICULAM DESIGN
LIST OF ALLIED COURSES
ALLIED COURSE I - MATHEMATICS ALLIED COURSE II - COMPUTER SCIENCE

Subject	No. of Courses	Total Credits
Language Part – I	4	12
English Part –II	4	12
Core Course	9	45
Core Practical	6	18
Allied Course	6	16
Allied Practical	2	4
Non-Major Elective	2	4
Skill Based Elective	3	6
Major Based Elective	2	10
Project	1	5
Environmental Studies	1	2
Value Education	1	2
Soft Skill Development	1	2
Gender Studies	1	1
Extension Activities	1	1
Total	**44**	**140**

For those who studied Tamil upto 10th +2 (Regular Stream)

+ Syllabus for other Languages should be on par with Tamil at degree level

those who studied Tamil upto 10th +2 but opt for other languages in degree level under Part I should study special Tamil in Part IV

** Extension Activities shall be outside instruction hours

Note:			
		CIA	**ESE**
1.	Theory	25	75
2.	Practical	40	60
3. Separate passing minimum is prescribed for Internal and External marks			

FOR THEORY

The passing minimum for CIA shall be 40% out of 25 marks [i.e. 10 marks]

The passing minimum for End Semester Examinations shall be 40% out of 75 marks [i.e. 30 marks]

FOR PRACTICAL

The passing minimum for CIA shall be 40% out of 40 marks [i.e., 16 marks]

The passing minimum for End Semester Examinations shall be 40% out of 60 marks [i.e., 24 marks]

MAJOR BASED ELECTIVE (MBE) OFFERED BY THE DEPARTMENT

Semester	Part	Course	Title of the Paper
V	III	MBE –I	Solid State Physics
			Communication Physics
			Laser Physics
VI		MBE –II	Microprocessor & Programming in C
			Nanotechnology
			Non-Conventional Energy Source

NON MAJOR ELECTIVE (NME) OFFERED BY THE DEPARTMENT

Semester	Part	Course	Title of the Paper
III	IV	NME –I	Bio Physics
IV		NME –II	Medical Physics

SKILL BASED ELECTIVE (SBE) OFFERED BY THE DEPARTMENT

Semester	Part	Course	Title of the Paper
IV	IV	SBE-I	Fiber Optic Communication
V		SBE-II	Mobile Communication
V		SBE-III	Satellite Communication

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TAMILNADU, INDIA

DEPARTMENTOF PHYSICS

B.Sc., PHYSICS

(For the candidates admitted in the academic year 2022 –2023)

Question Paper Pattern- (Theory)

Max time: 3 Hours **Max Marks: 75**

Section – A (10 x 2 = 20)

Answer all the questions

Answer in One or Two sentences each

1. 2.	Unit I
3. 4.	Unit II
5. 6.	Unit III
7. 8.	Unit IV
9. **10.**	Unit V

Section – B (5 x 5 = 25)

Answer all the questions

Each answer should not exceed 500 words

11. a (or) b	Unit I
12. a (or) b	Unit II
13. a (or) b	Unit III
14. a (or) b	Unit IV
15. a (or) b	Unit V

Section – C (3 x10 = 30)

Answer any <u>THREE questions</u> in 1200 words

16. Unit I
17. Unit II
18. Unit III
19. Unit IV
20. Unit V

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SEMESTER I

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI – 614016

(For the Candidate admitted in the academic year 2022-2023)

DEPARTMENT OF PHYSICS

B. Sc., PHYSICS

Semester: I-CC- I: Properties of Matter and Acoustics

Ins. Hrs. /Week: 6 **Course Credit: 5** **Course Code: 22PH101**

UNIT- I: Elasticity (17 Hours)

Introduction-Hooke's law – Stress-Strain diagram – Factors affecting elasticity- Different moduli of elasticity - Relation between the elastic moduli – Poisson's ratio –Twisting couple on a cylinder – Determination of rigidity modulus by static torsion – Work done in twisting a wire - Torsion pendulum - Determination of rigidity modulus and moment of inertia.

UNIT - II: Bending of Beams (19 Hours)

Bending of beams - Expression for bending moment – Cantilever – Expression for depression of the loaded end of a cantilever — Young's modulus by measuring the tilt in a loaded cantilever –Oscillation of a cantilever - Non-uniform bending – Expression for depression- Uniform bending – Expression for elevation – Experimental determination of Young's modulus using pin and microscope method (Non-uniform bending – Uniform bending) –Determination of Young's modulus by Mirror and Telescope method- Determination of Young's modulus by Koenig's method

UNIT - III: Surface Tension (18 Hours)

Definition –Explanation of surface tension on kinetic theory – Surface Energy-Interfacial surface Tension – Angle of contact -Neumann's triangle- Excess pressure inside a liquid drop and soap bubble -Excess pressure inside a curved liquid surface– Experimental determination of surface tension - Jaeger's method - Drop-weight method -Capillary rise method - Variation of surface tension with temperature.

UNIT- IV: Viscosity (19 Hours)

Newton's law of viscous flow – streamlined and turbulent motion – Reynold's number - Poiseuille's formula for the flow of a liquid through a horizontal capillary tube – Experimental determination of co-efficient of a liquid by Poiseuille's method -Ostwald's viscometer – Terminal velocity - Stokes's formula and Experimental determination of Stokes's Method- Viscosity of gases – Mayer's formula -Variation of viscosity with temperature and pressure - Lubrication.

UNIT -V: Acoustics (17 Hours)

Reverberation – Sabine's Reverberation formula – Factors Affecting the Acoustics of Buildings – Sound distribution in an Auditorium – Requisites for good acoustics – Ultrasonic Production and detection by Piezo electric method.

Total Lecture Hours – 90

COURSE OUTCOME

Upon successful completion of this course the students would be able:

1. Analyze and comprehend regarding the strength of the solid materials of different size.
2. Examine the physical properties of matter.
3. Describe the concept of Surface Tension.
4. Discuss the dynamic properties of fluids.
5. Acquire the knowledge about the concept of Acoustics.

TEXT BOOK(S)

1. Barber, J. R , 2010,.Elasticity,Springer

2. Brijlal& N. Subramanian, 2008, A Text Book of Sound, Vikas Publishing. Pvt.Ltd.

3. R. Murugeshan, 2019, Properties of matter, S. Chand & Co. Pvt. Ltd., Revised edition.

4. Murugeshan R., SivaprasathKiruthiga , 30 July 2012, Properties of Matter and Acoustics

5. Paul Filippi, AimeBergassoli , Dominique Habault , & 1 More , 23 September 1998 Acoustics: Basic Physics, Theory, and Methods

REFERENCE BOOK(S)

1. Fundamentals of General properties of matter, 2012, S. Chand &Co. Pvt. Ltd.
2. Basil C McEwen, 12 September 2011,The Properties of Matter.
3. Brijlal& N. Subramanian, 2005, Properties of matter, VikasPublishing. Pvt. Ltd.
4. R.L. Saihgal, 1979,A Text Book of Sound, S. Chand & Co. Pvt. Ltd, New Delhi.
5. Hanako Ayabito & Mitsuko Katsukawa ,15 April 2013,Ultrasonics: Theory, Techniques & Practical Applications.

E- RESOURCES

1. http://shorturl.at/dkux4

2. https://cutt.ly/Vhlco3J

3.https://youtu.be/amGa5RRrCss

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SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

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SUNDARAKKOTTAI, MANNARGUDI – 614016

(For the Candidate admitted in the academic year 2022-2023)

DEPARTMENT OF PHYSICS

B. Sc., PHYSICS

Semester: I-CP- I: Physics Practical I

(Any Ten Experiments)

Ins. Hrs. /Week: 3 **Course Credit: 3** **Course Code: 22PH102P**

1. Young's modulus - Uniform bending - Pin & Microscope Method.
2. Young's modulus - Non uniform bending - Pin & Microscope Method.
3. Surface Tension, Interfacial Surface Tension – Drop weight Method.
4. Moment of Inertia - Torsion pendulum.
5. Sonometer – Determine the frequency of a given tuning fork
6. Spectrometer – Refractive index of a solid prism.
7. Surface Tension by Capillary rise method.
8. Long focus convex lens - f, R, refractive index-determination.
9. Newton's ring's – Determination of radius of curvature of a given convex lens.
10. Stokes's method – Viscosity of highly viscous liquid.
11. Determination of the Elastic Constants of a Wire by Searle's method.
12. Comparison of Viscosities of two liquids – Ostwald's Viscometer/ HARE's Apparatus.
13. Young's Modulus by Uniform Bending – Optic Lever method.
14. Determine the diameter of the material using Travelling microscope.
15. Determine the coefficient of a liquid – Poiseuille's method.

Total Lecture Hours – 45

COURSE OUTCOME

Upon successful completion of this course the students would be able:

1. Perform experiments on any material to identify the strength of the given objects.
2. Deal with liquids based on their viscosity.
3. Commend on the relation between frequency, length and tension of a stretched string under vibration.

TEXT BOOK(S)

1. Dr. S. Somasundaram, Practical Physics, Apsara Publications, Tiruchirappalli, 2012.

REFERENCE BOOK(S)

1. S. Srinivasan, A Text Book of Practical physics, S. Sultan Chand publications. 2005
2. R. Sasikumar, Practical Physics, PHI Learning Pvt. Ltd, New Delhi, 2011.

E - RESOURCES

1.https://youtu.be/GTnPEtksTEc
2.https://youtu.be/veQ-LfJhfxM
3.https://youtu.be/hV0qG7BTJJI

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI – 614 016.

(For the students of I B.Sc. Mathematics / II B.Sc., Chemistry from 2022-23)

DEPARTMENT OF PHYSICS

Semester: I/III - AC- I: Allied Physics - I

Ins. Hrs. /Week: 4 **Course Credit: 3** **Course Code: 22APY101**

UNIT -I: Properties of Matter (14 Hours)

Elasticity: Stress–Strain–Young's modulus–stress-strain Diagram–Bending of beams–Expression for the bending moment–Measurement of Young's modulus by bending of a beam–Non-uniform bending and uniform bending.

Viscosity: Streamline flow and Turbulent Flow-Critical velocity-Poiseuille's formula – Determination of Coefficient of Viscosity of a liquid (Variable Pressure head)

Surface Tension: Definition-Drop Weight method of determining the surface tension of a Liquid-Experiment to determine the interfacial tension

UNIT-II: Mechanics (10 Hours)

Centre of Gravity – Introduction- Centre of Gravity of a Solid Hemisphere-Hollow Hemisphere-Centre of Gravity of a Solid Cone

States of Equilibrium: Equilibrium of a rigid body – Stable, unstable and neutral equilibrium - Law of Floatation- Stability of Floating bodies –Meta Center- Metacentric Height- Determination of Metacentric of a ship.

UNIT-III: Thermal Physics (12 Hours)

Modes of heat Transfer-Conduction, Convection, Radiation- Coefficient of Thermal Conductivity-Determination of Thermal Conductivity of a bad Conductor by Lee's disc Method.

Radiation: Blackbody-Stefan's Law-Newton's law of Cooling-Newton's law of cooling from Stefan's Law-Wien's displacement Law-Rayleigh-Jeans Law-Planck's law.

UNIT-IV: Optics (12 Hours)

Interference: Introduction-Air Wedge-Newton's Rings-Color of thin films.

Diffraction: Plane Diffraction, Grating-Theory of Plane Transmission Grating

Scattering: Types of Scattering-Raman Scattering-Tyndall Scattering

UNIT-V: Electronics (12 Hours)

Semiconductor and its Properties- Intrinsic and extrinsic semiconductor-PN Junction diode – Biasing of PN junction –V-I characteristics of junction Diode- Zener diode -Transistor-Characteristics of transistor-CB, CE Mode-Transistor as an Amplifier-Transistor as an Oscillator.

Total Lecture Hours - 60

COURSE OUTCOME

Upon successful completion of this course the students would be able:

1. Examine the physical properties of matter.
2. Determination of C.G of a various shapes.
3. Discuss different thermal Processes and laws of thermodynamics.
4. Identify the interference pattern, Diffraction and Scattering of light.
5. Acquire the knowledge of semiconductor and its properties.

TEXT BOOK(S)

1.R. Murugeshan, Properties of matter, 2012. Chand & Co. Pvt.Ltd., Revised edition

2.Narayanamoorthy and N. Nagarathinam, 2005.Mechanics-Part II, The National Publishin Company, Chennai,.

3.Dr.N.Subramaniyam,Brijlal andDr.M.N.Avathanulu,2012.Optics, S. Chand&Co. Pvt.Ltd.-25th revised edition, New Delhi,.

4.V.Vijayendran,S.Viswanathan, 2004.DigitalFundamentals, Printers & Publishers Private Ltd, Chennai.

5.A.B.Gupta and H.P.Roy 2016.Thermal physics,Books&Allied (P) Ltd.,kolkatta.

REFERENCE BOOK(S)

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

2.D.S. Mathur, 1990.Mechanics, S. Chand & Company Ltd., New Delhi ..

3.K.Mehta and Rohit Mehta, 2017.Principles of Electronics, Chand & Co. Pvt.Ltd., Revised edition

4. Brijlaland Subramaniyam, 2015.Heat and Thermodynamics & Statistical physics, S. Chand & Co.

5.P.Duraipandian & Muthamizh Jayapragasam, 2018.Chand&Co. Pvt.Ltd., Revised edition.

