SENGAMALATHAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

(*Affiliated to Bharathidasan University*)

(Accredited with "A" Grade by NAAC; An ISO9001:2015Certified Institution)

SUNDARAKKOTTAI, MANNARGUDI –614016.

TAMILNADU,INDIA.

M.Sc., PHYSICS

COURSE STRUCTURE WITH REVISED SYLLABUS UNDER CBCS

(*For the candidates admitted in the academic year2021–2022*)

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TAMILNADU, INDIA

M.Sc., PHYSICS COURSE STRUCTURE UNDER CBCS

(*For the candidates admitted in the academic year 2021 –2022)*

ELIGIBILITY : Candidates who have passed Bachelor level Examination in Physics, Electronics, Applied Electronics from many recognized university in India or Abroad.

Sem.	Nature of the Course	Course Code	Title of the Course	Ins. Hours/ Week	Credit	Exam Hours	Marks		Total
							CIA	ESE	
I	Core Course (CC) – I	21PPH101	Mathematical Physics	5	4	3	25	75	100
	Core Course (CC) – II	21PPH102	Classical Mechanics and Relativity	5	4	3	25	75	100
	Core Course (CC) – III	21PPH103	Applied Electronics	5	4	3	25	75	100
	Core Course (CC) – IV	21PPH104	Atomic and Molecular Spectroscopy	5	4	3	25	75	100
	Core Practical (CP) – I	21PPH105P	Physics Practical – I (General and Electronics)	6	3	3	40	60	100
	Elective Course (EC) – I	21PPHE1A/ 21PPHE1B	Non-linear Optics/ Medical Physics	4	3	3	25	75	100
			TOTAL	**30**	**22**				**600**
II	Core Course (CC) – V	21PPH206	Microprocessor Programming and Robotics	5	4	3	25	75	100
	Core Course (CC) – VI	21PPH207	Electromagnetic Theory	6	6	3	25	75	100
	Core Course (CC) – VII	21PPH208	Quantum Mechanics	6	6	3	25	75	100
	Core Practical (CP) – II	21PPH209P	Physics Practical – II (Microprocessor and C++ Programming)	6	3	3	40	60	100
	Elective Course (EC) – II	21PPHE2A/ 21PPHE2B	Numerical Methods and C++ Programming /Renewable and Non Renewable Energy	4	3	3	25	75	100
	Extra Disciplinary Course (EDC) – I	-	-	3	2	3	25	75	100
			TOTAL	**30**	**24**				**600**
III	Core Course (CC) – VIII			5	4	3	25	75	100
	Core Course (CC) – IX	-	-	6	6	3	25	75	100
	Core Course (CC) – X	-	-	6	6	3	25	75	100
	Core Practical(CP)– III	-	-	6	3	3	40	60	100
	Elective Course (EC) – III	-	-	4	3	3	25	75	100
	Extra Disciplinary Course (EDC) – II	-	-	3	2	3	25	75	100
			TOTAL	**30**	**24**				**600**
IV	Core Course (CC) – XI	-	-	6	5	3	25	75	100
	Core Course (CC) – XII	-	-	6	5	3	25	75	100
	Project	-	-	18	10	-	25	75	100
			TOTAL	**30**	**20**				**300**
			GRAND TOTAL	**120**	**90**				**2100**

CURRICULAM DESIGN

Subject	No. of Courses	Total Credits
Core Course	12	54
Core Practical	03	13
Elective Course	03	09
Extra Disciplinary Course	02	04
Project	01	10
Total	21	**90**

Note:

	CIA	ESE
1. Theory	25	75
2. Practical	40	60
3. Project	25	75

Separate passing minimum is prescribed for Internal and External

FOR THEORY

The passing minimum for CIA shall be 40% out of 40 marks [i.e. 10 marks]
The passing minimum for ESE shall be 40% out of 75marks [i.e. 30marks]

FOR PRACTICAL

The passing minimum for CIA shall be 40% out of 25 marks [i.e. 16 marks]
The passing minimum for ESE shall be 40% out of 60 marks [i.e. 24 marks]
The passing minimum not less than 50% in the aggregate.

ELECTIVE COURSES (EC) OFFERED BY THE DEPARTMENT

Semester	Nature of the Course	Course Code	Title of the Course (Any one from the list)
I	Elective course (EC)-I	21PPHE1A	Non-linear Optics
I	Elective course (EC)-II	21PPHE1B	Medical Physics
II	Elective course (EC)-III	21PPHE2A	Numerical Methods and C++ Programming
II	Elective course (EC)-IV	21PPHE2B	Renewable and Non Renewable Energy
III	-	-	-
III	-	-	-

EXTRA DISCIPLINARY COURSES (EDC) OFFERED BY THE DEPARTMENT

Semester	Nature of the Course	Course Code	Title of the Course (Any one from the list)
II	Extra disciplinary courses (EDC)-I	21PPHED1A	Home Appliances
II	Extra disciplinary courses (EDC)-I	21PPHED1B	Communication Electronics
III			-
III			-

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TAMILNADU, INDIA

DEPARTMENTOF PHYSICS

M.Sc., PHYSICS

(For the candidates admitted in the academic year 2021 –2022)

Question Paper Pattern-(Theory)

Max time: 3 Hour **Max Marks: 75**

Section – A (10 x 2 = 20)

Answer all the questions

Answer in One or Two sentences each

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

Section – B (5 x 5 = 25)

Answer all the questions

Each answer should not exceed 500 words

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

Section – C (3 x10 = 30)

Answer any THREE questions in 1200 words

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

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SEMESTER I

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DEPARTMENT OF PHYSICS

M. Sc., PHYSICS

Semester: I –CC - I: Mathematical Physics

Ins. Hrs. /Week: 5 **Course Credit: 5** **Course Code: 21PPH101**

OBJECTIVES

- To learn various mathematical concepts and techniques in vector space, groups and functions of special types to solve physical problems
- To acquire the knowledge of Matrix theory
- To understand the basic concepts of group theory and complex variables

UNIT - I: Vector Analysis **(15 Hours)**

Concept of vector and scalar fields – Gradient, divergence, curl and Laplacian – Vector identities – Line integral, surface integral and volume integral – Gauss theorem, Green's theorem, Stokes's theorem and their applications, Schmidt's orthogonalization process – Schwartz inequality.

UNIT- II: Matrix theory and Tensors **(14 Hours)**

Characteristic equation of a matrix – Eigen values and eigenvectors – Cayley–Hamilton theorem - Reduction of a matrix to diagonal form – Jacobi method – Sylvester's theorem- Transformation of coordinates - Contravariant, covariant and mixed tensors – Rank of a tensor – Symmetric and anti symmetric tensors – Contraction of tensor- Metric tensors

UNIT - III: Group theory **(15 Hours)**

Basic definitions – Multiplication table – Subgroups, cosets and classes – Point and space groups – Homomorphism and isomorphism – Reducible and irreducible representations – Schur's lemma – The great orthogonality theorem (qualitative treatment without proof) – Formation of character table of C_{2v} and C_{3v} .

UNIT - IV: Complex variables **(17 Hours)**

Functions of complex variables- differentiability- Cauchy-Riemann conditions – Complex integration – Cauchy's integral theorem and integral formula – Taylor's and Laurent's series – Residues and singularities - Cauchy's residue theorem – Evaluation of definite integrals.

UNIT -V: Special functions **(14 Hours)**

Basic properties of gamma and beta functions -- Legendre, Bessel, Laguerre: Series solution, Rodriguez formula, generating function, recurrence relations and orthogonality relations.

Total Lecture Hours-75

COURSE OUTCOME

The students will be able to,

1. Understand the basic concepts of vector Fields.
2. Understand the matrix calculation and acquire the knowledge of Tensors.
3. Understand the basics of Group theory.
4. Acquire skill to solve physics problems using complex analysis.
5. Understand the methods and solutions of special functions and differential equations.

TEXT BOOK (S)

1. S. Chand 2016.H.K. Dass and Dr. RamaVerma, Mathematical Physics, New Delhi.
2. Sultan Chand And Sons. 2015.6th Revised Edition, Sathya Prakash- Mathematical Physics, New Delhi.
3. Vikas Pub., Noida, 2015.4th edition. Gupta, Mathematical Physics.
4. George B. Arfken, Mathematical Methods for Physicists,7thed. Physicists Prism Books, Bangalore, 2013.
5. Wiley, NY1999.8th ed. E. Kreyszig, Advanced Engineering Mathematics.

REFERENCE BOOK(S)

1. New Age.2006.A.W. Joshi, Matrices and Tensors in Physics, New Delhi.
2. A.B. Gupta, Fundamentals of Mathematical Physics ,4thRevised Edition,2011.
3. McGraw Hill, Singapore, 1967.L.A. Pipes and L.R. Harvill, Applied Mathematics for Engineers and Physicists.
4. McGraw Hill.2013.B.V. Ramana, Higher Engineering Mathematics, New Delhi.
5. Wiley Eastern Ltd,1990.P. K. Chattopadhyay, Mathematical Physics, New Delhi.

E- RESOURCES

1. Selected topics in mathematical Physics, Prof. V. Balakrishnan, IIT Madras(NPTEL)
2. https://nptel.ac.in/course.html/Physics/Integrals and vector calculus
3. https://nptel.ac.in/course.html/Physics / Matrix analysis and with applications
4. https://bit.ly/2KMHUCC
5. https://bit.ly/3o81WWL
6. https://bit.ly/3qdWqUh

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DEPARTMENT OF PHYSICS

M. Sc., PHYSICS

Semester: I- CC-II: Classical Mechanics And Relativity

Ins. Hrs. /Week: 5 **Course Credit: 5** **Course Code: 21PPH102**

OBJECTIVES

- To learn about Lagrange's and Hamilton formulation and their applications using differential mathematical relation
- To study about motion under central force and Rigid Body Dynamics
- To understand the theory of relativity

UNIT- I: Lagrangian Formulation **(17 Hours)**

Mechanics of a particle and a system of particles –Conservation laws –Constraints–Degrees of freedom–Generalized coordinates – Alembert's principle and Lagrange's equation – Hamilton's principle – Applications to linear harmonic oscillator, pendulum, compound pendulum, and Atwood's machine.

UNIT - II: Motion under Central Force **(12 Hours)**

Conservation of energy and angular momentum– Inverse square law – Kepler's problem – Virial theorem–Rutherford scattering cross section– Artificial satellites – Geo stationary satellites – Eccentricity of orbit of satellites – Escape velocity

UNIT- III: Rigid Body Dynamics and Oscillatory Motion **(14 Hours)**

Euler's angles– Euler's equation– Moments and products of inertia - Symmetrical top – Stable and unstable Equilibrium-– Normal modes and frequencies – Linear triatomic molecule

UNIT- IV: Hamilton's Formulation **(20 Hours)**

Hamilton's canonical equations of motion – Hamilton's equations from variational principle – Principle of least action –Poisson bracket-Invariance of Poission bracket under canonical transformation-The Angular Momentum and Poisson's Bracket-phase space– Hamilton-- Jacobi method – Action and angle variables – Kepler's problem in action-angle variables – Applications of Hamilton's equations of motion to linear harmonic oscillator, pendulum, compound pendulum and charged particles in an electromagnetic field.

UNIT -V: Relativistic Mechanics **(12 Hours)**

Reviews of basic ideas of special relativity – Energy momentum four -vector – Minkowski's four-dimensional space – Lorentz transformation as rotation in Minkowski's space –Thomas precession – Elements of general theory of relativity

Total Lecture Hours-75

COURSE OUTCOME

The Students are able to,

1.Understand the various mathematical techniques of classical mechanics.
2.Learn about Lagrange's and Hamilton formulation and their applications.
3.Gain the knowledge about motion under central force.
4.Study the Rigid Body Dynamics.
5.Acquire the knowledge about relativistic dynamics.

TEXT BOOK(S)

1.S.L. Gupta, V. Kumar and H.V. Sharma, 2012. Classical Mechanics, Pragati Prakashan, Meerut.
2.G. Aruldhas, 2009. Classical Mechanics, PHI Learning private limited, New Delhi.
3.H. Goldstein, C.P. Poole and J.L. Safko, 2014. Classical Mechanics, 3rd edition, Pearson Education and DorlingKindersley, New Delhi.
4.Dr. J.C. Upadhyaya, 2014, Classical Mechanics, Himalaya publishing house .
5.John R.Taylor, 2005. Classical Mechanics, University Science Books.

REFERENCE BOOK(S)

1.V.B. Bhatia, 1997, Classical Mechanics Narosa, New Delhi.
2.T.L. Chow, 1995. Classical Mechanics, John-Wiley, New York.
3.Narayana chandra Rana, Classical Mechanics,Tata McGraw-Hill Publishing Company Limited New Delhi.

E_RESOURCES

1.https://arstechnica.com/science/2014/08/the-never-ending-conundrums-of-classical-
2.https://towardsdatascience.com/modelling-the-three-body-problem-in-classical-
3. https://www.askiitians.com/revision-notes/physics/special-theory-of-relativity/
4.https://bit.ly/36n6ZMM
5.https://rb.gy/6o8lzs

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DEPARTMENT OF PHYSICS

M.Sc., PHYSICS

Semester: I- CC-III: Applied Electronics

Ins Ins. Hrs. /Week: 5 Course Credit: 5 Course Code: 21PPH103

OBJECTIVES

- To understand the working of advanced semiconductor devices and OP-AMP
- To study the concept of circuital arrangements in Digital circuits
- To learn the basics of integrated circuit fabrication, applications of timer IC-555 and building block of digital systems

UNIT- I: Semiconductor Devices (15 Hours)

Varactor, tunnel, Gunn, optoelectronic, LASER, LED and photo diodes –Hall effect in a semiconductor - Depletion and enhancement type MOSFFT – Characteristics of UJT-relaxation oscillator - Characteristics of SCR-90° phase control.

UNIT- II: Operational Amplifier (16 Hours)

Wien bridge and phase-shift oscillators – Triangular, saw-tooth and square waves generators – Schmitt trigger – Voltage control oscillator – Phase-locked loops - Weighted resistor and binary R-2R ladder digital to analog converters -Counter type and successive approximation analog to digital converters.

UNIT- III: Digital Circuits-I (15 Hours)

Digital comparator – Parity generator/checker – Data selector - BCD to decimal decoder – Seven segment decoder – Encoders – RS, JK, D and JK master-slave flip-flops.