E- RESOURCES

1. https://cutt.ly/Vhlco3J
2. https://youtu.be/amGa5RRrCss
3. http://shorturl.at/dkux4
4. http://shorturl.at/lmBFL
5. https://youtu.be/G0iSEDyJKDo

Semester: I / III - AP- I: Allied Physics Practical - I

(Any 10 Experiments)

Ins. Hrs. /Week: 3 **Course Credit: 2** **Course Code: 22APY102P**

1. Measurements of length (or diameter) using Vernier calipers, Screw gauge and Travelling Microscope.
2. Non-Uniform bending – Pin and Microscope.
3. Uniform bending-scale and Telescope.
4. Surface tension and Interfacial Surface tension by Drop Weight Method.
5. Coefficient of viscosity of liquid – Variable Pressure Head Method.
6. Thermal conductivity of a bad conductor – Lee's disc Method.
7. Specific heat capacity of liquid – Newton's cooling Method.
8. Spectrometer – Refractive index of a solid prism.
9. Newton's Rings – 'R' determination.
10. Air wedge – Thickness of the given thin wire.
11. Determine the frequency of a given tuning fork – Sonometer.
12. Stokes's method Viscosity of highly viscous liquid.

Total Lecture Hours - 45

COURSE OUTCOME

Upon successful completion of this course the students would be able:

1. Acquire the knowledge of laboratory technique.
2. Elaboration of the usage of equipments in various field applications of Physics.

TEXT BOOK(S)

1. Dr. S. Somasundaram, Practical Physics, Apsara Publications, Tiruchirappalli, 2012.
2. R. Sasikumar, Practical Physics, PHI Learning Pvt. Ltd, New Delhi2011.

REFERENCE BOOK(S)

1. S. Srinivasan, A Text Book of Practical Physics., Sultan Chand Publications.

E - RESOURCES

1. https://youtu.be/Q8Otf6k3uGk
2. https://youtu.be/8DhfUz0idwM

SEMESTER II

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI – 614016

(For the Candidate admitted in the academic year 2022-2023)

DEPARTMENT OF PHYSICS

B. Sc., PHYSICS

Semester: II - CC - II: Mechanics and Theory of Relativity

Ins. Hrs. /Week: 6 **Course Credit: 5** **Course Code: 22PH203**

UNIT - I: Projectile, Impulse and Impact (17 Hours)

Projectile - particle projected in any direction - Path of a projectile is a parabola - Range of a projectile on plane inclined to the horizontal -Maximum range on the inclined plane - Impulse of a force - Laws of impact - Direct impact between two smooth spheres - oblique impact between two smooth spheres - Impact of a smooth sphere on a smooth fixed horizontal plane - Loss of KE due to direct impact - Oblique impact.

UNIT - II: Dynamics of Rigid Body (20 Hours)

Moment of Inertia - Kinetic energy and angular momentum of rotating body - Theorems of perpendicular and parallel axes - Acceleration of a body rolling down an inclined plane without slipping - Oscillations of a small sphere on a large concave smooth surface - Compound pendulum – Centre of suspension and Centre of oscillation - Centre of percussion – Minimum period of a compound pendulum.

UNIT - III: Gravitation (19 Hours)

Newton's law of gravitation - Mass and density of earth - Inertial and Gravitation mass - Determination of G-Boy's experiment -Kepler's Laws of planetary motion -Deduction of Newton's law of gravitation from Kepler's Law - Gravitation - Field - potential -Intensity of Gravitational field -gravitational potential due to a point mass-Gravitational potential and field due to a spherical cell and solid sphere

UNIT- IV: Centre of Gravity, Centre of Pressure and Floating Bodies (17 Hours)

Centre of gravity of a body –Centre of gravity of solid hemisphere- C.G of a hollow hemisphere – C.G of a solid cone - Centre of Pressure-Pascal's law- rectangular lamina-triangular lamina- Archimedes principle - Conditions of equilibrium of a floating body - Stability of equilibrium of a floating body - Meta -Centre - Experimental determination of a metacentric height of a ship.

UNIT - V: Relativity (17 Hours)

Galilean –Newtonian relativity, Galilean transformations-Michelson Morley experiment and its importance- Lorentz transformations and its interpretation- consequence of Lorentz transformation- Length

contractor, time dilation-relativistic addition of velocities-Mass energy equivalence-Basic ideas of general theory of relativity.

Total Lecture Hours - 90

COURSE OUTCOME

Upon successful completion of this course the students would be able:

1. Acquire the knowledge of motion of the charged particle in electromagnetic field.
2. Discuss the effect of gravitation on objects.
3. Determination of C.G of a various shapes.
4. Analyze the concepts of floating bodies.
5. Apply the knowledge of the general theory of relativity.

TEXT BOOK(S)

1. M. Narayanamurthi and N. Nagarathinam, 2005, Dynamics, The National Publishing Company, Chennai.
2. M. Narayanamurthi and N. Nagarathinam, Statics, 2005, Hydrostatics and Hydrodynamics - The National Publishing Company, Chennai.
3. R. Murugeshan, 2019,Properties of matter, S. Chand & Co. Pvt. Ltd., Revised edition.
4. Steven Weinberg ,2008,Gravitation and Cosmology: Principles and Applications of the General Theory of Relativity (WSE) ,Wiley Publishers,January .
5. Robert Resnick , January 2007, Introduction to Special Relativity ,Wiley publishers.

REFERENCE BOOK(S)

1. R. Murugesan, January 2007,Mechanics and Mathematical Physics, S. Chand & Company Ltd., New Delhi.
2. D.S. Mathur, Mechanics, S. Chand & Company Ltd., New Delhi.
3. James M. Gere , *2017,*Mecánica De Materiales, 7th Edition.
4. Russell C. Hibbeler, 22 March 2010,Mechanics of Materials.
5. Albert Einstein , 15 June 2017,Relativity: The Special and the General Theory.

E- RESOURCES

1.https://youtu.be/R8wKV0UQtlo

2.http://shorturl.at/lmBFL

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Semester: II - CP - II: PHYSICS PRACTICAL II
(Any Ten Experiments)

Ins. Hrs. /Week: 3 **Course Credit: 3** **Course Code: 22PH204P**

1. Cantilever depression—Scale and Telescope Method.
2. Potentiometer – Calibration of an Ammeter.
3. Spectrometer – μ of the hollow Prism.
4. Concave lens – Focal length determination.
5. Meter bridge - Specific resistance determination.
6. Spectrometer – Grating - Normal incidence method.
7. Meter bridge – Series and parallel circuit.
8. Spectrometer – Grating – wavelength of the mercury spectral lines.
9. Compound pendulum – g and k determination.
10. Potentiometer –Determination of resistance.
11. Determination of thickness of thin wire - Air wedge.
12. Viscosity of a liquid – capillary flow method.
13. Young's modulus uniform bending – Optical lever.
14. Rigidity modulus – Static Torsion.
15. Polarimeter.

Total Lecture Hours - 45

COURSE OUTCOME

Upon successful completion of this course the students would be able:

1. Comparison of the thermal conductivity of solids.
2. Analyze the heat capacity of various liquids.

TEXT BOOK(S)

1.Dr. S. Somasundaram, Practical Physics, Apsara Publications, Tiruchirappalli, 2012.

REFERENCE BOOK(S)

1. S. Srinivasan, A Text Book of Practical physics, S. Sultan Chand Publications. 2005
2. R. Sasikumar, Practical Physics, PHI Learning Pvt. Ltd, New Delhi, 2011.

E - RESOURCES

1.https://youtu.be/5Rk2klHiPBc
2.https://youtu.be/N0lxwqANsd4

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI – 614 016

(For the students of I B.Sc. Mathematics / II B.Sc., Chemistry from 2022-23)

DEPARTMENT OF PHYSICS

Semester: II / IV - AC- II: Allied Physics – II

Ins. Hrs. /Week: 4 **Course Credit: 3** **Course Code: 22APY203**

UNIT- I: Electrostatics (12 Hours)

Coulomb's inverse square law – Gauss theorem and its applications (Intensity at a point due to a charged Sphere & cylinder) – Principle of a capacitor – Capacity of a spherical and cylindrical capacitors – Energy stored in a capacitor – Loss of energy due to sharing of charges - Capacitors in series and parallel- Types of capacitors

UNIT -II: Magnetism (12 Hours)

Intensity of magnetization–Magnetic lines of Force-Magnetic Lines of Induction- Magnetic Susceptibility Magnetic Permeability — Types of magnetic materials – Properties of para, dia and ferromagnetic materials, Cycle of magnetization– Hysteresis – B-H curve – Applications of B-H curve– Ferro magnets, ferrimagnetism and their applications.

UNIT-III: Atomic Physics (11 Hours)

Bohr Model - Somerfield's and Vector Atom Models – Pauli's exclusion Principle – Various quantum numbers and quantization of orbits. X-rays: Continuous and Characteristic X-rays – Mosley's Law and importance, Bragg's law – Determination of Crystal Structure by Laue's Powder photograph method

UNIT -IV: Nuclear Physics (12 Hours)

Introduction – Nucleus – Classification of Nuclei – Nuclear Size – Charge – Mass and Spin – Liquid drop model. Particle Accelerators-Cyclotron– Betatron and –Nuclear reactor- Four types of reactions– Classifications of Elementary particles.

UNIT -V: Digital Electronics (13 Hours)

Decimal – Binary – Octal and Hexa Decimal number systems and their Mutual Conversions – Binary arithmetic (Addition, Subtraction, Multiplication and Division - Basic logic gates – AND, OR, NOT, NAND, NOR and EXOR gates – NAND and NOR as universal building gates – Boolean Algebra – Laws of Boolean Algebra – De Morgan's Theorems – Their verifications using truth tables.

Total Lecture Hours - 60

COURSE OUTCOME

Upon successful completion of this course the students would be able:

1. Identify the Presence of static electric charges and field due to static charges.
2. Describe about the magnetic materials and their applications.
3. Analyze the different atom models.
4. Discuss about the applications reactors.
5. Discuss the Basic Logic gates.

TEXT BOOK(S)

1.Brilal and N. Subrahmanyam, 2000.A Text Book of Electricity and Magnetism, Ratan Prakasan Mandir Educational &University Publishers,New Delhi.

2.R. Murugesan., Electricity and Magnetism. 2001. Third Revised edition, S. Chand & Co, New Delhi.

3.R. S. Sedha, 2004. A text book of Digital Electronics, S. Chand & Co, New Delhi, First edition.

4.Mehta V.K., 2014. Principles of Electronics, S. Chand and company Ltd, New Delhi,

5.D.C. Tayal, 2009.Nuclear Physics, Himalaya Publishing House.

REFERENCE BOOK(S)

1. Narayanamurthi, 1988.Electricity and Magnetism, The National Publishing Co, First edition.

2.J. B. Rajam, 1990. Atomic Physics., S. Chand & Company Limited, New Delhi, First edition,

3.Malvino, Digital principles and Applications, McGraw-Hill International Editions, New York, 2002.

4.Albert Paul Malvino, Digital principles and Applications, McGraw-Hill International Editions, New York, 2002.

5.R. Murugesan, Kiruthiga Sivaprasath, Modern Physics, S. Chand &Co Ltd., New Delhi, 14th Revised edition, 2014.

E – RESOURCES

1.https://cutt.ly/Vhlco3J

2.https://bit.ly/39S6kEG

3.https://youtu.be/PYScA3BGphA

4.https://youtu.be/wEu4w4jxq30

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Semester: II / IV- AP- II: ALLIED PHYSICS PRACTICAL - II
(Any 10 Experiments)

Ins. Hrs. /Week: 3 **Course Credit: 2** **Course Code: 22APY204P**

1. Potentiometer – Ammeter calibration.
2. Carry Foster's Bridge – Resistance Determination.
3. Meter bridge – Specific resistance.
4. Characteristics of a Zener Diode-Break down voltage.
5. Basic logic gates – AND, OR and NOT gates using discrete components.
6. AND, OR and NOT gates using IC'S.
7. Verification of NAND and NOR as Universal gates.
8. Verification of De Morgan's theorem.
9. Verification of Boolean algebra (any five).
10. Spectrometer – Grating – Normal incidence.
11. Characteristics of a junction diode –Forward resistance and knee voltage.
12. Potentiometer – low range voltmeter.

Total Lecture Hours - 45

COURSE OUTCOME

Upon successful completion of this course the students would be able:

1. Apply the principle of potentiometer to calibrate the ammeter and voltmeter.
2. Explain I-V characteristics of a junction and Zener diode.
3. Apply AND /OR/NOT logic operation to solve simple logic circuits.
4. Acquire the knowledge of laboratory technique in the field of Physics.

TEXT BOOK(S)

1. Dr.S. Somasundaram, Practical Physics, Apsara Publications, Tiruchirappalli, 2012.
2. R. Sasikumar, Practical Physics, PHI Learning Pvt. Ltd, New Delhi2011.

REFERENCE BOOK(S)

1. S. Srinivasan, A Text Book of Practical Physics., Sultan Chand publications.

E - RESOURCES

1. https://youtu.be/aMrGe2r9nco
2. https://youtu.be/x3VvjHVBGDU

SEMESTER III

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI – 614016

(For the Candidate admitted in the academic year 2022-2023)

DEPARTMENT OF PHYSICS

B. Sc., PHYSICS

Semester: III-CC- III: Thermal Physics

Ins. Hrs. /Week: 6 **Course Credit: 5** **Course Code:23PH305**

UNIT -I: Specific Heat **(17 Hours)**

International temperature scale-Specific heat of solids – radiation correction – Dulong and Petit's law - Quantum theory - Einstein theory of specific heat – Debye's theory of specific heat– Specific heat of liquids – Newton's law cooling - Specific heat of gases – Mayer's Relation - Platinum resistant thermometer

(19 Hours)

UNIT- II: Conduction

Coefficient of Thermal Conductivity - Rectilinear Flow of Heat along a Bar Thermal conductivity of good conductors - Lee's method for metal– Forbe's method to find K – Lee's disc method of Bad Conductors – Heat Flow Through a Compound wall – Accretion of Ice on Ponds – Practical applications of conduction of heat.

(18 Hours)

UNIT -III: Radiation

Radiation – Stefan's law - Deduction of Newton's law from Stefan's law – Boltzmann's law –Black body radiation – Wein's law – Rayleigh-Jean's law – Wiedemann-Franz law– Planck's law- Angstrom Pyrheliometer – Solar constant – Surface temperature of sun -Sources of solar energy Photo voltaic cell .

(18 Hours)

UNIT- IV: Low Temperature

Joule – Thomson's effect – Porous plug experiment – Liquefaction of gases –Linde's method Liguefaction of hydrogen- Adiabatic demagnetization– Liquefaction of He– Practical applications of low temperature – Refrigerating mechanism.

UNIT -V: Thermodynamics **(18 Hours)**

First law of thermodynamics – Heat engines – Reversible an irreversible process - Carnot's theorem- Carnot's refrigerator – Second law of thermodynamics - Entropy – Change of entropy in reversible and irreversible processes – Temperature entropy diagram (T.S) – Law of increase of entropy– Maxwell's thermo dynamical relations.

Total Lecture Hours-90

COURSE OUTCOME

The students will be able to

1. Justify the phenomena connected with heat as radiation
2. Know the basics concept of conduction and production methods
3. Ability to different thermalcapacities of substances
4. Discuss the process of making heat to do mechanical work
5. Illustrate the basic laws of Thermodynamics
6. Solve the problems based on heat transfer, entropy, and thermal radiation

TEXT BOOK(S)

1. J.B.RajamandC.LArora,1983,Heat and Thermodynamics, S.Chand&Co.
2. Brijlal and Subramaniyam,2015, Heat and Thermodynamics & Statistical physics, S.Chand &Co.
3. Brijlal and Subramaniyam, 2016,Heat and Thermodynamics , S. Chand & Co.
4. Mark Zemansky and Richard Dittman 1 July 2017 , Heat and Thermodynamics, SIE8thEdition
5. D.S. Mathur , 1 January 2008, Heat and Thermodynamics S. Chand &Sons

REFERENCE BOOK(S)

1. M. Narayanamoorthy and N. Nagarathinam, 1987,Heat, Nationalpublishing Co,EighteditionChennai,.
2. D.S. Mathur,2014, Heat and Thermodynamics, S. Chand &Co.
3. Anandamoy Manna, January 2011,Heat and Thermodynamics.
   S.C. Garg,R.M. Bansal&Ghosh, 1 July 2017, Thermal Physics:with Kinetic Theory, Thermodynamics and Statistical Mechanics2nd Edition,
4. Erode Gopal, 12 June 2012,Specific Heats at Low Temperatures (TheInternational Cryogenics Monograph Series),

E_RESOURCES

https://youtu.be/1nECy2s_qEohttps://youtu.be/x6V-8rYNuss

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI – 614016

(For the Candidate admitted in the academic year 2022-2023)

DEPARTMENT OF PHYSICS

B. Sc., PHYSICS

Semester: III-CP- III: PHYSICS PRACTICAL- III

Ins. Hrs./Week:3 **Course Credit:3** **Course Code: 23PH306P**

1. Specific heat capacity – Newton's Law of cooling
2. Rigidity modulus – Torsion Pendulum (Without mass)
3. Rigidity modulus – Torsion Pendulum (With mass)
4. Determination of thermal conductivity of good conductor by Searle's method
5. Specific heat capacity of a liquid by method of mixtures (Mass time correction)
6. Young's modulus by non-Uniform bending Optic lever method.
7. Specific heat capacity – Joule's Calorimeter.
8. A Thermal Conductivity – Lee's disc.
9. Spectrometer – Liquid Prism.
10. Determination of thermal conductivity of rubber tube.
11. A.C frequency by Sonometer using steel wire.
12. Young's modulus by Non-uniform bending Koenig's method.
13. C frequency by Sonometer using brass wire.
14. Rigidity modulus – Bar Pendulum
15. Sonometer – Determination of specific gravity of solid and liquid.

Total Lecture Hours - 45

TEXT BOOK(S)

1. Dr.S.Somasundara*PracticalPhysics*, Apsara publications, Tiruchirapalli,2012.
2. Department of Physics, *Practical Physics*, (B.Sc. Physics Main), St. Joseph's College, Tiruchirapalli1998.

REFERENCE BOOK(S)

1. S. Srinivasan, *A Text Book of Practical physics*, S. Sultan Chandpublications,2005.
2. R. Sasikumar, *Practical Physics*, PHI Learning Pvt. Ltd, NewDelhi,2011.

E_RESOURCES:

1.https://youtu.be/GTnPEtksTEc

2.https://youtu.be/veQ-LfJhfxM

SEMESTER -IV

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI – 614016

(For the Candidate admitted in the academic year 2022-2023)

DEPARTMENT OF PHYSICS

B. Sc., PHYSICS

Semester: IV- CC- IV: ELECTRICITY AND MAGNETISM

Ins. Hrs./Week:5 **Course Credit: 5** **Course Code: 23PH407**

UNIT I Electrostatics (15 hours)

Coulomb's Law – Gauss's Law and its applications (Electric Field due to a uniformly charged sphere, hollow cylinder & solid cylinder)– Electric Potential – Potential at a point due to a uniformly charged conducting sphere – Principle of a capacitor– Capacity of a spherical and cylindrical capacitors – Energy stored in a charged capacitor–Loss of energy on sharing of charges between two capacitors.

UNIT II Current Electricity (14 hours)

Ampere's circuital law and its applications -Field along the axis of a circular coil and Solenoid–Theory of Ballistic Galvanometer –Figure of merit– Damping Correction– Kirchhoff's Laws of Electricity – Wheatstone's Bridge – Carey Foster's Bridge–Potentiometer– Calibration of Ammeter – Calibration of Voltmeter (Low range and High range) – Comparison of Resistances.

UNIT III Electromagnetic Induction (16 hours)

Laws of electromagnetic induction– Self and mutual induction– Self-inductance of a solenoid– Mutual inductance of a pair of solenoids–Coefficient of coupling–Experimental determination of self (Rayleigh's method) and mutual inductance– Growth and decay of current in a circuit containing L and R–Growth and decay of charge in a circuit containing C and R– Measurement of High resistance by leakage.

UNIT IV AC Circuits (16 hours)

Alternating EMF applied to series circuits containing, LR and CR– Alternating EMF applied to circuits containing L, C and R–Series and Parallel resonance circuits– Sharpness of resonance–Q factor– Comparison between Series and Parallel resonant circuits –Power in AC circuits (R, L-R, L-C-R only) – Power factor–Watt less current – Choke Coil – Transformer
– Uses of Transformers – Skin Effect.

UNIT V Magnetic Properties of Materials (14 hours)

Magnetic field – Magnetic induction – Intensity of Magnetization – Magnetic permeability – Susceptibility – Properties of para, dia, and ferromagnetic materials – Curie point - Curie temperature - Hysteresis – Retentivity – Coercivity – Experiment to draw B-H curve by magnetometer method – Loss of energy per cycle.

Total Lecture Hours - 75

COURSE OUTCOMES:

On the completion of the course students will be able to:

- Understand fundamental laws of electricity and magnetism
- Analyze the calibration of electrical instruments.
- Verify the laws of electromagnetic induction
- Apply the knowledge of electricity and magnetism towards technological applications
- Differentiate magnetic materials

TEXT BOOK(S)

1. BrijLal and N. Subrahmanyam, *A Text Book of Electricity and Magnetism*, S. Chand & Company Pvt. Ltd, New Deihi-2020.
2. R. Murugeshan, *Electricity and Magnetism*, S. Chand & Company Pvt. Ltd., New Delhi – 2017.
3. M. Narayanamurthy & N.Nagarathnam, *Electricity & Magnetism*, NPC pub., Revised edition-1992.

REFERENCE BOOK(S)

2. D. L. Sehgal, K. L. Chopra and N. K. Sehgal, *Electricity and Magnetism*, Sultan Chand& Sons. New Delhi-2020.
3. D.N.Vasudeva, *Electricity and Magnetism*, S.Chand & Co- 2011
4. K.K.Tewari, *Electricity and Magnetism*, S.Chand & Co-2002.
5. E.M.Pourcel, *Electricity and Magnetism*- Berkley Physics Course,Vol.2, McGrawHill Education; 2nd edition -2017.
6. D.C. Tayal, *Electricity and Magnetism*, Himalaya Publishing Co., Fourth Edition-2019.
7. D. Halliday, R.Resnick and J.Walker, *Fundamentals of Physics–Electricity and Magnetism*, iley India, Pvt Ltd -2011
8. David Griffith, *Introduction to Electrodynamics*, Pearson Education India Learning Private Limited; 4th edition- 2012.
9. R.B. Singh, *Fundamentals of Electricity and Magnetism,* New Age International (P) Ltd., Publishers-2018
10. Basudev Ghosh,*Foundations of Electricity and Magnetism,* Books & Allied., Publishers-2021
11. Edward M. Purcell and Edward M. Purcell, *Electricity and Magnetism,* University printing house Cambridge- 2013

E-Resources

1. https://nptel.ac.in/courses/115104088
2. https://www.uou.ac.in/sites/default/files/slm/BSCPH-102.pdf

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2022 – 2023)

DEPARTMENT OF PHYSICS

B.Sc., PHYSICS

Semester: IV-CP- IV: PHYSICS PRACTICAL- IV

Ins. Hrs./Week:3 **Course Credit: 3** **Course Code: 23PH408P**

(Any Twelve Experiments)

1. Carey Foster's Bridge- Specific Resistance.
2. Carey Foster's Bridge- Temperature coefficient.
3. Potentiometer-Calibration of low range voltmeter.
4. Figure of Merit of a B.G
5. Characteristics of Junction Diode.
6. Characteristics of Zener Diode.
7. Self Inductance of a coil- Anderson bridge.
8. Logic gates – Discrete components.
9. Potentiometer- high range voltmeter.
10. Measurement of low resistances by using Potentiometer.
11. Determination of internal resistance of a cell using potentiometer.
12. Field along the axis of the coil.
13. Moment of magnet – Tan C Position.
14. M and $B_H$determination.
15. Transistor –CE Configuration.

Total Lecture Hours - 45

TEXT BOOK(S)

1. Dr.S.Somasundaram, *PracticalPhysics*, Apsara publications,Tiruchirapalli,2012.
2. Department of Physics, *Practical Physics*, (B.Sc. PhysicsMain),St.Joseph's College,Tiruchirapalli1998.

REFERENCE BOOK(S)

1.S. Srinivasan, *A Text Book of Practical physics*, S. Sultan Chand publications,2005.
2. R. Sasikumar, *Practical Physics*, PHI Learning Pvt. Ltd, New Delhi,2011.

E_RESOURCES

1. https://youtu.be/5Rk2klHiPBc
2. https://youtu.be/N0lxwqANsd4

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI - 614016.

(For the Candidates admitted in the academic year 2022 -2032)

DEPARTMENT OF PHYSICS

B.Sc., PHYSICS

Semester: IV-SBE - I: FIBER OPTIC COMMUNICATION

Ins. Hrs./Week:2 **CourseCredit:2** **Course Code: 23SBEPH1**

UNIT-I: Optical Fiber **(6 Hours)**

Introduction – Structure of optical fiber-Total Internal Reflection-Block diagram of optical fiber– Advantages, Disadvantages & Applications of fiber optic communication.

UNIT-II: Optical Fiber Modes **(7 Hours)**

Fiber Modes-Wave Propagation-Single and multimode Fibers-Step and Graded index fiber – Ray transmission theory – Single mode fiber – Cut off wavelength.

UNIT-III: Fiber Losses **(5 Hours)**

Fiber Losses - Scattering, absorption, bending, leaky mode and coupling Losses-Attenuation Coefficient. – Inter modal dispersion, Intra modal dispersion

UNIT-IV: Fiber Optical Sources **(6 Hours)**

LDR –LED'S, Laser Diode- PN photo diode – Photo detectors – Photo detectors noise – Response time – Comparison of photodetectors.

UNIT-V: Fiber Optic Sensors **(6 Hours)**

General features, -Fiber Optic Sensors-Sensor for Temperature, displacement and pressure measurement, Intrinsic and extrinsic sensor.

Total Lecture Hours- 30

COURSE OUTCOME

The students will able to,

1. Know the basic elements of optical fiber transmission inks.
2. List the fiber modes configurations.
3. Learn the different kinds of losses, signal distortion.
4. Gain the knowledge of various optical sources.
5. Analyze the fiber optical Sensors.

TEXT BOOK(S)

1. Gerd Keiser,2008 Optical Fiber Communication- 4thEd. MGH.
2. Djafar K. Mynbaev and Lowell ,Fiber Optical Communication Technology–, L.Scheinner(Pearson).
3. G.Agarwal, 2003,Fiber Optic Communication Systems –3rdEdn.(John Wiley,Singapore,).
4. RongqingHui, 2019,Introduction to Fiber Optic Communications –, Academic Press; 1 stedition.
5. Anokh Singh and Chopra A.K.,2013,Principles of Communication Engineering ,S.Chand&CompanyPVT.Ltd..

REFERENCE BOOK(S)

1. John. Senior, Optical Fiber Communication ,Pearson Education,3rdImpression.
2. Joseph C.Palais Fiber Optic Communication 4th Edition, PearsonEducation.
3. Subir Kumar Sarkar, 2007,OpticalFibres and Fibre Optic Communication Systems, S. Chand Limited.
4. D.C.Agarwal, 2010, Fiber Optics Communication,S.Chand.
5. R.K.Puri and V.K.Babbar,OpticalFibres and Fibre Optic Communication Systems, ,S. Chand & CO

E-RESOURCES

1. **https://nptel.ac.in/courses/115/107/115107095/**
2. **https://www.youtube.com/playlist?list=PLq-Gm0yRYwTgr7v3HhdrI_Kcc38369fw**
3. **https://nptel.ac.in/courses/115/102/115102026/**
4. **https://moodle.usth.edu.vn/course/view.php?id=362#section-1**
5. **https://youtu.be/q6_q2IBm93o**

II B.Sc., CHEMISTRY

ALLIED PHYSICS

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)
SUNDARAKKOTTAI, MANNARGUDI – 614 016.
(For the students of II B.Sc., Chemistry from 2022-23)

DEPARTMENT OF PHYSICS

Semester: III - AC- I: Allied Physics - I

Ins. Hrs. /Week: 4 **Course Credit: 3** **Course Code: 23APY301**

UNIT -I: Properties of Matter **(14 Hours)**

Elasticity: Stress–Strain–Young's modulus–stress-strain Diagram–Bending of beams–Expression for the bending moment–Measurement of Young's modulus by bending of a beam–Non-uniform bending and uniform bending.