UNIT- IV: Digital Circuits-II (14 Hours)

Serial-in serial-out, serial-in parallel-out and parallel-in serial-out shift registers – Synchronous, asynchronous, ring and up/down (using mod 10) counters --Multiplexers – De multiplexers.

UNIT -V: IC Fabrication and Timer Applications (15 Hours)

Basic monolithic ICs – Epitaxial growth – Masking – Etching, impurity diffusion – Fabricating monolithic resistors, inductors and capacitors – Circuit layout – Contacts and inter connections – Charge coupled device – Applications of CCDs -- 555 timer Description of the functional diagram, applications of monostable and astable operations and pulse generation-Microwave Generation.

Total Lecture Hours-75

COURSE OUTCOME:

The Student will be able to,

1.Understand the working of advanced semiconductor devices.
2.Understand the utility of OP-AMP.
3.Study the concept of circuital arrangements in Digital circuits.
4.Learn the details of integrated circuit fabrication
5.Learn the preparation of electronic gadgets.

TEXT BOOK(S)

1.T.F. Schubert, E.M. Kim, 1996, Active and Nonlinear Electronics ,John Wiley, New York,
2.L. Floyd, Electronic Devices, 2013, Pearson Education, New York.
3.D.P. Leach and A.P. Malvino, 2011, Digital Principals and Applications, Tata McGraw-Hill,New Delhi.
4.David A. Bell, 2008.Electronic Devices and Circuits, Oxford university press, New Delhi,
5. David A. Bell, 2011.Operational Amplifiers & Linear ICs, Oxford university press, New Delhi.

REFERENCE BOOK(S)

1. R.L. Geiger, P.E. Allen and N.R Strader, 1990 VLSI Design Techniques for Analog and Digital Circuits, McGraw--Hill, Singapore.
2. D. Roy Choudhury and S.B. Jain, 2010, Linear Integrated Circuit , New Age International Publications, New Delhi,
3. D.Chattopadhyay and P.C. Rakshit, 2010, Electronics Fundamentals and Applications New Age International Publications, New Delhi,
4. J. Millman, C. Halkias and C.D. Parikh, 2010 Integrated Electronics, Analog and Digital Circuits and Systems, TMGH.

E_RESOURCE

1. https://youtu.be/1rZyGL1K5QI
2. https://youtu.be/7FYHt5XviKc

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DEPARTMENT OF PHYSICS

M.Sc., PHYSICS

Semester: I- CC-IV: Atomic and Molecular Spectroscopy

Ins Ins. Hrs. /Week: 5 **Course Credit: 5** **Course Code: 21PPH104**

OBJECTIVES

- To understand the atomic spectra and electron system and Quantum chemistry
- To study the principles of microwave ,Infrared spectroscopy and Raman spectroscopy
- To acquire knowledge of nuclear magnetic resonance spectroscopy

UNIT- I: Atomic Spectroscopy (14 Hours)

Quantum states of an electron in atom – Hydrogen atom spectrum – Electron spin -- Stern—Gerlach experiment – Spin-orbit interaction – Two electron system -- LS-JJ coupling schemes – Spectroscopic terms and selection rules - Exchange Symmetry of wave functions- pauli's exclusion principle -Hund`s rule

UNIT- II: Atoms in external fields & Quantum chemistry (14 Hours)

Atoms in External Fields: Zeeman and Paschen- Back effect of one and two electron Systems- Selection rules – Stark effect.

quantum Chemistry Of Molecules: Covalent, inonic and Vander waals interactions – Born-Oppenheimer approximation- Heitler-London and molecular orbital theories of H_2 –Huckel`s molecular approximation – Application of butadiene and benzene.

UNIT -III: Microwave and Infrared absorption spectroscopies (16 Hours)

Microwave Spectroscopy: Rotation of diatomic molecules– Rotational spectra of polyatomic molecules– Spectrum of non rigid rotator – Experimental technique –Polyatomic molecules – Linear, symmetric top and asymmetric top molecules - Characteristic and group frequencies

Infrared Absorption Spectroscopy: Vibrating diatomic molecule – An harmonic oscillator – Diatomic vibrating rotator – Vibration-rotation spectrum of carbon monoxide –Linear and symmetric top molecules –Influence of nuclear spin – FT techniques.

UNIT -IV: Raman spectroscopy & ESR spectroscopies (16 Hours)

Raman effect-Classical and Quantum theory of Raman effect – Pure rotational Raman spectra – Linear molecules– Symmetric top molecules – Vibration Raman spectra –

ESR Spectroscopies: Theory of ESR –Nuclear interaction and hyperfine structure-Experimental study – ESR spectrometer — Determination of g factor – Free radical studies and biological applications.

UNIT -V: Nuclear magnetic resonance spectroscopy (15 Hours)

Basic principles and working of NMR-- Bloch equations and solutions – Shielding and de shielding effects–Chemical shift–Spin lattice and spin-spin relaxation- Detection of NMR – Structural diagnosis and hydrogen bonding.

Total Lecture Hours-75

COURSE OUTCOME

The students will be able to,

1. Study the atomic spectra of molecules
2. Understand the concepts Atoms in external field and quantum chemistry
3. Understand concept of microwave and IR spectroscopy
4. Understand the Raman spectroscopy and ESR spectroscopy
5. Acquire the knowledge of nuclear magnetic resonance spectroscopy

TEXT BOOK (S)

1. Gupta kumar Sharma, Elements of spectroscopy, pragati edition, Meerut.
2. C.N.Banwell,1981 ,*Fundamentals of Molecular Spectroscopy* Mc Graw Hill, NewYork.
3. G.Aruldhas,2006 ,*Molecular Structure and Spectroscopy* ,Prentice Hall, New Delhi.
4. D.N.Sathyanarayana,2015, *Vibrational* Spectroscopy, NewAge International, NewDelhi.
5. Donald L.Pavia, Gary M. Larmpman, George S. krizJarnesA.Vyvyan,2004, Introduction to spectroscopy Cengage Learning.

REFERENCEBOOK (S)

1. J.MichaelHollas,2004, *Modern Spectroscopy* ,WileyIndia, NewDelhi.
2. B.P.StraughanandS.Walker,1976,*Spectroscopy*VolumesI--III, Chapman and Hall, NewYork.
3. Raymond Chang,1980, Basic Principles of spectroscopy, McGraw-Hill, Kogakusha, Tokyo.
4. S.Lakshmi Reddy, Tamio Endo Et Al., 2016,lectronic Spectroscopy, Magnum publishing1st edition USA.
5. Dheeraj Kumar Singh, Manik Pradhan,Arnulf Materny,2021,Modern Techniques of Spectroscopy,volume-13,Springer Publication,New Delhi.

E_ RESOURCES

1. https://youtu.be/M1v_77kswqg
2. https://youtu.be/HhV3H-m5f2c
3. https://youtube.com/playlist?list=PLOzRYVm0a65dcxLJgO0uzQ0Sad-57w37u
4. https://youtu.be/dkARLSQWHH8
5. https://youtu.be/RqBAW-uFHK0

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DEPARTMENT OF PHYSICS

M. Sc., PHYSICS

Semester: I- CP-I: Physics Practical I (General and Electronics)

Ins. Hrs. /Week: 6 **Course Credit: 5** **Course Code: 21PPH105P**

OBJECTIVE

- Experimental determination of certain physical constants and properties and verification of characteristics and applications of electronic components and devices.