Viscosity: Streamline flow and Turbulent Flow-Critical velocity-Poiseuille's formula –Determination of Coefficient of Viscosity of a liquid (Variable Pressure head)

Surface Tension: Definition-Molecular theory-droplets formation—shape, size and life time Drop Weight method of determining the surface tension of a Liquid

UNIT-II: Mechanics **(10 Hours)**

Centre of Gravity – Introduction- Centre of Gravity of a Solid Hemisphere-Hollow Hemisphere- cone-Centre of Gravity of a Solid Cone

States of Equilibrium: Equilibrium of a rigid body – Stable, unstable and neutral equilibrium - Law of Floatation- Stability of Floating bodies –Meta Center- Metacentric Height- Determination of Metacentric of a ship.

UNIT-III: Thermal Physics **(12 Hours)**

Modes of heat Transfer-Conduction, Convection, Radiation- Coefficient of Thermal Conductivity-Determination of Thermal Conductivity of a bad Conductor by Lee's disc Method.

Radiation: Blackbody-Stefan's Law-Newton's law of Cooling-Newton's law of cooling from Stefan's Law-Wien's displacement Law-Rayleigh-Jeans Law-Planck's law.

UNIT-IV: Optics **(12 Hours)**

Interference- Interference in thin films -colors of thin films -Air Wedge-Newton's Rings-Color of thin films.

Diffraction: Diffraction of light vs sound- nomal incidence

Scattering: Types of Scattering-Raman Scattering-Tyndall Scattering

UNIT-V: Electronics **(12 Hours)**

Semiconductor and its Properties- Intrinsic and extrinsic semiconductor-PN Junction diode –Biasing of PN junction –V-I characteristics of junction Diode- Zener diode -Transistor-Characteristics of transistor-CB, CE Mode-Transistor as an Amplifier-Transistor as an Oscillator.

Total Lecture Hours - 60

COURSE OUTCOME

Upon successful completion of this course the students would be able:

1. Examine the physical properties of matter.
2. Determination of C.G of a various shapes.
3. Discuss different thermal Processes and laws of thermodynamics.
4. Identify the interference pattern, Diffraction and Scattering of light.
5. Acquire the knowledge of semiconductor and its properties.

TEXT BOOK(S)

1.R. Murugeshan, Properties of matter, 2012. Chand & Co. Pvt.Ltd., Revised edition
2.Narayanamoorthy and N. Nagarathinam, 2005.Mechanics-Part II, The National Publishing Company, Chennai,.
3.Dr.N.Subramaniyam,Brijlal andDr.M.N.Avathanulu,2012.Optics, S. Chand&Co. Pvt.Ltd.-25th revised edition, New Delhi,.
4.V.Vijayendran,S.Viswanathan, 2004.DigitalFundamentals, Printers & Publishers Private Ltd, Chennai.
5.A.B.Gupta and H.P.Roy 2016.Thermal physics,Books&Allied (P) Ltd.,kolkatta.

REFERENCE BOOK (S)

1.R.L. Saihgal, 1979.A Text Book of Sound, S. Chand & Co. Pvt. Ltd, New Delhi.
2.D.S. Mathur, 1990.Mechanics, S. Chand & Company Ltd., New Delhi ..
3.K.Mehta and Rohit Mehta, 2017.Principles of Electronics, Chand & Co. Pvt.Ltd., Revised edition
4. Brijlaland Subramaniyam, 2015.Heat and Thermodynamics & Statistical physics, S. Chand& Co.
5.P.Duraipandian & Muthamizh Jayapragasam, 2018.Chand&Co. Pvt.Ltd., Revised edition.

E- RESOURCES

1. https://cutt.ly/Vhlco3J
2. https://youtu.be/amGa5RRrCss
3. http://shorturl.at/dkux4
4. http://shorturl.at/lmBFL
5. https://youtu.be/G0iSEDyJKDo

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI – 614016

(For the Candidates admitted in the academic year 2022 – 2023)

DEPARTMENT OF PHYSICS

For the students of II B.Sc., Chemistry

Semester: III - AP- I: ALLIED PHYSICS PRACTICAL - I

(Any 10 Experiments)

Ins. Hrs. /Week: 3 **Course Credit: 2** **Course Code:23APY302P**

1. Measurements of length (or diameter) using Vernier calipers, Screw gauge and Travelling Microscope.
2. Non-Uniform bending – Pin and Microscope.
3. Uniform bending-scale and Telescope.
4. Surface tension and Interfacial Surface tension by Drop Weight Method.
5. Coefficient of viscosity of liquid – Variable Pressure Head Method.
6. Thermal conductivity of a bad conductor – Lee's disc Method.
7. Specific heat capacity of liquid – Newton's cooling Method.
8. Spectrometer – Refractive index of a solid prism.
9. Comparison of viscosities of two liquids-burette method
10. Air wedge – Thickness of the given thin wire.
11. Determine the frequency of a given tuning fork – Sonometer.
12. Stokes's method Viscosity of highly viscous liquid.

Total Lecture Hours - 45

COURSE OUTCOME

Upon successful completion of this course the students would be able:

1. Acquire the knowledge of laboratory technique.
2. Elaboration of the usage of equipments in various field applications of Physics.

TEXT BOOK(S)

1. Dr. S. Somasundaram, Practical Physics, Apsara Publications, Tiruchirappalli, 2012.
2. R. Sasikumar, Practical Physics, PHI Learning Pvt. Ltd, New Delhi2011.

REFERENCE BOOK(S)

1. S. Srinivasan, A Text Book of Practical Physics., Sultan Chand Publications.

E - RESOURCES

1. https://youtu.be/Q8Otf6k3uGk
2. https://youtu.be/8DhfUz0idwM

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI – 614 016

(For the students of II B.Sc., Chemistry from 2022-23)

DEPARTMENT OF PHYSICS

Semester: IV - AC- II: Allied Physics – II

Ins. Hrs. /Week: 4 **Course Credit: 3** **Course Code: 23APY403**

UNIT- I: Electrostatics **(12 Hours)**

Coulomb's inverse square law – Gauss theorem and its applications (Intensity at a point due to a charged Sphere & cylinder) – Principle of a capacitor – Capacity of a spherical and cylindrical capacitors – Energy stored in a capacitor – Loss of energy due to sharing of charges - Capacitors in series and parallel- Types of capacitors

UNIT -II: Magnetism **(12 Hours)**

Intensity of magnetization–Magnetic lines of Force-Magnetic Lines of Induction- Magnetic Susceptibility Magnetic Permeability — Types of magnetic materials – Properties of para, dia and ferromagnetic materials, Cycle of magnetization– Hysteresis – B-H curve – Applications of B-H curve– Ferro magnets, ferrimagnetism and their applications.

UNIT-III: Atomic Physics **(11 Hours)**

Bohr Model - Somerfield's and Vector Atom Models – Pauli's exclusion Principle – Various quantum numbers and quantization of orbits. X-rays: Continuous and Characteristic X-rays – Mosley's Law and importance, Bragg's law – Determination of Crystal Structure by Laue's Powder photograph method- Photoelectric effect-Einstein photoelectric equation

UNIT -IV: Nuclear Physics **(12 Hours)**

Introduction – Nucleus – Classification of Nuclei – Nuclear Size – Charge – Mass and Spin – Liquid drop model. Particle Accelerators-Cyclotron– Betatron and –Nuclear reactor- Four types of reactions– Classifications of Elementary particles.

UNIT -V: Digital Electronics **(13 Hours)**

Decimal – Binary – Octal and Hexa Decimal number systems and their Mutual Conversions – Binary arithmetic (Addition, Subtraction, Multiplication and Division - Basic logic gates – AND, OR, NOT, NAND, NOR and EXOR gates – NAND and NOR as universal building gates – Boolean Algebra – Laws of Boolean Algebra – De Morgan's Theorems – Their verifications using truth tables.

Total Lecture Hours - 60

COURSE OUTCOME

Upon successful completion of this course the students would be able:

1. Identify the Presence of static electric charges and field due to static charges.
2. Describe about the magnetic materials and their applications.
3. Analyze the different atom models.
4. Discuss about the applications reactors.
5. Discuss the Basic Logic gates.

TEXT BOOK(S)

1.Brilal and N. Subrahmanyam, 2000.A Text Book of Electricity and Magnetism, Ratan Prakasan Mandir Educational &University Publishers,New Delhi.
2.R. Murugesan., Electricity and Magnetism. 2001. Third Revised edition, S. Chand & Co, New Delhi.
3.R. S. Sedha, 2004. A text book of Digital Electronics, S. Chand & Co, New Delhi, First edition.
4.Mehta V.K., 2014. Principles of Electronics, S. Chand and company Ltd, New Delhi,
5.D.C. Tayal, 2009.Nuclear Physics, Himalaya Publishing House.

REFERENCE BOOK(S)

1. Narayanamurthi, 1988.Electricity and Magnetism, The National Publishing Co, First edition.
2.J. B. Rajam, 1990. Atomic Physics., S. Chand & Company Limited, New Delhi, First edition,
3.Malvino, Digital principles and Applications, McGraw-Hill International Editions, New York, 2002.
4.Albert Paul Malvino, Digital principles and Applications, McGraw-Hill International Editions, New York, 2002.
5.R. Murugesan, Kiruthiga Sivaprasath, Modern Physics, S. Chand &Co Ltd., New Delhi, 14th Revised edition, 2014.

E – RESOURCES

1.https://cutt.ly/Vhlco3J
2.https://bit.ly/39S6kEG
3.https://youtu.be/PYScA3BGphA
4.https://youtu.be/wEu4w4jxq30

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SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI – 614016

(For the Candidates admitted in the academic year 2022 – 2023)

DEPARTMENT OF PHYSICS

For the students of II B.Sc., Chemistry

Semester: IV- AP- II: ALLIED PHYSICS PRACTICAL - II

(Any 10 Experiments)

Ins. Hrs. /Week: 3 **Course Credit: 2** **Course Code:23APY404P**

1. Potentiometer – Ammeter calibration.
2. Refractive index of liquid using liquid prism.
3. Meter bridge – Specific resistance.
4. Characteristics of a Zener Diode-Break down voltage.
5. Basic logic gates – AND, OR and NOT gates using discrete components.
6. AND, OR and NOT gates using Ic'S.
7. Verification of NAND and NOR as Universal gates.
8. Verification of De Morgan's theorem.
9. Verification of Boolean algebra (any five).
10. Spectrometer – Grating – Normal incidence.
11. Characteristics of a junction diode –Forward resistance and knee voltage.
12. Potentiometer – low range voltmeter.

Total Lecture Hours - 45

COURSE OUTCOME

Upon successful completion of this course the students would be able:

1. Apply the principle of potentiometer to calibrate the ammeter and voltmeter.
2. Explain I-V characteristics of a junction and Zener diode.
3. Apply AND /OR/NOT logic operation to solve simple logic circuits.
4. Acquire the knowledge of laboratory technique in the field of Physics.

TEXT BOOK(S)

1.Dr.S. Somasundaram, Practical Physics, Apsara Publications, Tiruchirappalli, 2012.

2.R. Sasikumar, Practical Physics, PHI Learning Pvt. Ltd, New Delhi2011.

REFERENCE BOOK(S)

1.S. Srinivasan, A Text Book of Practical Physics., Sultan Chand publications.

E - RESOURCES

1.https://youtu.be/aMrGe2r9nco

2.https://youtu.be/x3VvjHVBGDU

II B.Sc., COMPUTERSCIENCE – APPLIED PHYSICS

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI - 614016.

(For the Candidates admitted in the academic year 2022-2023)

DEPARTMENT OF PHYSICS

For the students of II B.Sc., COMPUTER SCIENCE

Semester: III - AC-I: APPLIED PHYSICS-I

Ins. Hrs./Week:4 **Course Credit: 3** **Course Code: 23APH301**

UNIT-I:Current Electricity **(12 Hours)**

Ohm's Law-Verification of Ohm's Law-Kirchoff's law- Applications of Kirchoff's law-Wheatstone's bridge- Metre bridge- Carey Foster's bridge- Potentiometer- Measurement of Current and Resistance- Calibration of low range Voltmeter.

UNIT-II: Alternating current **(12Hours)**

AC circuits containing RC and RL- AC circuit containing L, C and R – measurement of current and voltage – power in anAC Circuit-Power Factor (derivation)- Wattless current – Choke - series and parallel resonant circuits - Impedance-Q factor-Selectivity and Sharpness of resonance.

UNIT-III: Number Systems, Codes And Logic Gates **(13Hours)**

Number Systems - Conversions - Binary: Addition, Subtraction, Multiplication, Division-8421 Code - BCD Code - Excess 3 code - Gray code - Binary to Gray and Gray to Binary Conversion - Basic and Derivative Gates: AND, OR,NOT, NAND, NOR, EX-OR, NAND & NOR as Universal Gates.

UNIT-IV: Boolean Algebra, Arithmetic And Combinational Logic Circuits **(12 Hours)**

Basic laws of Boolean algebra - De Morgan's theorem - Verification of Boolean expression using Boolean laws - Half-adder - Full adder - Half-Subtractor- Full subtractor (using gates)- Multiplexer and Demultiplexer

UNIT-V: Semiconductor Memories **(11Hours)**

Introduction – ROM using diodes and transistors – ROM in terms of digital circuits –PROM – EPROM – EEPROM – ROM as a unit in microcomputers – RAM – Static RAM – Memory expansion – Memory Parameters.

Total Lecture Hours- 60

COURSE OUTCOME

The students will able to,

1. Discuss the concept of electric current flows in a circuit.
2. Gain the knowledge about AC concepts to analyze circuits.
3. Know the different types of number systems as they related to computers.
4. Acquire the knowledge about various combinational logic circuits using basic gates.
5. Identification of new developments in semiconductor memory.

TEXTBOOK(S)

1. Narayanamurthi and Nagarathinam,1994, Electricity and Magnetism,The National Publishing Company,Madras.
2. Brijlal& Subramanian, 1995,Electricity and Magnetism, RatanPrakashanMandir.
3. PuriV.K.,2011,Digital Electronics circuits and systems, TATA Mcgrawhillpublications, NewDelhi.
4. Vijayendran. V & Subramanian. V,2012, Introduction to Integrated Electronics, S. Viswanath PVT Ltd., Chennai.
5. Sanjay D Jain, Applied Physics, Universities Press,Hyderabad,Telengana.

REFERENCE BOOK(S)

1. Murugeshan.R,2015,ElectricityandMagnetism,S.Chand&CompanyLtd.
2. Gothaman W.H., 1996,Digital Electronics, Prentice Hall of India PVT., NewDelhi.
3. Beiser Arthur, Concepts of Modern Physics, 7 th Edition, Mcgraw hill education,Europe.
4. D.N. Vasudeva, 2007,Electricity and MagnetismS.Chand&Co, twelfth edition.
5. S.Salivahanan,2018, Digital Circuits and Design, Oxford University Press 5th Edition.

E -RESOURCES

1. https://youtu.be/InSK7biFdbo
2. https://youtu.be/FFDMzbrEXaE
3. https://www.askiitians.com/revision-notes/physics/current-electricity.html
4. https://www.askiitians.com/revision-notes/physics/electromagnetic-induction-andalternating-current/
5. https://www.my-mooc.com/en/mooc/circuits-electronics-1-basic-circuit-mitx-6-002-1x-0/

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2022 – 2023)

DEPARTMENT OF PHYSICS

For the students of II B.Sc., COMPUTER SCIENCE

Semester: III - AC- II: APPLIED PHYSICS PRACTICAL-I

Ins. Hrs./Week:3 **Course Credit:2** **Course Code:23APH302P**

(Any 10 Experiments)

1. Metre Bridge-Specific Resistance.
2. Potentiometer-Measurement of Current.
3. Potentiometer-Calibration of low range voltmeter.
4. Carey Foster's Bridge- Specific Resistance.
5. Logic Gates (AND, OR, NOT, NAND, NOR and EX-OR) Using IC's.
6. NAND as Universal Gates.
7. Verification of De-Morgan's Theorems.
8. Half –Adder and Half –Subtractor using logic gates.
9. Full Adder and Full Subtractor using logic gates.
10. NOR as Universal Gates.
11. Demorgans theorem.
12. Boolean Algebra.

Total Lecture Hours - 45

COURSE OUTCOME

- Acquire the laboratory technique in the field of Physics

TEXT BOOK (S):

1. Somasundram S.,2012, Practical Physics, ApsaraPublications,Tiruchirappalli.
2. Department of Physics, *Practical Physics*, (B.Sc. Physics Main), St. Joseph's College, Tiruchirapalli1998.

REFERENCE BOOK(S):

1. Srinivasan M.N. Balasubramanian S. &Renganathan R.,2000 A Text book of Practical Physics, Sulthan Chand & Sons, NewDelhi.

E_RESOURCES

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ps://youtu.be/8DhfUz0idwM

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(For the Candidates admitted in the academic year 2022-2023)

DEPARTMENT OF PHYSICS

For the students of II B.Sc., COMPUTER SCIENCE

Semester: IV - AC- III: APPLIED PHYSICS-II

Ins. Hrs./Week:4 **Course Credit:3** **Course Code: 23APH403**

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UNIT-I: Semiconductor Physics (12 Hours)

Theory of energy bands in crystals- Distinction between conductors, Insulators and Semiconductors – Intrinsic and Extrinsic semiconductors – Hall effect in semiconductor– Junction diode-Zener diode - Tunnel Diode and Backward Diode.

UNIT-II: Transistors (12 Hours)

Transistors - PNP and NPN transistors - DC Characteristics of CE and CB configuration-Hybrid parameters-Functions of Transistor as an amplifier and Osillator – FET-N-channel FET - performance Characteristics- FET amplifier

UNIT-III: Lasers (10 Hours)

Laser - Basic concepts of stimulated emission, spontaneous emission –Population inversion and Meta stable state-Einstein coefficient A &B -He-Ne laser-Ruby laser

UNIT-IV: Opto-Electronic Devices LED (14 Hours)

Radiation transition - Emission spectra –Luminescent efficiency-Method of Excitation-Visible LED-Materials for LED - LED configuration and performance-Photo conduction –Photo diode-Photo transistor-seven segment display-LCD.

UNIT-V: Operational Amplifier (12Hours)

The basic operational amplifier– Inverting and Non inverting operational Amplifier –CMRR-Basic uses of operational amplifier as sign and scale changer and phase shifter - Adder – Sub tractor – comparator-Differentiator and Integrators.

Total Lecture Hours-60

COURSE OUTCOME

The students will be able to

1. Acknowledge of fundamentals of semiconductor physics enable the students to apply the various system
2. Design characterization and study of properties of material help the students for various applications
3. Gain the applications of LASER
4. The knowledge for using Opto electronic devices
5. Acquire the basic concept of Op-amp

TEXT BOOK(S)

1. JacobMillman,1985,Micorelectronics,McGrawHillpublications,NewDelhi.
2. TherajaB.L.,2002,Thefundamentalsofsolidstatephysics,SultanChand&Co.,Delhi.
3. MithalG.K.andVanvasi,2006,PulseandDigitalelectronics,Khannapublication,New Delhi.
4. Vijayendran. V & Subramanian. V, 2012,Introduction to Integrated Electronics, S. Viswanath PVT Ltd.,Chennai.
5. L. Floyd,2013, Electronic Devices (Pearson Education, NewYork).

REFERENCE BOOK(S)

1. Ramanan,1994,Function Electronics, TMH, NewDelhi.
2. Millman&Halkias, 1967,Electronics devices and Circuits,McGraw-Hill.
3. Sanjay D Jain,2012, Engineering Physics, Universities Press, Hyderabad,Telengana.
4. Gothaman W.H.,1996, Digital Electronics, Prentice Hall of India PVT., New Delhi.
5. W.T. Silvast,2003, Laser Fundamentals (Cambridge University Press,Cambridge).

E - RESOURCES

1. https://youtu.be/kiiA6WTCQn0
2. https://youtu.be/KynKHr2cXgk
3. https://bit.ly/3qomJYb
4. https://bit.ly/2JwMRix
5. https://youtu.be/AcxDiesy-nI

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI - 614016.

(For the Candidates admitted in the academic year 2022-2023)

DEPARTMENT OF PHYSICS

For the students of II B.Sc., COMPUTER SCIENCE

Semester: IV-AC- IV: APPLIED PHYSICS PRACTICAL-II

Ins. Hrs./Week:3 **Course Credit:2** **Course Code: 23APH404P**

(Any 10 Experiments)

1. Semiconductor diode-Characteristics.
2. Zener diode - Characteristics.
3. FET -Characteristics.
4. Transistor Characteristics-CB Configuration.
5. Transistor Characteristics-CE Configuration.
6. Inverting and non inverting operational amplifier using Op-amp.
7. Mathematical operator –addition, Subtraction using Op-amp.
8. AC circuits with L,C,R-series resonance
9. BCD to Seven Segment Display
10. Operational amplifier-differential amplifier
11. Operational amplifier- differentiator and Integrator
12. AC circuits with L,C,R-Parallel resonance

Total Lecture Hours - 45

TEXT BOOK(S)

1. Somasundram S., 2012,Practical Physics, ApsaraPublications,Tiruchirappalli.
2. Department of Physics, *Practical Physics*, (B.Sc. Physics Main), St. Joseph's College, Tiruchirapalli1998.

REFERENCE BOOK(S)

1. Srinivasan M.N. Balasubramanian S. &Renganathan R., 2000A Text book of Practical Physics, Sulthan Chand & Sons, New Delhi.

E_RESOURCES

1. https://youtu.be/aMrGe2r9nco
2. https://youtu.be/x3VvjHVBGDU

NON MAJOR ELECTIVE

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

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(For the Candidates admitted in the academic year 2022-2023)

DEPARTMENT OF PHYSICS

B. Sc., PHYSICS

Semester: III - NME - I: BIO PHYSICS

Ins. Hrs./Week:2 **Course Credit: 2** **Course Code: 23NMEPH1**

UNIT I:CELLULAR BIOPHYSICS (6 Hours)

Architecture and Life Cycle of cells – Organelles of Prokaryotic and Eukaryotic cell – Cell size and shape –Electrical activities of cardiac cells.

UNIT II: MOLECULAR BIOPHYSICS (6 Hours)

Macromolecular structure: Protein structure – amino acids, peptide bonds, primary, secondary, tertiary and quaternary structures of proteins

UNIT III: MEMBRANE AND NEURO BIOPHYISCS (7 Hours)

Models membranes - Biological membranes and dynamics–Transport across cell and organelle membranes

Nervous system: Organization of the nervous system – Origins of membrane potential - Electrochemical potentials – Nernst equation

UNIT IV: RADIATION BIO PHYSICS (6 Hours)

X-Ray: Effects on bio-macromolecules – UV radiation: Effects on bio-macromolecules and proteins – Radiation hazards and protection – use of radiations in cancer.

UNIT V: PHYSICAL METHODS IN BIOLOGY (6 Hours)

Spectroscopy: UV-Visible absorption spectrophotometry – Structure Determination: X-ray Crystallography, Electron spin resonance (ESR) and biological applications..

Total Lecture Hours-30

COURSE OUTCOME:

At the end of the course, the student will be able to:

1. Understand the structural organization and function of living cells and should able to apply the cell signaling mechanism and its electrical activities.
2. Comprehension of the role of biomolecular conformation to function.
3. Conceptual understanding of the function of biological membranes and also to understand the functioning of nervous system.
4. To know the effects of various radiations on living systems and how to prevent ill effects of radiations.
5. Analyze and interpret data from various techniques viz., spectroscopy, crystallography, chromatography etc.,

TEXT BOOK(S)

1. The cell: A molecular approach, Geoffrey M. Cooper, ASM Press, 2013.
2. Biophysics, VasanthaPattabhi, N. Gautham, Narosa Publishing, 2009
3. Biophysics, P. S. Mishra VK Enterprises, 2010.
4. Biophysics, M. A Subramanian, MJP Publishers, 2005.
5. Bioinstrumentation, L. Veerakumari, MJP Publishers, 2006.

REFERENCE BOOK(S)

1. Chemical Biophysics by Daniel A Beard (Cambridge University Press, 2008).
2. Essential cell biology by Bruce Albert et al (Garland Science)
3. Biophysics, W. Hoppe, W. Lohmann, H. Markl and H. Ziegler. Springer Verlag, Berlin (1983).
4. Membrane Biophysics by Mohammad Ashrafuzzaman, Jack A. Tuszynski, (Springer science & business media).
5. Biological spectroscopyby Iain D. Campbell, Raymond A. Dwek

E-RESOURCES

1. General Bio: http://www.biology.arizona.edu/DEFAULT.html
2. Spectroscopy: http://www.cis.rit.edu/htbooks/nmr/inside.htm
3. Electrophoresis:http://learn.genetics.utah.edu/content/labs/gel/
4. Online biophysics programs: http://mw.concord.org/modeler/
5. https://blanco.biomol.uci.edu/WWWResources.html

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI – 614016

For the Candidate admitted in the academic year 2022-2023

DEPARTMENT OF PHYSICS

B. Sc., PHYSICS

Semester: IV - NME - II: MEDICAL PHYSICS

Ins. Hrs. /Week: 2 **Course Credit: 2** **Course Code:23NMEPH2**

Unit 1: Non-ionizing Radiation (6 hours)

Electromagnetic spectrum - Different sources of NonIonizing radiation, Radio-frequency, Microwaves, Infrared, Visible and Ultra violet radiation production, physical properties and their interaction with tissues.

Unit 2: Ionizing Radiation (6 hours)

Radiation sources- Exposure to ionizing radiation- Health effects of ionizing radiation- Interaction of electromagnetic radiation with matter - Photoelectric and Compton process and energy absorption - Pair production - Attenuation and mass energy absorption coefficients.

Unit 3: Radiation Quantities and Units (5 hours)

Particle flux and fluence - energy flux and fluence -Linear and mass attenuation coefficients - Mass energy transfer and mass energy absorption coefficients - Stopping power - LET Absorbed dose - Kerma – Exposure.

Unit 4: Medical Physics in Diagnostic radiology (7hours)

Discovery - Production - Properties of X-rays -– characteristics of X-ray – different modalities of X-ray –fluoroscopy – mammography – C arm – Digital radiography – Computed tomography (CT) – different generation of CT - Nuclear Medicine.

Unit 5: Medical Physics in Radiotherapy applications (6 hours)

Construction and working of Tele-cobalt units - The Resonant transformer - Cascade generator - Van DeGraff Generator - Pelletron - Cyclotron - Betatron - Synchro-Cyclotron - Design and working of Linear Accelerator

Total Lecture Hours - 30

COURSE OUTCOMES:

Upon completion of this course, the students would be able to

- Gained knowledge about basic principle of medical physics.
- Understood the basic principles of Ionizing and non-ionizing radiations.
- Learnt the units of radiation.
- Understood the production and working principles of X-ray Generators.
- Learnt the theory of Interactions of photons with matter.

TEXT BOOK(S)

[1] K. Thayalan, Basic Radiological Physics ***(2nd Ed)***, Jaypee Brothers Medical Publishers, New Delhi,(2017).

[2] Faiz M. Khan & John P. Gibbons, *The Physics of Radiation Therapy* ***(4th Ed)***, Lippincott Williams&Wikins, Philadelphia, (2010).