Any **TWELVE** experiments

A. General Experiments:

1. Determination of q, n, σ by elliptical fringes method.
2. Determination of Stefan's constant.
3. Determination of Rydberg's constant.
4. Study of Hall effect in a semiconductor.
5. Determination of dielectric constant at high frequency by Lecher wire.
6. Michelson interferometer -- Determination of wavelength of monochromatic source.
7. Determination of wavelength of monochromatic source using Biprism.
8. Charge of an electron by spectrometer.

B. Electronics Experiments:

1. Construction of dual regulated power supply.
2. Characteristics of UJT.
3. Characteristics of SCR.
4. Characteristics of LDR.
5. Up/down counter using mod10.
6. Operation of shift register using serial-in serial-out, serial-in parallel-out & parallel-in serial-out.
7. Digital comparator using XOR and NAND gates.
8. Study of Arithmetic Logic Unit (ALU) - IC74181

Total Lecture Hours-90

COURSE OUTCOME:

1. Acquire the practical knowledge of certain physical constants and properties, verification of characteristics and applications of electronic components and devices.

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/uKHuLnF9ALc
2. https://youtu.be/uKHuLnF9ALc

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DEPARTMENT OF PHYSICS

M.Sc., PHYSICS

Semester: I- EC-I: Non- Linear Optics

Ins. Hrs. / Week: 4 **Course Credit: 3** **Course Code: 21PPHE1A**

OBJECTIVES

- To learn the basic principles and working of lasers.
- To understand the basic concepts and processes of non linear optics
- To study the features of nonlinear optical materials fiber optics.

UNIT-I: Lasers (13 Hours)

Basic concepts of Laser- Stimulated emission– Population inversion and Meta stable state-Gas lasers – He-Ne, Ar^+ ion lasers – Solid state lasers – Ruby – Nd:YAG,– Semiconductor lasers – Diode Laser, p-n-junction laser and GaAs laser – Industrial applications of Laser: Laser cutting – Laser Welding – Hologram.

UNIT-II: Basics of Non-linear Optics (12 Hours)

Wave propagation in an anisotropic Crystal–Polarization response of materials to light– Harmonic generation–Second harmonic generation–Sum and difference frequency generation– Phase matching - Third harmonic generation – Bistability.

UNIT-III: Multi photon Processes (13 Hours)

Two photon process – Theory and experiment – Three photon process – Parametric generation of Light – Oscillator – Amplifier – Stimulated Raman scattering – Intensity dependent refractive index - Optical Kerr effect– Photorefractive, electronic and optic effects.

UNIT-IV: Non-linear Optical materials (10 Hours)

Basic requirements – Inorganics – Borates – Organics – Urea, Nitro aniline – Semiorganics – Thoreau complex – Laser induced surface damage threshold.

UNIT-V: Fiber Optics (12 Hours)

Step – Graded index fibers – Wave propagation – Fiber modes – Single and multimode fibers – Block diagram of fiber optic communication– Numerical aperture – Dispersion – Fiber bandwidth – Fiber losses – Scattering, absorption, bending losses -- Attenuation coefficient– Material Absorption.

Total Lecture Hours- 60

COURSE OUTCOME

The students will be able to,

1. Understand the concept of laser action.
2. Learn the basic concept of non- linear optics.
3. Understand the principle of multi photon processes.
4. Study the general features of non -linear optical materials.
5. Acquire the knowledge about fiber optics concept.

TEXT BOOK(S)

1. W.T. Silvast, 2003, Laser Fundamentals, Cambridge University Press, Cambridge.
2. B.B. Laud, 2011, Lasers and Nonlinear Optics, 3rdEdn, New Age, New Delhi.
3. R.W. Boyd, 2008, Nonlinear Optics, 3rd Edn. Academic Press, New York,.
4. P.E.Powers, 2011, Fundamentals of Nonlinear Optics, CRC Press.
5. G.P.Agarwal, 2003, Fiber-Optics Communication Systems, 3rdEdn,John Wiley, Singapore..

REFERENCE BOOK(S)

1. K.R. Nambiar, 2014, Lasers: Principles, Types and Applications, New Age International Publishers Ltd, New Delhi.
2. D.L. Mills, 1998., Nonlinear Optics – Basic Concepts ,Springer, Berlin,
3. AjoyGhatak, 2017, Optics, , 6th Edition , McGraw-Hill Education (India) Pvt Ltd,.
4. Dieter Meschede, 2004, Optics, Light and Lasers, Wiley-VCH, Verley GmbH.
5. Ariel Lipson, Stephen G. Lipson, Henry Lipson, 2011, Optical Physics, 4th Edition,. Cambridge University Press, New Delhi,

E_RESOURCES

1. https://nptel.ac.in/courses/104/104/104104085/
2. https://nptel.ac.in/courses/122/107/122107035/
3. https://www.sif.it/static/SIF/resources/public/files/va2014/Boyd_talk1.pdf
4. https://nptel.ac.in/courses/115/105/115105105/
5. https://nptel.ac.in/courses/115/107/115107095/

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DEPARTMENT OF PHYSICS

M.Sc., PHYSICS

Semester: I- EC-I: Medical Physics

Ins. Hrs. /Week: 4 **Course Credit: 3** **Course Code: 21PPHE1B**

OBJECTIVES

- To gain the knowledge about medical terms and Radiology techniques
- To understand the uses of light in medicine and Ultrasonic in medicine
- Acquire the knowledge about computer uses in medicine

UNIT -I: Medical Terminology and Measurement (13 Hours)

Terminology and measurement –Applications of electricity and magnetism in medicine-Electrical shock, High frequency Electricity in medicine- Low frequency electricity and magnetism in medicine.

UNIT- II: Radiology (12 Hours)

MRI- Computed tomography - Positron emission tomography - X – RAY- Radiation Protection in Diagnostic Radiology-Radiation protection in Radiation therapy-- Radio frequency, Infrared and Ultraviolet radiation production.

UNIT -III: Light In Medicine (11 Hours)

Measurement of light and its units, Application of ultraviolet and infrared light medicine, Lasers in medicine-Physics of diagnostic X rays-Producing live X-ray images-Fluoroscopy.

UNIT- IV: Ultrasonic's in Medicine (11 Hours)

Propagation of ultrasound in biological materials- Principles of Echo ranging – A Scan-– Identification of early pregnancy-fetal growth - Safety of diagnostic ultrasound- Ultrasonic holography.

UNIT- V: Computers in Medicine (13 Hours)

History taking-Laboratory Automation-Electrocardiogram interpretation-Patient monitoring-Drug – test interactions-Prescribing drug dosage-Medial record systems-Hospitals book keeping- Other uses of computers in medicine.

Total Lecture Hours- 60

COURSE OUTCOME

The students will able to

1. Understand the concept of medical terms and measurements.
2. Gain the knowledge about Radiology concepts.
3. Understand the uses of light in medicine.
4. Acquire the knowledge about ultrasonic's in medicine.
5. Understand the computer applications used in medical physics

TEXT BOOK(S)

1. John R.Cameron &James G.Skofronick, Medical Physics, A Willey-Inter science Publication, John Willey & Sons.
2. M.Arumugam, 2004, Bio Medical instrumentation, Anuradha Publishing Co, Kumbakonam, Tamilnadu,
3. Paras N.Prasad, 2003, Introduction to Biophotonics, John Wiley and Sons lnc
4. W.R.Handee, 2003, Medical Radiation Physics, Year book Medical Publishers lnc., London.
5. J.P.Woodcock, 2002, Ultrasonic Medical Physics Hand book series1, Adam Hilger Bristol

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REFERENCE BOOK(S)

1. B.H.Brown, R.H.Smallwood, D.C.Barber, P.V.Lawford and D.R.Hose, 1998, Medical Physics and Biomedical Engineering, CRC Press.
2. K.Thayalan, 2014, The Physics Of Radiology And Imaging, Jaypee Brothers Medical Publishers.
3. T.Rajalakshmi, 2008, Bio Medical Instrumentation, First Edition, Sams Publishers.
4. R.S.Khandpur, 2007, Hand Book of Bio Medical Instrumentation, Tata McGraw Hill.
5. G.K.Knoff,A.S.Bassi, 2007, Smart Biosensor Technology, CRC Press,2006.

E_RESOURCES:

1.https://nptel.ac.in/courses/115/102/115102017/
2. https://nptel.ac.in/courses/115/106/115106087/
3.https://radiologykey.com/clinical-radiation-generators/
4.https://spie.org/news/spie-professional-magazine-archive/2011-january/lasers-inmedicine?SSO=1
5.https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-cy13/

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SEMESTER II

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2021 – 2022)

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2021 – 2022)

DEPARTMENT OF PHYSICS

M.Sc., PHYSICS

Semester: II- CC-V: Microprocessor programming and Robotics

Ins. Hrs. /Week: 5 Course Credit: 5 Course Code: 21PPH206

OBJECTIVES

- To illustrate the architecture of 8085 microprocessor
- To understand Devices and Programming of 8051 Microcontroller
- To introduce the functional elements of Robotics & knowledge on the direct and inverse kinematics

UNIT-I: Microprocessor architecture and interfacing (14 Hours)

Intel 8085 microprocessor architecture – Pin configuration –Timing diagram – Instruction and data formats – Addressing modes – Memory mapping and I/O mapping I/O scheme -- Memory mapping I/O interfacing -Data transfer schemes -- Synchronous and asynchronous data transfer – Interrupt driven data transfer

UNIT-II: Peripheral devices and Microprocessor applications (15 Hours)

Programmable peripheral interface - Architecture of 8255A -Programmable DMA controller (82597)-Programmable interrupt controller (8259) -- Programmable counter-Intel 8253 -- Architecture, control word and operation, Block diagram and interfacing of analog to digital converter (ADC 0800)–Digital to analog converter (DAC0800) –7 segment LED Display – Stepper motor

UNIT-III: Microcontroller 8051 (14 Hours)

Block diagram of Intel 8051 – Architecture –Registers– Pin configuration- Memory organization--External data and program memory -- Counters and timers – Serial data input/output – Interrupt structure–External interrupts–Addressing modes—Comparison between microprocessor and microcontroller.

UNIT-IV: Basic concepts of Robotics (16 Hours)

Brief history-Types of Robot–Technology-Robot classifications and specifications-Design and Control issues- Various manipulators – Sensors - work cell - Programming languages.

UNIT-V: Direct and inverse Kinematics (16 Hours)

Mathematical representation of Robots - Position and orientation – Homogeneous transformation- Various joints- Degrees of freedom-Direct kinematics-Inverse kinematics- SCARA robots - Solvability

Total Lecture Hours-75

COURSE OUTCOME

The students will be able to

1. Acquire knowledge of Intel 8085architecture
2. Get the knowledge about peripheral devices and microprocessor application
3. Acquire knowledge about Intel 8051micro controller
4. Ability to understand basic concept of robotics.
5. Acquire knowledge to analyze Instrumentation systems and their applications to various

TEXTBOOK(S)

1. *B.*Ram, 2006, Fundamentals of Microprocessor and Microcomputers, Dhanpat Rai Pub., NewDelhi.
2. M.A. Mazidi, J.G. Mazidi and R.D. Mckinlay, 2013, The 8051 Microcontroller and Embbeded Systems using Assembly and C. Dorling Kindersley, NewDelhi.
3. A.P.Godseand ,D.A.Godse, 2008, Microprocessors and Microcontrollers ,Technical Pub, Pune.
4. R.K.Mittal and I.J.Nagrath, 2005, Robotics and Control, Tata McGraw Hill4th Reprint, New Delhi.
5. John J.Craig, 2009, Introduction to Robotics Mechanics and Control, Third edition, Pearson Education.

REFERENCEBOOK(S)

1.R. Gaonkar, 2006, Microprocessor Architecture, Programming and Applications.with8085, Penram International Publishing 5th edition , Mumbai.

2.K.Ayala, 2013, The Microcontroller, Cengage Learning India 3rdedition, New Delhi.

3.Ashitava Ghoshal,2010, Robotics-Fundamental Concepts and Analysis', Oxford University Press, Sixth impression.

4. K. K.Appu Kuttan, 2007, Robotics, I K International.

5.S.Ghosal, 2009, Embedded systems &Robatics-Projects using the 8051 Microcontroller, Cengage Learning.

E_RESOURCES

1. https://youtu.be/XEMyFUuV31o
2. https://youtu.be/1Ei5gBBE
3. https://youtu.be/0yD3uBshJB0
4. https://youtu.be/lVjFhNv2N8o
5. https://youtu.be/iXSXIJn_Xwc

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SENGAMALA THAYAAR EDUCATIONAL TRUSTWOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI – 614016

(For the Candidate admitted in the academic year 2021-2022)

DEPARTMENT OF PHYSICS

M. Sc., PHYSICS

Semester: II- CC-VI: Electromagnetic Theory

Ins. Hrs. /Week: 4 **Course Credit: 4** **Course code: 21PPH207**

OBJECTIVES

- To introduce the basic mathematical concept related to electromagnetic vector field
- To impart knowledge on the concepts of electrostatics and magneto statics.
- To impart knowledge on the concepts of Maxwell's equation and concepts of electromagnetic waves and transmission lines

UNIT- I: Electrostatics and Polarization (14 Hours)

Coulomb's Law-Gauss's law – Field due to an infinite, straight, uniformly charged wire – Multipole expansion of a charge distribution -- Field inside a uniformly polarized sphere – Electric field inside a dielectric – Electric displacement and polarizability – Claussius- Mossotti relation – Polarization of polar molecules and Langevin equation and Debye relation – Electrostatic energy.

UNIT -II: Boundary Value Problems In Electrostatics (13 Hours)

Boundary conditions – Potential at a point between the plates of a spherical capacitor – Potential at a point due to uniformly charged disc –Method of image charges–Point charge in the presence of a charged, insulated conducting sphere - -Laplace equation in spherical coordinates.

UNIT- III: Magneto Statics (10 Hours)

Biot and Savart law-Force between current carrying conductors-Magnetic scalar and vector potentials – Magnetic dipole in a uniform field – Magnetization current – Magnetic intensity – Magnetic susceptibility and permeability Hysteresis – Correspondences in electrostatics and magneto statics.

UNIT- IV: Field Equations and Conservation Laws (11 Hours)

Continuity equation– Displacement current–Poynting theorem– Energy in electromagnetic fields–Electromagnetic potentials–Maxwell's equations in terms of electromagnetic potentials – Lorentz and Coulomb gauges.