REFERENCE BOOK(S)

1. E.B. Podgorsak, *Radiation Oncology Physics: A Handbook for Teachers and Students***,** International Atomic Energy Agency Vienna, (2005).
2. W. R. Hendee, *Medical Radiation Physics*, Year Book Medical Publishers Inc., London, (2003).
3. Martin Hollins, *Medical Physics,* Nelson Thornes Ltd, 1991
4. Dinesh K Baghel, *Medical Physics, Peepee Publishers, 2017*
5. Stephen Keevil, Renato Padovani, Slavik Tabakov, Tony Greener, Cornelius Lewis, *An Introduction toMedical Physics,* CRC Press, 2022
6. B.H Brown, R.H Smallwood, D.C. Barber, P.V Lawford, D.R Hose, Medical Physics and BiomedicalEngineering, CRC Press, 1999.
7. J. R. Cameron , J. G. Skofronick, *Medical Physics,* John Wiley & Sons, 1980.

E-RESOURCES

1. https://www.youtube.com/watch?v=p2rx8Qpw49w
2. https://www.aapm.org/meetings/2010AM/documents/biggs2.pdf
3. http://www-naweb.iaea.org/nahu/DMRP/documents/Chapter5.pdf

SEMESTER V

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016
(For the Candidates admitted in the academic year 2022 – 2023)

DEPARTMENT OF PHYSICS
B.Sc., PHYSICS

Semester: V-CC-V: OPTICS

Ins. Hrs./Week:5 **Course Credit: 5** **Course Code: R23PH509**

UNIT- I:Geometricaloptics **(14 Hours)**

Spherical aberration - Spherical aberration of a thin and thick lens – Methods of reducing Spherical aberration – Coma – Aplanatic surface – Astigmatism – Curvature of the field – Distortion – Chromatic aberration - Chromatic aberration in a lens.

UNIT-II: Interference **(14 Hours)**

Air wedge – Newton's rings – Haidinger's fringes – Brewster's fringes – Michelson Interferometer and its applications – Rayleigh's Interferometer-Stationary waves in light-Holography – Construction and reconstruction of a hologram– Applications.

UNIT-III:Diffraction **(16 Hours)**

Fresnel's diffraction – Diffraction at a (1) circular aperture (2) Straight edge narrow wire – Fraunhofer diffraction at a single slit – Double slit – Missing orders in a Double slit, Diffraction pattern – Grating (theory)- Resolving power – Rayleigh's criterion of resolution-Resolving power of a Telescope and Grating – Dispersive power and resolving power of a grating.

UNIT-IV: Polarization **(15 Hours)**

Nicol prism – Nicol prism as an analyzer and polarizer – Huygens's explanation of Double refraction in uni axial crystals – Double Image polarizing prisms – Elliptical and Circularly polarized light – Production and detection – Quarter wave and half wave plates .

UNIT-V:Optical Instruments **(16 Hours)**

Microscopes – Simple Microscope (Magnifying glass) — Eyepieces - Huygen's Eyepiece - Ramsden'sEyepiese — Comparison of Eyepieces –.Kellner eye piece Microscope.

Total Lecture Hours -75

COURSE OUTCOMES

The students will be able to

- Learn the basics of Geometrical Optics and Lenses
- Study the concepts Interference and its applications
- Acquire Knowledge about Diffraction and its applications
- To Understand the concept of Polarization and its application in analyzing the optical activity
- To Procure the Fundamental knowledge of Optical instrument

TEXT BOOK(S)

1. Dr. N. Subramaniyam, Brijlal and Dr.M.N. Avathanulu, 2012*Optics*,S. Chand &Co. Pvt.Ltd.25 threvised edition , NewDelhi.
2. KrishnapadaGhoshAnandamoy Manna,2007*Text book of Physical Optics*, McMillan India Ltd, Firstedition.
3. Subramaniam N &Brijlal, 1990,Optics, S. Chand & Co. Pvt. Ltd., NewDelhi.
4. Khanna D R &Gulati H R, 1979,Optics, S. Chand & Co. Pvt. Ltd., New Delhi.
5. Grant R.Fowles,2012,Introduction to Modern physics Dover Publications,2nd edition

REFERENCEBOOK(S)

1. Singh & Agarwal,2002*Optics and Atomic Physics*, PragatiPrakashan Meerut, Nineth edition.
2. A.B. Gupta, 2006,*Modern Optics*, Books and allied (P) Ltd, Kolkata, Firstedition.
3. Ajoy Ghatak,2009, *Optics*, (TMH), New Delhi, Fourthedition.
4. Arial Lipson, Stephen G.Lipson and Hentry Lipson, 2011,*Optical Physics*, Cambrige, Fourthedition.
5. Schaum's outlines,2011, *Optics*, Tata McGrawHill.

E- RESOURCES

1. https://byjus.com/physics/aberration-of-lens/
2. https://www.physicsclassroom.com/class/waves/Interference-of-Waves
3. https://byjus.com/physics/polarization-of-light/
4. https://youtu.be/ap6hzAwoEol
5. https://youtu.be/BXymve4FwqY

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2022 – 2023)

DEPARTMENT OF PHYSICS

B.Sc., PHYSICS

Semester: V-CC- VI: ATOMIC AND MOLECULAR PHYSICS

Ins. Hrs./Week:5 **Course Credit: 5** **Course Code: R23PH510**

.

UNIT- I: Cathode and positive ray analysis (10 Hours)

Production and Properties of Cathode rays - Electronic charge - Millikan's oil- drop method - Production and properties of positive rays - Thomson's parabola method-Aston's, and Bainbridge's mass - spectrographs (e/m) – Mass defect and Packing Fraction.

UNIT- II: Atom Model (18 Hours)

Bohr atom model – Critical Potentials - Experimental determination of critical potentials - Franck and Hertz's experiment -Somerfield's Relativistic atom model - Vector atom model - Quantum numbers associated with vector atom model - Pauli's exclusion principle - Electronic configurationofelementsandperiodictable-TheSternandGerlachexperiment-Zeemaneffect - Experimental arrangement for the normal Zeeman effect - Larmor's theorem - Paschen Back Effect – Stark effect.

UNIT-III:X-Rays (15 Hours)

X-rays - production - detection and properties -Bragg's law - Bragg's X-ray spectrometer - Laue's experiment - The Powder crystal method –Rotating crystal method -X-ray spectra - Characteristics and continuous of X-ray spectrum - Moseley's law - Compton effect - Determination of wavelength - Symmetry operations and elements of Symmetry.

UNIT- IV: Photoelectric Effect and Free Electron Theory of Metals (17 Hours)

Free electron theory of metals-Properties of metals-Drude and Lorentz theory-Electrical and thermal conductivities - Wiedemann and Franz law. Photoelectric effect - Lenard's experiment - Richardson and Compton experiment - Experimental investigations on the photoelectric effect - Laws of photoelectric emission - Einstein's photoelectric equation - Photoelectric cells – Photo emissive cell – Photovoltaiccell- Photoconductive cell - Applications of Photoelectric cells- photomultiplier.

UNIT- V:Molecular Physics **(15Hours)**

Induced absorption - Spontaneous emission - Stimulated emission - Ruby laser - He laser - Semiconductor laser - Properties of laser beam – Applications of LASER in Medicine and Industry - Theory of the pure rotational spectrum of a molecule - Theory of the origin of the vibration - rotation spectrum of a molecule - Theory of ESR.

Total Lecture Hours-75

COURSE OUTCOME

The students will be able to

1. Understand the basic properties of Positive and Cathode rays.

2. Explain the evolution of different atomic models and their merits and limitations.

3. Acquire the knowledge of X rays and their detections.

4. Analyze the Photoelectric effect and free electron theory of metals.

5. Understand the different types of Laser and their applications.

TEXT BOOK(S)

1.R. Murugesan, KiruthigaSivaprasath, 2014. Modern Physics, 14th Revised edition, S. Chand &Co Ltd., New Delhi.
2.J.B. Rajam, 2009. Atomic Physics, Revised edition, S. Chand & Co Ltd., New Delhi,.3.Sehgal, Chopra and Sehgal, Modern physics, Sultan Chand &Sons, New Delhi
4.B.H. Bransden, Charles Jean Joachain, Theodor J Plivier, 2003. Physics of atoms and Molecules, 2 nd edition, Pearson Education Limited,England.
5.G. Aruldhas, P. Rajagopal, 2005. Modern Physics, 6 th edition, PHI Learning PrivateLimited, Delhi

REFERENCEBOOK (S)

1. Arthur Beiser, ShobhitMahajan, S. RaiChoudhury, 2009. Concepts of Modern Physics,6th edition ,SIE,.

2. S.N .Ghoshal, 2004. Atomic Physics, Revised edition, S. Chand & Co Ltd., NewDelhi.

E -RESOURCES

1.https://www.askiitians.com/revision-notes/physics/atomic-physics/
2.https://nptel.ac.in/courses/115/101/115101003/
3. https://www2.physics.ox.ac.uk/sites/default/files/2011-10-19/atomic_physics_lectures_1_8_09_pdf_pdf_1828.pdf
4. https://bit.ly/31U79bG
5. https://youtu.be/dJKBe5ZHL9c

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SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2022 – 2023)

DEPARTMENT OF PHYSICS

B.Sc., PHYSICS

Semester: V-CC- VII : ELECTRONICS

Ins. Hrs./Week:6 **Course Credit: 5** **Course Code: R23PH511**

UNIT -I: Semiconductors and Diodes (16-Hours)

Intrinsic and extrinsic semi -conductors –PN junction diode – Biasing–V-I Characteristics– Rectifiers –Half wave–full wave and Bridge rectifiers–Breakdown mechanisms–Zener diode-characteristics of Zener diode - Zener diode as voltage regulator.

UNIT -II: Bipolar Transistors and Field Effect Transistors (19-Hours)

Bipolar junction transistor – Basic configurations -Relation between α and β – Characteristic curves of transistor – CB, CE mode –DC bias and stabilization – fixed bias – voltage divider bias - Single stage CE amplifier –Power amplifiers – Efficiency of class A,B & C Power amplifier – Concept of Negative feedback - Criterion for oscillations –Hartley oscillator – Colpitt's oscillator -FET – construction and characteristics- FET Amplifier.

UNIT- III: Number Systems, Logic Gates and Boolean Algebra (20-Hours)

Introduction to decimal, binary, octal, hexadecimal number systems – Inter conversions– 1's and 2's complements –Logic gates, Symbols and their truth tables – AND, OR, NOT, NAND, NOR, XOR, and XNOR – Universality of NAND and NOR gates.

Boolean algebra – De-Morgan's theorems -Reducing Boolean expressions using Boolean laws – SOP forms of expressions (min terms) – Karnaugh map simplification (Four variables).

UNIT- IV: Combinational and Sequential Digital Systems (18-Hours)

Half and full adders – Half and full subtractor – Decoder(2:4 line) – Encoder(4:2 line)– Multiplexer(4:1 line) – Demultiplexer (1:4 line) - Flip flop – RS –clocked RS – T and D flip flops – JK and master slave flip flops – Counters –Four bit asynchronous ripple counter – Mod-10 counter – – Synchronous counter – Ring counter.

UNIT -V: Operational Amplifier **(17-Hours)**

Operational amplifier - Characteristics – Inverting and Non-inverting amplifier – Voltage follower – Adder, Subtractor, Integrator and Differentiator circuits –Op- amp as Comparator –Filters - low, band pass, high pass filters- A/D conversion – Successive approximation method – D/A conversion – R-2R ladder network.

Total Lecture Hours-90

COURSE OUTCOME

The students will be able to

- Understand the basics of semiconductor device.
- Acquire the knowledge of Bipolar transistors.
- Analyze the Boolean systems.
- Study about the Digital systems.
- Enhance the knowledge of Operational amplifier.

TEXT BOOK(S)

1. Mehta V.K.,2014*Principles of Electronics*, S. Chand and companyLtd.
2. A.P. Malvino, D.P. Leach, 2011*Digital Principles and Application*, IV Edition,Tata McGraw Hill, NewDelhi.
3. V. Vijayendran, 2004,*Digital Fundamentals*, S.Viswanathan, Printers &Publishers Private Ltd, Chennai.
4.Smarajit Ghosh,Fundametals of Elecrtical and Electronics Engineering, PHI Learning Pvt.Ltd.Secondedition.
5.Ajay Kumar Singh , Electronic Devices and Integrated Circuits, PHI Learning Pvt.Ltd.Second edition.

REFERENCE BOOK(S)

1. Theraja. B.L,*2002, Basic electronics - Solid State*, S.Chand and CompanyLtd.
2. Sedha R.S.,2002, *A text book of applied Electronics*, S.Chand&companyLtd.
3. W.H.Gothmann, 1996,*Digital Electronics*, Prentice Hall of India, Pvt. Ltd., NewDelhi.

E-RESOURCES

1.https://youtu.be/G0iSEDyJKDo
2.https://youtu.be/AcxDiesy-nI
3. https://youtu.be/KiiA6WTCQn0
4. https://youtu.be/FKvnmxte98A
5. 5.https://youtu.be/D6-ikJFUoFc

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DEPARTMENT OF PHYSICS

B.Sc., PHYSICS

Semester: V-CP- V: PHYSICS PRACTICAL-V

Ins. Hrs./Week:3 **Course Credit:3** **Course Code: R23PH512P**

(Any Twelve Experiments)

1. Spectrometer- i-d curve.
2. Spectrometer - i-i 'curve.
3. Spectrometer - small angle prism.
4. Spectrometer - Grating-minimum deviation method.
5. Spectrometer – Grating – dispersive power.
6. Spectrometer - Cauchy's constants.
7. Koenig's method – Uniform bending.
8. Field along the axis of a coil – determination of M.
9. Regulated power supply using Zener diode - Percentage of regulation.
10. Transistor –CB Configuration.
11. Single stage - RC coupled amplifier –Transistor.
12. FET Characteristics.
13. FET amplifier – Common source.
14. AND, OR and NOT gates using IC's.
15. Op - Amp -Adder and Subtractor.
16. Op - Amp - Integrator and Differentiator.