UNIT- V: Electromagnetic Waves and Wave Propagation (12 Hours)

Electromagnetic waves in free space – Propagation of electromagnetic waves in isotropic dielectrics and in anisotropic dielectrics – Reflection and refraction of electromagnetic waves: TM and TE modes – Propagation in rectangular waveguides – Cavity resonator.

Total Lecture Hour-60

COURSE OUTCOME

The Students will be able to,

1. Understand the basic of Electrostatics
2. Understand Magnetostatics and Electromagnetisms.
3. Solve problems on magnetic vector potentials.
4. Understand the basic of Dielectrics.
5. Acquire knowledge on the various modes of propagation of EM waves in waveguide

TEXT BOOK(S)

1. J.D. Jackson, 1999, Classical Electrodynamics, 3rd edition, John-Wiley, New York.
2. K.K. Chopra and G.C. Agarwal, Electromagnetic Theory, K. Nath&Co., Meerut.
3. D.J. Griffiths, 2014, Introduction to Electrodynamics, 4th edition, Pearson, Essex.
4. E.C. Jordan and K.G.Balmain, 2015, Electromagnetic Waves and Radiating Systems PHI, New Delhi.
5. Jerrold Franklin, 2017, Classical Electromagnetism, 2nd Edition, Dover Publications, Inc.

REFERENCE BOOK(S)

1. John R. Reitz, Fredric, J. Milford and Robert W. Christy, 1992 Foundations of Electromagnetic Theory 4th edition, Narosa Publishing House, Pvt., Ltd.
2. K.G.Balmain, 1995, Electromagnetic Waves and Radiating System, Prentice Hall of India,.
3. Paul Lorrain, Dale R.Corson, Francois Lorrain, 2003, Electromagnetic fields and waves.CBS Publishers.
4. B.B.Laud, 2005, Electromagnetics, New Age International Pvt., Ltd., New Delhi,
5. T.L. Chow, 2012, Electromagnetic Theory , Jones and Bartlett Learning.

E_RESOURCES

1. https://youtu.be/r-shNhpBkhs
2. https://youtu.be/AGGJvLJEKA4
3. http://nptel.ac.in/cources/122/106/12210634/
4. http://ocw.mit.edu/cources/physics/8-04-quantum physics-i-spring-2016/lecture-notes
5. http://youtu.be/JgSXQorBQSk

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SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2021 – 2022)

DEPARTMENT OF PHYSICS

M.Sc., PHYSICS

Semester: II- CC-VII: Quantum Mechanics

Ins. Hrs. /Week: 4 **Course Credit: 4** **Course Code: 21PPH208**

OBJECTIVES

- To study the basic formulation of Schrodinger equations
- To understand the concepts of scattering theory and angular momentum
- To acquire knowledge on relativistic quantum mechanics

UNIT- I: Schrodinger equation and general formulation (13 Hours)

Schrödinger equation and its plane wave solution –Physical meaning and conditions on the wave function –Expectation values- Ehrenfest theorem –Hermitian operators and their properties – Commutator relations - Uncertainty relation-- Bra and ket vectors -–Schrödinger, Heisenberg and interaction pictures.

UNIT -II: Exactly solvable systems (11 Hours)

Linear harmonic oscillator: Solving the one-dimensional Schrödinger equation and abstract operator method – Particle in a box --Rectangular barrier potential – Rigid rotator – Hydrogen atom

UNIT -III: Approximation methods (12 Hours)

Time-independent perturbation theory: Non-degenerate (first-order) and degenerate perturbation theories-Zeeman effect-Stark effect–WKB approximation and its application to tunneling problem and quantization rules**.**

Time-dependent perturbation theory: Constant and harmonic perturbations -- Transition probability – Sudden approximation.

UNIT IV: Scattering theory and angular momentum (13 Hours)

Scattering theory: Scattering amplitude and cross-section – Green's function approach-- Born approximation and its application to square-well and screened- Coulomb potentials.

Angular momentum: Components of orbital angular momentum - L^2, L_x, L_y, L_z – Spin angular momentum - Total Angular Momentum **–** Properties of J and J^2 – Eigen pairs of J^2 and J_z

UNIT V: RELATIVISTIC QUANTUM MECHANICS (11 Hours)

Klein--Gordon equation for a free particle and its solution –Dirac equation for a free particle and Dirac matrices -- Charge and current densities – Plane wave solution –Negative energy states – Zitterbewegung.

Total Lecture Hours-60

COURSE OUTCOME

The Student will be able to,

1. Study the postulates of quantum mechanics
2. Understand the concepts one dimensional problems
3. Study transition under constant perturbation and transition probability
4. Understand the concepts of scattering theory
5. Acquire knowledge of quantization of fields.

TEXT BOOK(S)

1. Sathya prakash, 2007, Quantum Mechanics, Pragathi Prakashan.
2. G.Aruldhas, 2009, Quantum Mechanics PHI Learning Private Limited, Newdelhi-110001.
3. S.RajasekarandR.Velusamy,2015,QuantumMechanicsI: The Fundamentals, CRC Press, Boca Raton.
4. R.Shankar, 2007, Principles of Quantum Mechanics, Springer, New Delhi.
5. A.K.Ghatak andS.Lokanathan,2004,QuantumMechanics:Theory&Applications,5th edition Macmillan, Chennai.

REFERENCEBOOK(S)

1. P.M.Mathews and K.Venkatesan, 1987, A Text Book of Quantum Mechanics. Tata Mc Graw Hill, New Delhi.
2. L.Schiff, 2014,Quantum Mechanics,4th edition, Tata Mc Graw Hill, New Delhi.

E_RESOURCES

1. https://nptel.ac.in/courses/115/103/115103104/
2. https://nptel.ac.in/courses/115/106/115106065/
3. https://nptel.ac.in/courses/115/106/11510606
4. https://youtu.be/IKJAJdDEqhM
5. https://youtu.be/TQKELOE9eY4

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SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2021 – 2022)

DEPARTMENT OF PHYSICS

M.Sc., PHYSICS

Semester: II- CP-II: Physics Practical II (Microprocessor And C++ Programming)

Ins. Hrs. / Week: 6 **Course Credit: 4** **Course Code: 21PPH209P**

OBJECTIVES

- To develop programming skills of microprocessor and C++ programming in solvingsome mathematical problems and their applications.
- To facilitate numerical computing.

Any **TWELVE** experiments

A. Microprocessor (8085):

1. Finding the largest number from set of numbers.
2. Finding the smallest number from set of numbers.
3. Arranging a set of numbers in ascending and descending orders.
4. Study of multi byte decimal addition and subtraction.
5. Study of seven segment display.
6. Traffic control system.
7. Generation of square and sine waves using DAC0800.
8. Control of stepper motor using microprocessor.

B. C++Programming:

1. Least-squares curve fitting – Straight-line fit
2. Least-squares curve fitting – Exponential fit
3. Real and complex roots of one-dimensional nonlinear equations – Newton-Raphson method
4. Numerical integration – Composite trapezoidal rule.
5. Numerical integration – Composite Simpson's 1/3rule.
6. Solution of a second-order ODE – Euler method.
7. Solution of a first-order ODE – Fourth-order Runge-Kutta method.
8. Uniform random number generation – Park and Miller method.

Total Lecture Hours-90

COURSE OUTCOME

Develop programming skills of microprocessor and C++ programming for solving some mathematical problems and their applications.

TEXT BOOK (S)

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

REFERENCE BOOK(S)

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

E_RESOURCES

1. https://youtu.be/uvupli4nik8
2. https://youtu.be/IugJKfNhbew

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SENGAMALA THAYAAR EDUCATIONAL TRUSTWOMEN'S COLLEGE

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DEPARTMENT OF PHYSICS

M. Sc., PHYSICS

Semester: II-EC-II: Numerical Methods and C++Programming

Ins. Hrs. /Week: 4 **Course Credit: 3** **Course Code:** 21PPHE2A

OBJECTIVES

- To understand C++ computer programming necessary for numerical simulation of physical problems.
- To learn numerical methods of computing certain mathematical quantities, construction and evaluation of a function and solution of an ordinary differential equation
- To solve problems in the field of theoretical physics and engineering this requires computing of numerical results using certain raw data.

UNIT- I: Programming in C++ (11 Hours)

Constants and variables -- I/O operators and statements -- Header files -- Main function – Conditional statements -- Switch statement -- Void function -- Function program -- For, while and do-while statements--Break, continue and goto statements--Arrays.

UNIT- II: Curve Fitting and Interpolation (14 Hours)

Curve fitting: Method of least-squares - Straight-line fit -- Exponential and power- law fits.

Interpolation: Newton interpolation polynomial: Newton Forward and Backward inter polation formula- Linear interpolation, Higher-order polynomials and first-order divided differences–Gregory--Newton interpolation polynomials –Lagrange interpolation.

UNIT- III: Solutions of Linear and Nonlinear Equations (13 Hours)

Simultaneous linear equations: Upper triangular form and back substitution – Augmented matrix Solutions of linear algebraic equations-Gauss elimination method-- Jordan's modification—Inverse of a matrix by Gauss--Jordan method.

Roots of nonlinear equations: Solutions of Transcendental equations- Successive Approximation Method-Bisection Method-Newton- Raphson Method

UNIT- IV: Numerical Differentiation and Integration (10 Hours)

Newton's forward and backward difference formula to compute derivatives

Numerical integration: Trapezoidal and Simpson's 1/3rules-Errors in the formulae- Composite trapezoidal and Simpson's 1/3 rules-Errors in the formulae.

UNITV: Numerical Solution of Ordinary Differential Equations (12 Hours)

First-order equations: Euler and improved Euler methods–Local and global truncation errors-Second and Fourth-order Runge -Kutta method

Second-order equations: Euler methods and fourth-order Runge-Kutta method.

Total Lecture Hours- 60

COURSE OUTCOME

The student will be able to

1.Learn numerical methods of computing certain mathematical quantities, construction and evaluation of a function and solution of an ordinary differential equation.

2. Learn the C++ computer programming necessary for numerical simulation of physical problems.

3. Learn the suitable and effective methods.

4. Obtain the approximate representative numerical results of the problems.

5. Solve the problems in the field of theoretical physics and engineering which requires computing of numerical results using certain raw data.

TEXT BOOK(S)

1. J.R. Hubbard, 2006, Programming with C++, McGraw-Hill, New Delhi.

2. J.H. Mathews, 1998, Numerical Methods for Mathematics, Science and Engineering, Prentice-Hall of India, New Delhi,.

3. M.K.Venkatraman, 1999, Numerical Methods in Science and Engineering, The National Publishing Company, Madras.

4. S.S.Sastry, 2006, Introductory Numerical Methods, Prentice Hall of India, New Delhi,.

5. P.B.Patil and U.P.Verma, 2013, Numerical Computational Methods Narosa, NewDelhi.

REFERENCE BOOK(S)

1. E.Balagurusamy, 2013, Objected Oriented Programming in C++ , 6th edition ,McGrawHill, NewDelhi..

2.M.K.Jain,S.R.K.Iyengar and R.K.Jain, 1993, Numerical Methods for Scientific and Engineering Computation ,New Age International, New Delhi..

E- RESOURCES

1.MITOpenwareCourse https://ocw.mit.edu/courses/mathematics/18-335j-introduction-to-numerical-methods-spring-2019/

2.Courserahttps://www.coursera.org/learn/intro-to-numerical-analysis

3.Swayamhttps://swayam.gov.in/nd1_noc19_ma21/preview

4. https://drive.google.com/file/d/1ZYCtYXyk-bnS_o4T324nUbzszcC7nEb0/view

5. https://s.docworkspace.com/d/AJrQf67z-oNKgZjUoOSdFA

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SENGAMALA THAYAAR EDUCATIONAL TRUSTWOMEN'S COLLEGE

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DEPARTMENT OF PHYSICS

M. Sc., PHYSICS

Semester: II- EC-II: Renewable And Non Renewable Energy

Ins. Hrs. /Week: 4 **Course Credit: 3** **Course Code: 21PPHE2B**

OBJECTIVE

- To know the availability of the energy resources
- To make the students to understand the present day crisis of need for Biomass energy and alternative based.
- To develop the biomass energy and utilization

UNIT - I: Conventional Energy Sources (15 Hours)

World reserve- Commercial energy sources and their availability – Various forms of energy – Renewable andConventional energy system – comparison – Coal, oil and natural gas – applications – Merits and Demerits.

UNIT -II: Solar Energy (15 Hours)

Renewable energy sources – Solar energy – nature and Solar radiation – components – Solar heaters – Cropdryers – Solar cookers – Water desalination (block diagram) - Photovoltaic generation – merits and demerits.

UNIT III: Biomass Energy (10 Hours)

Biomass energy – classification – Photosynthesis – Biomass conversion process

UNIT IV: Biomass Applications (10 Hours)

Gobar gas plants – Wood gasification – advantage & disadvantages of biomass as energy source

UNIT V: Other Energy Resources (10 Hours)

Geothermal energy–Wind energy–Ocean thermal energy conversion–Energy from waves and tides (basicideas)

Total Lectures hours-60

COURSE OUTCOME

The student will be able to

1. Gain knowledge on the availability of the energy resources
2. Understand the solar applications
3. Understand the present day crisis of need for Biomass energy and alternatives are provided.
4. Develop the biomass energy utilization
5. Analyze the various methods of energy production

TEXT BOOK(S)

1. D.P. Kothari, K.C. Singal & Rakesh Ranjan, 2008.Renewable energy sources and emerging Technologies, Prentice Hall of India Pvt. Ltd., New Delhi.
2. Suhas P Sukhatme, 2012..Solar energy -- Principles of thermal collection and storage, Second edition ,Tata McGraw-Hill Publishing company, New Delhi,
3. Michael E. MacKay ,2015.Solar Energy-Introduction, OUP Oxford, United Kingdom.
4. Sergio C.Capreda, 2013.Introduction to Biomass Energy Conversions, I st edition CRC Press .
5. S.C. Bhatia,R.K.Gupta 2018.Textbook of Renewable Energy, Wood head Publisahing India Pvt Ltd:

REFERENCE BOOK(S)

1. S.A. Abbasiand Nasema Abbasi, 2008.Renewable Energy sources and their environmental impact, PHI Learning Pvt. Ltd., New Delhi .
2. Arno Smets 2016..,Solar energy-The physics and engineering of photovoltaic conversion, technologies and systems, UIT Cambridge.
3. P.Chartier,G.L. Ferrero, 1997.Biomass for Energy and the Environment,pergamon,
4. S.P.Sukhatme &J.K Nayak, 2017 .Solar Energy, Fourth Edition, Mc Graw Hill Education :.
5. Mehmet Kanoglu,Yunus A.Gengel &John M.Cimbala , 2020. Fundamentals and Applications of Renewable Energy, Mc Graw Hill Education,

E - RESOURSES

1. https://youtu.be/rzGPzVBQ00E
2. https://youtu.be/oos7fETc2OE
3. http://courses.edx.org
4. http://www.vssut.ac.in
5. http://atme.in

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SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

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SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2021 – 2022)

DEPARTMENT OF PHYSICS

EDC offered by the Department

Semester: II- EDC-I: Home Appliances

Ins. Hrs. /Week: 3 **Course Credit: 2** **Course Code: 21PPHED1A**

OBJECTIVES:

- To make the Students to understand the basic principles of electricity and wiring system.
- To understand the basic ideas behind electrical appliances and their applications, and electrical lamps.
- To understand the electrical measuring instruments and their uses.