TEXT BOOK(S)

1. Dr. S. Somasundaram, 2012, *Practical Physics*, Apsarapublications,Tiruchirapalli.

REFERENCE BOOK(S)

1. S. Srinivasan, 2005,*A Text Book of Practical physics*, S. Sultan Chandpublications.

2. 2. R. Sasikumar, 2011,*Practical Physics*, PHI Learning Pvt. Ltd, NewDelhi.

E-RESOURCES

1.https://youtu.be/jNQtYDPslXg

2. https://youtu.be/Q-mhFTe8-Po

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
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DEPARTMENT OF PHYSICS
B. Sc., PHYSICS

Semester: V - MBE - I: MATERIAL SCIENCE

Ins. Hrs./Week:5 **Course Credit:5** **Course Code:R23MBEPH1**

UNIT- I: Crystal Structure **(19 Hours)**

Types of crystals-space lattice-basis- unit cell and lattice parameters – Bravais lattices-Lattice planes and Miller indices-inter planar spacing in a cubic lattice - SC – BCC – FCC- Sodium chloride and Diamond crystal structure.

UNIT- II: Chemical Bonds **(17 Hours)**

Review of Atomic structure – Inter atomic Forces – Different types of chemical bonds – Ionic covalent bond – Metallic bond – Dispersion bond –Dipole bond – Hydrogen bond.

UNIT - III: Superconducting Materials **(14 Hours)**

Superconductivity – Properties-Meissner's effect- London equations - types of superconductors Type I and Type II –High temperature superconductors Josephson effects and its applications – SQUIDS - Applications of superconductor.

UNIT - IV: Smart Materials **(12 Hours)**

Metallic glass and its applications — Fiber reinforced metals – SAW Materials and its applications – Biomaterials – Ceramic-Nuclear engineering materials-Nano phase materials - SMART materials-Conducting Polymers.

(13 Hours)

UNIT V: Mechanical behavior of Materials

Different mechanical properties of engineering materials – creep – Fracture technological properties – factors affecting mechanical properties of Material-Heat treatment-cold and hot working-types of mechanical tests- metal forming process- deformation of Metals.

Total Lecture Hours-75

COURSE OUTCOME

The students will be able to,
1.The lattice vibration and thermal properties
2.Understand the structure of atoms.
3.To understand the properties of Superconducting materials.
4.To acquire knowledge in nano phase materials.
5.Understand the properties of polymers

TEXT BOOK(S)

1.Dr. M.N. Avadhanulu,2016, Material science, S.Chand& Company, New Delhi.
2.C.Kittel ,2004, Introduction to Solid State Physics (Wiley Eastern , New Delhi
3.Donglu Shi , 1995,High – Temperature Superconducting Materials Science and Engineering , Pergamon Publisher.
4.R.S. Khumi , 1987,Material science, S.Chand Publishing .
5.I.P Singh , 2018,Materials Science and Engineering ,Jain Brothers,13th ed..

REFERENCE BOOK(S)

1. M.Arumugam, 1990,Material science, Anuradhapuplishers.

2. V. Raghavan,2019, Material Science and Engineering , PrinticeHallIndia.

3. V. Rajendran, 2001,Material Science, Tata McGraw Hill Ltd, NewDelhi.

4. William D.Callister, Dravid G. Rethwisch, Steven Bananiaris 2020, Material Scienceand Engineering.

E- RESOURCES

1. https://bit.ly/2Rid7kF

2. https://bit.ly/3dKj6Ga

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DEPARTMENT OF PHYSICS

B.Sc., PHYSICS

Semester: V - SBE - II: SATELLITE COMMUNICATION

Ins. Hrs./Week:2 **Course Credit:2** **Course Code: R23SBEPH2**

UNIT-I:SatelliteCommunication (6 Hours)

Introduction - Basic components of Satellite – Classification of Satellites – Types of Satellites– Constructional features of Satellites - Applications of satellite communication.

UNIT-II: Earth Orbit Satellite (6 Hours)

Kepler's laws, Newton's law – Orbital parameters – Geo stationary and Non-Geo Stationary orbits - Geo synchronous earth orbit satellites - Medium and low earth orbit satellites - Orbital slots.

UNIT-III: Satellite Launching And Subsystems (5 Hours)

Launching of Satellites -Satellite Launch Vehicles-Space and earth segment subsystems –Payload and supporting subsystems – Tracking and commands.

UNIT-IV: Antenna Systems And Transponders (6 Hours)

Power Systems - Antenna Subsystems - Satellite antennas – Interference analysis - Satellite and Transponders-Block diagram of Transponder-Types of Transponders

UNIT-V: Satellite Applications (7Hours)

INSAT - VSAT- GSM – GPS – INMARSAT -Satellite Navigational System, Direct broadcast Satellites (DBS/DTH).

Total Lecture Hours- 30

COURSE OUTCOME

The students will able to,

1. Make the students to become familiar with satellites and satellites services.
2. Study about satellite orbits and Launching.
3. Study the concept of Earth segment and space segment components**.**
4. Understand the concept of Power and Antenna Systems.
5. Learn about the role of Transponders in Satellite Communication.

TEXT BOOK(S)

1.T. Pratt, Ch. Bostain, J.Allnutt, 1986,Optical Satellite Communications, 2 nd edition,John Wiley & Sons

2. I.PoornimaThangam , 2012,Satellite Communication, CharulathaPublications.

3. A.W. Joshi,2000, Horizons of Physics (Wiley Eastern Ltd, NewDelhi).

4.U.Shankar,2007, The Economics of India's Space Programme – An Exploratory Analysis 2nd reprint, Oxford University Press, Delhi.

5. R. Blake, 2001,Wireless Communication Technology DELMAR, New Delhi.

REFERENCE BOOK(S)

1. D.Roddy, 2001,Satellite Communications, 3 rd ed., McGraw–Hill.

2. B.Elbert, 1999,Introduction to Satellite Communications, 2 nd ed., ArtechHouse.

3. Dr.D.C.Agarwall,1995 "Satellite Communications", Khanna Publications, 3rdedition.

4. G.D. Gordon and W.L. Morgan, *Principles of Communication Satellites*, John Wiley &Sons,Inc

5. Anil K. Maini, VarshaAgrawal, Satellite Communications, Wiley India Pvt.Ltd.,

E - RESOURCES:

1. **http://nptel.iitm.ac.in/course.php**
2. **http://ocw.mit.edu**
3. **www.radio-electronics.com**
4. **http://en.wikipedia.org**
5. **https://youtu.be/f2wlHL1Sok8**

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

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DEPARTMENT OF PHYSICS

B.Sc., PHYSICS

Semester: V - SBE - III: MOBILE COMMUNICATION

Ins. Hrs./Week:2 **CourseCredit:2** **Course Code: 23SBEPH3**

UNIT-I:Mobile Communication

(5 Hours)

Mobile Communication-Mobile services-Features of mobile Communication- Concept of cell – Advantages of mobile communication.

UNI-II: Terms In Mobile Telephony

(6 Hours)

Mobile station(MS) – Mobile Equipment (ME) – SIM – Base station(BS) – Base Transceiver Station(BTS) – MSC –Channels – Hand off – Dropped call.

UNIT-III: Multiple Access Techniques

(6 Hours)

FDMA, TDMA, CDMA, SDMA Techniques – Spread Spectrum multiple access – FHSS,DSSS

UNIT-IV:Cellular Concept

(7 Hours)

Cellular telephone specifications and operations – Security and Privacy - Cell site equipment-Fax and data communication using cellular phones.

UNIT-V: Mobile Transport And Applications

(6 Hours)

Mobile TCP – WAP – Architecture – WDP –WTLS –WTP-WSP – WAE –WTA Architecture– WML.

Total Lecture Hours- 30

COURSE OUTCOME

The students will able to,

1. Understand the mobile radio communication principles.

2. Learn the basic terms in mobile telephony concepts.

3. Understand the various multiple access techniques.

4. Study the Recent trends adopted in cellular systems and wireless standards.

5. Know about the concept of mobile antennas.

TEXT BOOK(S)

1. Williams, C.Y. Lee, 1991,Mobile cellular telecommunications second edition by: Tata McGraw – Hill Publications.

2. R. Blake,2001, *Wireless Communication Technology* (DELMAR, NewDelhi).

3. Dennis Roddy and John coolen,1990, Electronic communication,PHI.

4. Anokh Singh and Chopra A.K ,2013, Principles of Communication Engineering , S.Chand& Company PVT.Ltd.

5. T.S.Rappaport, 2002,Wireless communications Principles and Practce, 2nd edition,PHI.

REFERENCE BOOK(S)

1.. J.Schiller,2000, Mobile Communication , Addison Wesley.

2. William Stallings, 2003,Wireless Communication and Networks, PearsonEducation.

3. Singhal, WAP2003,Wireless Application Protocol, PearsonEducation.

4. Jochen Schiller,2007 “Mobile Communications”, Second Edition, PearsonEducation.

5. Asoke K Talukder, Hasan Ahmed, Roopa Yavagal,2010 “MobileComputing”,TMH.

E- RESOURCES

1.**https://bit.ly/2IxKvjg**2.**https://www.tutorialspoint.com/mobile_computing/index.htm 2**

3. https://www.javatpoint.com/mobile-computing3

4. https://nptel.ac.in/noc/courses/noc16/SEM2/noc16-cs13/

5. https://youtu.be/r-RxGQuZLio

BHARATHIDASANUNIVERSITY, TIRUCHIRAPPALLI -24.
UNDER GRADUATE DEGREE
PROGRAMMES
SOFT SKILLS DEVELOPMENT
(23UGSDC)

UNIT - I

Know Thyself/ Understanding Self
Introduction to Soft skills-Self discovery-Developing positive attitude-Improving perceptions-Forming values

UNIT - II

Interpersonal Skills/ Understanding Others
Developing interpersonal relationship-Team building-group dynamics-Net working
Improved work relationship

UNIT -III

Communication Skills / Communication with others
Art of listening-Art of reading-Art of speaking-Art of writing-Art of writing e-mails-e mail etiquette

UNIT -IV

Corporate Skills / Working with Others
Developing body language-Practicing etiquette and mannerism-Time management Stress management

UNIT -V

Selling Self / Job Hunting
Writing resume/cv-interview skills-Group discussion- Mock interview-Mock GD – Goal setting
- Career planning

TEXT BOOKS:

1. Meena.K and V.Ayothi (2013) A Book on Development of Soft Skills (Soft Skills : A Road Map to Success), P.R. Publishers & Distributors, No, B-20 & 21,V.M.M.
2. Complex, Chatiram Bus Stand, Tiruchirappalli- 620002.
3. (Phone No: 0431-2702824: Mobile No: 94433 70597, 98430 74472)
4. Alex K. (2012) Soft Skills – Know Yourself & Know the World, S.Chand & Company LTD, Ram Nagar, New Delhi- 110 055. Mobile No : 94425 14814 (Dr.K.Alex)

REFERENCE BOOKS:

1. Developing the leader within you John cMaxwell
2. Good to Great by JimCollins
3. The seven habits of highly effective people StephenCovey
4. Emotional Intelligence DanielGoleman
5. You can win ShiveKhera
6. Principle centred leadership StephenCovey

SEMESTER VI

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI –614016

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DEPARTMENT OF PHYSICS

B. Sc., PHYSICS

Semester: VI – CC - VIII: NUCLEAR PHYSICS

Ins. Hrs. /Week:6 **Course Credit:5** **Course Code: R23PH613**

(19 Hours)

UNIT - I: Properties of Nuclei

Constituents of nuclei-Classification of nuclei - Nuclear mass and binding energy - Binding energy and stability of nucleus, Mass defect and Packing fraction, Binding fraction Vs Mass number curve - Nuclear size – Nuclear spin-nuclear energy levels - Nuclear magnetic moment --Parity of nuclei - Nuclear forces - Yukawa's model of nuclear force.

UNIT - II: Radioactivity **(18 Hours)**

Radioactive decay law-Half life and Average life - Activity or strength of a radio – sample - Successive transformation - Radioactive chain- Radioactive equilibrium - Radioactive dating - α-decay - Geiger- Nuttal law , Tunnel effect - Gamow's theory of α decay - β-decay - Energetics of β-decay -Continuous spectrum - Inverse β-decay -Parity violation in β-decay -Neutrino hypothesis - Properties of neutrino - Gamma rays-origin of the gamma rays - Internal conversion.

UNIT - III: Particle accelerators and detectors **(18 Hours)**

Linear accelerator – Cyclotron – Betatron - Electron synchrotron -Accelerators in India.
Radiation Detectors - Ionization Chamber –G.M. Counter-Cloud chamber - Scintillation counter - Solid state track detector –Semiconductor detector photo multiplier tube (PMT) ..

UNIT - IV: Nuclear reactions and Reactors **(18 Hours)**

Nuclear reactions - Types of nuclear reactions – Conservation laws in nuclear reactions -Energetic of nuclear reactions - Kinematics of nuclear reactions -Threshold energy of nuclear reactions - Solution of the Q- value equation - Cross-section of nuclear reactions.
Nuclear fission - fission of light nuclei - Nuclear chain reaction - Fusion-Thermonuclear reaction - Hydrogen bomb -Possibility of fusion reactor.

UNIT V: Elementary Particles **(17 Hours)**

Classification of elementary particles – Pions and Muons - K-mesons –Hyperons- Conservation laws - Exact laws - Approximate conservative laws-Fundamental interactions – Antiparticles -Resonance particles – Hyper nucleus- Symmetry classification of elementary particles - Quark model.

Total Lecture Hours-90

COURSE OUTCOME

The students will be able to

1.Understand the evolution of different atomic models and their merits and limitations.