UNIT- I : Caution practiced in advance **(10 Hours)**

Electricity – Basic principles - Practical unit of electricity - Electric shock– Precautions to avoid electric shock– Rescue steps in electric Shock - Electric Line Circuit Breaker (ELCB).

UNIT -II: Wiring **(9 Hours)**

Wiring system – Electric supply to house and factories – Types of wiring– Megger testing – Ear thing. Electricity in house: Design for heating element– Electric iron, Table heater, and Room heater.

UNIT -III : Electrical measuring instruments **(8 Hours)**

Moving coil instruments– Voltmeter – Ammeter – Wattmeter– Kilowatt meter– Frequency meter– Multi meter

UNIT -IV: Electrical appliances **(10 Hours)**

Electric fan– Refrigerator– Air Conditioner– Air cooler-Electric bell–Buzzer-Washing machine-Vacuum cleaner

UNIT -V: Light **(8 Hours)**

Incandescent lamp – Fluorescent lamp – LED lamp –Home light - Storage battery Solar powered street lights -.

Total Lecture Hours-45

COURSE OUTCOME

The students will be able to

1. Understand the principles and working of Electricity.
2. Acquire knowledge of Wiring systems.
3. Learn the electrical measuring instruments and their use and functions.
4. Understand working principles of the latest electrical appliances
5. Learn about different kinds of electrical lamps and their energy efficiency.

TEXT BOOK(S)

1. A.L.AnwaniandI.Anwani, 2003. Basic Electrical Engineering, Dhanpat Rai and Co(P)Ltd.,Delhi, (Units1to 5).
2. William D.Cooper, 1997. Electrical Instruments and Measurement Techniques, PHIPvtCo., NewDelhi, (Units2,3 &4).
3. S.P.Bali,ConsumerElectronics,2005,PearsonEducation,India
4. B.L.Theraja, 2000, Textbook of Electrical Technology ,Vol.1&2,S.Chand.
5. C.L.Wadha2011, Basic Electrical Engineering, New age International (P) Ltd, Publisher,2nd edition .
6. Sinha ShashiBhushan 2011, Hand book of Repair and Maintanance of Domestic Electronics Appliances, BPB Publication, India.

REFERENCE BOOK(S)

1. Hoerner Thomas,, 2007, Basic Electricity & Practical Wiring ,Hobar publication, Mumbai.
2. P.N.Ananthanarayanan, Basic Refrigeration and Air Conditioning 3rdedition, Tata McGraw Hill Publication Company Ltd, Newdelhi.
3. Sathish Kumar Peddapelli, Sridhar Gaddam,2020, Electrical Machines: A Practical Approach, Walter de Gruyter GmbH& Co KG.

E-RESOURCES

1. **https://youtu.be/Clvu9d73c**
2. **https://youtu.be/A5p-buWX-dA**
3. **https://youtu.be/-AY43nb_438**
4. https://youtu.be/xLjk5DrScEU
5. https://youtu.be/EZ4qUCY0Tg4

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SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS),
SUNDARAKKOTTAI, MANNARGUDI - 614016.

(For the Candidates admitted in the academic year 2021-2022)

DEPARTMENT OF PHYSICS

EDC offered by the Department

Semester: II-EDC-I: Communication Electronics

Ins. Hrs. /Week: 3 **Course Credit: 2** **Course Code: 21PPHED1B**

OBJECTIVES

- To learn about the light sources and provide Knowledge on Digital Transmission Systems
- To Gathered the basics of Modulation Techniques and study the design of Satellite Communication
- To Impart Knowledge in Fiber structure and their Properties.

UNIT-I: Fiber Structure and Properties **(09 Hours)**

Fiberstructure-FiberMaterials-Fiberfabrication-MechanicalPropertiesofFibers-Attenuation-Singledistortionin Optical waveguides.

UNIT-II: Optical Sources **(10 Hours)**

Laser Diodes-Photo detectors-Physical Principles of Photodiodes-Photo Detector-Noise –detector response Time-Transmitter design-Optical receiver operation

UNIT-III: Digital Transmission Systems **(08 Hours)**

Point –to –point Links-Line Coding Coherent Optical fiber communications- Definition and Classification Coherent Systems-Semiconductor lasers.

UNIT-IV: Modulation Techniques **(08 Hours)**

Modulation-Demodulation-Principles of amplitude, frequency and phase Modulations-Simple circuits for amplitude, frequency and phase modulation and Demodulation.

UNIT-V: Satellite Communications **(10 Hours)**

Ground Station-Antenna, angle of elevation and transmission path-Various blocks of equipment abroad the satellite-Transmit and receiver contour-Block diagram of network control station (NCS) interconnecting telephone traffic between remote stations.

Total Lecture Hours-45

COURSE OUTCOME

1. Ability to understand and analyze the Fiber structure and Properties
2. Ability to understand and analyze Instrumentation system and their applications.
3. Understand the digital communication systems.
4. Understand the basic modulation techniques.
5. Apply the special function to solve the satellite communications

TEXTBOOK(S)

1. Metha V.K.,2013. Principles of Electronics, S. Chand & Company Ltd.,G.Keiser, Optical Fiber Communications (McGraw-Hill,NewDelhi,1991).
2. J.M Senior, 1996. Optical Fiber Communications; Principles and Practice (Prentice Hall, New Delhi).
3. G.Kennedy,1995. Electronic communication Systems (Tata Mc Graw Hill, NewDelhi.)
4. J.MillmanandL.C.Halkias,1972. Electronics Devices and circuits (Mc Graw Hill, Singapore.

REFERENCEBOOK(S)

1. Anokh Singh and Chopra A.K.,2013 Principles of communication Engineering, S. Chand & Company PVT. Ltd.,
2. Mani I. P.,2016. A text book of Engineering Physics, Dhanam Publications, Chennai.
3. Dennis Roddy and John Coolen, 1990 .Electronic Communication, PHI,
4. William C.Y. lee,1991. Cellular telecommunication (second edition), Tata Mcgraw hill.
5. PoornimaThangamI,2012..Satellitecommunication,CharulathaPublications,

E-RESOURCES

1. https://youtu.be/1rZyGL1K5QI
2. https://youtu.be/7FYHt5XviKc\
3. https://youtu.be/kiiA6WTCQn0
4. https://youtu.be/KynKHr2cXgk
5. https://youtu.be/mHvV_Tv8HDQ

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