2.Acquire the knowledge of various nuclear decays and radioactivity.

3.Analyze the properties of various fundamental particles, their decay modes and the interactions.

4.Know the different type of nuclear reactions.

5.Understand symmetry properties & Quark model of elementary particles.

TEXT BOOK(S)

1.Gupta& Roy., 2011,*Physics of the Nucleus*, Books and Allied (P) Ltd. Kolkata.

2.AmirtanshuShukla , 2020,Suresh Kumar Patra.

3.DevanarayananShankara ,2016, A Text Book of Nuclear Physics ,Create Space Independent Publ..

4. B.L Cohen, 1988,Concepts of Nuclear Physics (Tata McGraw Hill, New Delhi).

5. David J.Griffiths, 1987,Introduction to Elementary Particles ,Wiley.com.

REFERENCE BOOK(S)

1. S. N. Ghoshal 2003,,*Nuclear Physics* , S. Chand & Co., Edition .

2. M L Pandya& R. P .S .Yadav,2000, *Elements of Nuclear Physics*,KedaarNath&Ram Nath.

3. SatyaPrakash,*2011, Nuclear Physics*, A PragatiPrakasanPublication.

4. Jahan Singh, 2012,*Fundamentals of Nuclear Physics*, A PragatiPublication.

5. D.C.Tayal, 2009 ,*Nuclear Physics*, Himalaya PublishingHouse.

E- RESOURCES

1.https://nptel.ac.in/courses/115/104/115104043/

2. https://nptel.ac.in/courses/115/103/115103101/

3.https://www.youtube.com/watch?v=xrk7Mt2fx6Y4.https://bit.ly/2Q3CcPk

5.https://bit.ly/3fNJ52c

6.https://bit.ly/3wxy0Z9

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DEPARTMENT OF PHYSICS

B.Sc., PHYSICS

Semester: VI-CC- IX: THEORETICAL PHYSICS

Ins. Hrs./Week:6 **Course Credit:5** **Course Code: R23PH614**

UNIT -I: Lagrangian Formulation **(19 hours)**

Mechanics of aparticleandsystemofparticles–Conservationlaws–Constraints–Generalized coordinates – Principle of virtual work- D' Alembert's principle and Lagrange's equation – Hamilton's principle – Compound Pendulum–Atwood's machine – Simple pendulum.

UNIT- II: Hamilton's Formulation **(17 hours)**

Hamilton's canonical equations of motion – Hamilton's equations from variational principle – Principle of least action – Phase space – Generalized momentum – Cyclic co-ordinates – Conservation theorem for generalized momentum – Conservation theorem for energy

UNIT -III: Dual Nature of Matter **(20 hours)**

De Broglie concept of matter waves – De Broglie wavelength – Wave velocity and group velocity for the De Broglie waves – Experimental study of matter waves – Davison and Germer experiment – G.P. Thomson's experiment for verifying De Broglie relation – Heisenberg's uncertainty Principle – Electron microscope – Gamma ray microscope.

UNIT- IV: Basics of Quantum Mechanics **(19 hours)**

Basic postulates of wave Mechanics – Development of Schrödinger wave equation – Time independent and dependent forms of equations – Properties of wave function – Orthogonal and normalized wave function Eigen function and eigen values–Expectation values and Ehrenfest's theorem.

UNIT- V : Quantum Systems **(15 hours)**

Linear harmonic oscillator – Particle in a box – Barrier penetration problem – Quantum mechanical tunneling-Rigid rotator – Hydrogen atom.

Total Lecture hours-90

COURSE OUTCOMES

The students will be able to

1. Understand the fundamental principles of classical mechanics.
2. Understand the Hamilton's formulation.
3. Learn and apply the concepts of wave mechanics.
4. Understand the basic principles of Quantum mechanics.
5. Study the applications of Quantum mechanics.

TEXT BOOK (S)

1. Murughesan, R.2016. Modern Physics,18 th edition, S.Chand& Co., NewDelhi,
2. S.L.Gupta., V. Kumar and H.V.Sharma, 2011. Classical Mechanics, 25th edition,PragathiPrakasan, Educational Publisher,Meerut.
3. H.Goldstein, 2011. Classical Mechanics, 3rd edition, Narosa Book distributors, NewDelhi
4. Sathyaprakash, 2007, Quantum Mechanics, PragathiPrakashan,.
5. P M. Mathews and K. Venkatesan, 1987. A Text Book of Quantum Mechanics, TataMcGraw Hill, NewDelhi.

REFERENCEBOOK (S)

1. Arthur Beiser, 1999.Concept of Modern Physics, McGraw HillEd..
2. N.C.Rana and P.S.Joag, 1991. Classical Mechanics, Tata McGraw Hill, NewDelhi.

E RESOURCES

1. https://www.youtube.com/playlist?list=PLbMVogVj5nJTDMhThY9xu2Tvg0u1RPuxO
2. https://medium.com/predict/what-is-quantum-mechanics-what-is-theory-of-relativity-Fdbe87eb9c79
3. https://www.askiitians.com/revision-notes/physics/special-theory-of-relativity/
4. https://bit.ly/3cVTXtd
5. https://youtu.be/0FBZFhwJgp8

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

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DEPARTMENT OF PHYSICS

B.Sc., PHYSICS

Semester: VI-CP- VI: PHYSICS PRACTICAL -VI

Ins. Hrs./Week:5 **Course Credit:3** **Course Code: R23PH615P**

(Any Twelve Experiments)

SECTION –A (Electronics):

1. Verification of Boolean Laws (any four).
2. NAND as universal gate.
3. NOR as universal gate.
4. Emitter follower amplifier – Frequency response.
5. Construction of Half wave rectifier.
6. Half Adder and Full adder circuits using logic gates.
7. Half Subtractor and Full Subtractor circuits using logic gates.
8. Flip Flop using gates.
9. Multiplexer and Demultiplexer using IC'S

SECTION – B (Microprocessor 8085):

1. 8-bit addition and 8-bitsubtraction.
2. 8-bitmultiplication
3. 8-bit division.
4. Arranging the given set of numbers in ascending order.
5. Arranging the given set of numbers in descending order.
6. Conversion from decimal to hexa decimal system.
7. Conversion from hexadecimal to decimal system.

TEXT BOOK(S)

1. Dr.S.Somasundaram ,2012, *Practical Physics*, Apsara publications, Tiruchirapalli .

REFERENCE BOOK(S)

1. S.Srinivasan 2005,*A Text Book of Practical physics*, S.SultanChandpublications.

2. R. Sasikumar,2011, *Practical Physics*, PHI Learning Pvt. Ltd, NewDelhi.

E-RESOURCES

1. https://cutt.ly/UvKpd48
2. https://cutt.ly/NvKpDnB

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DEPARTMENT OF PHYSICS

B.Sc., PHYSICS

Semester: VI-MBE-II: MICROPROCESSOR AND 'C' PROGRAMMING

Ins.Hrs./Week:6 **Course Credit:5** **Course Code: R23MBEPH2**

UNIT- I : Basics of Digital Computer **(16-Hours)**

Basic components of a digital computer - Evolution of microprocessors -Important INTEL microprocessors - Hardware, Software and Firmware - Memory - Semiconductor memories - RAM, ROM - Flash memory – CCD memory – Cache memory -Buses.

UNIT- II : Intel 8085 and its Architecture **(17-Hours)**

INTEL 8085 - Pin Diagram - Architecture - Various registers - Status Flags - Interrupts and their order of priority-Addressing modes – Direct Register, Register indirect, Immediate and implicit addressing-Instruction set-Data transfer group-Arithmetic Group - Logical group - Branch group, Stack, I/O and Machine control group.

UNIT- III : Assembly Language Programming **(18-Hours)**

Addition-subtraction-multiplication-division of two 8-bit numbers-Finding the largest and smallest number in a data array-Arranging a list of numbers in ascending or descending order-multibyte addition and subtraction –decimal addition - subtraction.

UNIT- IV:Introduction To C **(20-Hours)**

Basic Structure of C Programs – Character set – C tokens - Keywords and identifiers – constants – variables – Data types – declaration of variables – Assigning values to variables – Symbolic constants – Operators and Expressions – Arithmetic operators-Relational, Logical and Assignment operators, Increment and Decrement operators – Conditional operator, Bitwise and Special operators.

UNIT- V: Preliminaries And Functions **(19-Hours)**

Data input and output – get char, put char, scan f, print f, gets, puts functions – Decision making and branching –if, if…else, else if ladder, switch, break, continue, goto – Decisionmakingandlooping–while,do…while,for,nestedloops–Arrays(one-,two- dimensional arrays)-Declaration, Initialization of arrays.

Total Lecture Hour-90

COURSE OUTCOME

The students will be able to

1. Know the Basics of Digital Computer.
2. Enrich the knowledge of Intel 8085 and its Architecture.
3. Know the assembly language program
4. Enhance the knowledge the C language.
5. Understand the Preliminaries and Functions.

TEXTBOOK(S)

1. B. Ram ,2013,*Fundamentals of Microprocessors and Microcontrollers*– DhanpatRai Publications (P) Ltd., NewDelhi.
2. E. Balagurusamy ,2012, *Programming in ANSI C* – Tata McGraw Hill Education Private Limited, NewDelhi.
3. Tim Bailey ,2000, Inroduction to the C Programming Language and software Design,Prentice – Hall, 2nd edition
4. Arock, , 2014,Fundamentals of Programming With C,Tbh/YesDeePublication.
5. Manish Kumar Ghodki,2000,Fundamentls of Microprocessor Programming,Khanna book publication,Bhopal.

REFERENCE BOOK(S)

1. R.S.Gaonkar,*2007,MicroprocessorArchitecture,Programming,andApplications with the 8085*, Penram International Publishing (India) Private Limited,Mumbai.

2. K. R. Venugopal and S. R. Prasad 2002,*Programming with C* – Tata McGraw-Hill Publishing Company Limited, NewDelhi.

E_RESOURCES

1. hManishKuarttps://youtu.be/XEMyFUuV31o
2. https://youtu.be/1Ei5gBBE4AA
3. https://youtu.be/si-KFFOW2gw
4. https://youtu.be/zAXAb-ttazY
5. https://youtu.be/l78iyzXQrP4

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Gender Studies (23UGGS)

Unit – I

Concepts of Gender: Sex – Gender – Biological Determinism – Patriarchy – Feminism – Gender Discrimination – Gender Division of labour – Gender Stereotyping – Gender Sensitivity – Gender Equity – Equality – Gender Mainstreaming - Empowerment.

Unit – II

Women's Studies vs Gender Studies : UGC's Guidelines – VII to XI Plans – Gender Studies : Beijing Conference and CEDAW – Exclusiveness and Inclusiveness.

Unit – III

Areas of Gender Discrimination : Family – Sex Ratio – Literacy – Health – Governance – ReligionWorkVsEmployment–Market–Media–Politics–Law–DomesticViolence–Sexual Harassment – State Policies and Planning.

Unit – IV

Women Development and Gender Empowerment : Initiatives – International Women's Decade – International Women's Year – National Policy for Empowerment of Women – Women Empowerment Year 2001 – Mainstreaming Global Policies .

Unit – V

Women's Movements and Safeguarding Mechanism : In India National /State Commission for Women(NCW) – All Women Police Station – Family Court – Domestic Violence Act – Prevention of Sexual Harassment at Work Place Supreme Court Guidelines – Maternity Benefit Act – PNDT Act – Hindu Succession Act 2005 – Eve Teasing Prevention Act – Self Help Groups – 73rd and 74th Amendment for PRIS

References

1. Bhasin Kamala, Understanding Gender : Gender Basics , New Delhi : Women Unlimited , 2004
2. BhasinKamala,ExploringMasculinity:GenderBasics,NewDelhi:WomenUnlimited,2004
3. Bhasin Kamala , What is Patriarchy? : Gender Basics, New Delhi :Women Unlimited,1993
4. Pernau Margrit, Ahmad Imtiaz, Reifeld Hermut (ed.,)Family and Gender : Changing Values in Germany and India ,New Delhi :SagePublications,2003
5. Agarwal Bina, Humphries Jane and Robeyns Ingrid(ed.,) Capabilities , Freedom , and Equality: Amartya Sen's Work from a Gender Perspective,New Delhi : Oxford University Press,2006
6. Rajadurai. S.V,Geetha.V,Themes in Caste Gender and Religion, Tiruchirappalli : Bharathidasan University,2007
7. Misra Geetanjali, Chandiramani Radhika (ed.,) Sexuality , Gender and Rights: Exploring Theory and Practice in South and Southeast Asia, New Delhi : Sage Publication,2005
8. Rao Anupama (ed.,) Gender &Caste : Issues in Contemporary Indian Feminism, New Delhi : Kali for Women,2003
9. Saha Chandana , Gender Equity and Gender Equality : Study of Girl Child in Rajasthan , Jaipur: Rawat Publication,2003.
10. Krishna Sumi, (ed.,),Livelihood and Gender : Equity in Community Resource Management, New Delhi : Sage Publication,2004
11. Pludi.AMichele(ed.,)praegerGuidetothePsychologyofGender,London:PraegerPublisher ,2004
12. Wharton .S Amy , The Sociology of Gender : An Introduction to Theory and Research ,USA : Blackwell Publishing ,2005
13. MohantyManoranjan(ed.,)Class,Caste,Gender:ReadingsinIndianGovernmentandPolitics – 5,New Delhi : Sage Publications ,2004.
14. Arya Sadhna Women ,Gender Equality and the State ,New Delhi :Deep &Deep Publication, 2000
16. Mishra .O.P,Law Relating to Women &Child ,Allahabad :Central Law Agency,2001
17. Chari Leelavathi ,Know Your Rights ,Madras; Tamilnadu Social WelfareBoard,1987
18. Bhattacharya Malini , Sexual Violence and Law ,Kolkata; West Bengala Commission for Women ,2002
19. Sexual Harassment at the Workplace – A Guide , New Delhi;Sakshi,1999

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