



AUXILIUM COLLEGE (Autonomous)

(Accredited by NAAC with A+ Grade with a CGPA of 3.55 out of 4 in the 3rd cycle)
Gandhi Nagar, Vellore – 6.

DEPARTMENT OF PHYSICS

LESSON PLAN

2020-2021

Lesson Plan
2020-2021
(Odd Semester)

Auxilium College (Autonomous), Gandhi Nagar, Vellore – 632 006.

Lesson Plan for the year 2020 – 2021

B.Shalini, Assistant Professor, Department of Physics

Subject: Atomic Physics

Week	Portions to be covered	Reference	Platform (LMS)
July 2 nd week (8 th to 15 th July 2020)	Photo electric emission-laws-Lenard's experiment and Richardson and Compton experiment	Modern Physics by Murugesan aand Atomic Physics by Murugesan	Online – google Meet
July 16 th to 23 rd , 2020	Einstein's photoelectric equation – Experimental Verification of Einstein's photoelectric equation by Millikan's experiment.	Modern Physics by Murugesan aand Atomic Physics by Murugesan	Online – google Meet
July 24 th to 31 July, 2020	photoelectric cells-photo-emissive cell-photo-voltaic cell-photoconductive cell-applications of photo electric cell.	Modern Physics by Murugesan aand Atomic Physics by Murugesan	Online – google Meet
August 3 rd to 8 th August, 2020	Spectral terms and notations-Selection rules-Intensity rule and interval rule	Modern Physics by Murugesan aand Atomic Physics by Murugesan	Online – google Meet
August 10 to 15 th , 2020	Intensity rule and interval rule-Fine structure of Sodium D lines -Spectrum of Helium	Modern Physics by Murugesan aand Atomic Physics by Murugesan	Online – google Meet
August 17 th 22 nd . 2020	Zeeman effect(experimental arrangement for the normal Zeeman effect) -Larmor's theorem-	Modern Physics by Murugesan aand Atomic Physics by Murugesan	Online – google Meet
August 24 th to 31, 2020	Debye's explanation of normal Zeeman effect-Anamalous Zeeman effect-Theoretical explanation-Lande's g factor and explanation of splitting of D1 and D2 lines of sodium – coalescence of spectral lines.	Modern Physics by Murugesan aand Atomic Physics by Murugesan	Online – google Meet
September 03 rd to 08	I CA Examinations		

9 TH September to 16 th september	Vector Atom Model- Spatial Quantization – Electron spin	Modern Physics by Murugesan aand Atomic Physics by Murugesan	Online – google Meet
17 th to 23 rd September, 2020	Electronic configuration of elements and periodic classification-	Modern Physics by Murugesan aand Atomic Physics by Murugesan	Online – google Meet
23 rd to 29 th September,2020	Magnetic dipole moment of electron due to orbital and spin motion- Bohr magnetron - Stern and Gerlach experiment-Spin Orbit Coupling	Modern Physics by Murugesan aand Atomic Physics by Murugesan	Online – google Meet
30 th September to 7 th October, 2020	Spectrum-Emission and absorption spectra-Types of emission spectra-Types of Absorption Spectra	Modern Physics by Murugesan aand Atomic Physics by Murugesan	Online – google Meet
8 th to 15 th October,2020	Electromagnetic spectrum- Laws of Absorption - UV rays -Sources of UV – detection –IR rays- Sources – Detection-	Modern Physics by Murugesan aand Atomic Physics by Murugesan	Online – google Meet
22 nd to 26 th October,2020	Double Beam Spectrophotometer- Scattering of light- Rayleigh’s scattering- Raman effect-Experimental study of Raman effect- Quantum theory of Raman effect-Comparison of Raman and IR Spectra.	Modern Physics by Murugesan aand Atomic Physics by Murugesan	Online – google Meet

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Work done for the year 2020 - 2021

Date	Class	Portions Covered	Reference	Methods of Teaching
8 th to 15 th July 2020	(III B.Sc Physics)	Photo electric emission-laws- Lenard’s experiment and Richardson and Compton experiment	Modern Physics by Murugesan and Atomic Physics by Murugesan	Online – PPT
July 16 th to 23 rd ,2020	(III B.Sc Physics)	Einstein’s photoelectric equation – Experimental Verification of Einstein’s photoelectric equation by Millikan’s experiment. Problems	Modern Physics by Murugesan and Atomic Physics by Murugesan	Online –PPT
July 24 th to 31 july, 2020	(III B.Sc Physics)	photoelectric cells-photo-emissive cell-photo-voltaic cell-photoconductive cell-applications of photo electric cell.	Modern Physics by Murugesan and Atomic Physics by Murugesan	Online –PPT
August 3 rd to 8 th August, 2020	(III B.Sc Physics)	Zeeman effect(experimental arrangement for the normal Zeeman effect) -Larmor’s theorem-	Modern Physics by Murugesan and Atomic Physics by Murugesan	Online –PPT
August 10 to 15 th , 2020	(III B.Sc Physics)	Debye’s explanation of normal Zeeman effect- Energy level diagram - problems	Modern Physics by Murugesan and Atomic Physics by Murugesan	Online – PPT
August 17 th to 22 nd .2020	(III B.Sc Physics)	Anamalous Zeeman effect- Theoretical explanation-Lande’s g factor and explanation of splitting of D1 and D2 lines of sodium	Modern Physics by Murugesan and Atomic Physics by Murugesan	Online –PPT

August 24 th to 31, 2020	(III B.Sc Physics)	coalescence of spectral lines.coalescence of spectral lines- lands factor- problems - Revision	Modern Physics by Murugesan aand Atomic Physics by Murugesan	Online - PPT
September 3 rd to 8 th , 2020	I CA Examinations			
9 th September to 16 th september	(III B.Sc Physics)	Vector Atom Model- Spatial Quantization – Electron spin	Modern Physics by Murugesan aand Atomic Physics by Murugesan	Online – google Meet
17 th to 23 rd September, 2020	(III B.Sc Physics)	Electronic configuration of elements and periodic classification-	Modern Physics by Murugesan aand Atomic Physics by Murugesan	Online – google Meet
23 rd to 29 th September,2020	(III B.Sc Physics)	Magnetic dipole moment of electron due to orbital and spin motion- Bohr magnetron - Stern and Gerlach experiment-Spin Orbit Coupling	Modern Physics by Murugesan aand Atomic Physics by Murugesan	Online – google Meet
30 th September to 7 th October, 2020	(III B.Sc Physics)	Spectrum-Emission and absorption spectra-Types of emission spectra-Types of Absorption Spectra	Modern Physics by Murugesan aand Atomic Physics by Murugesan	Online – google Meet
8 th to 15 th October,2020	(III B.Sc Physics)	Electromagnetic spectrum-Laws of Absorption - UV rays -Sources of UV –detection –IR rays-Sources – Detection-	Modern Physics by Murugesan aand Atomic Physics by Murugesan	Online – google Meet
22 nd to 26 th October,2020	(III B.Sc Physics)	Double Beam Spectrophotometer-Scattering of light-Rayleigh’s scattering- Raman effect-Experimental study of Raman effect-Quantum	Modern Physics by Murugesan aand Atomic Physics by Murugesan	Online – google Meet

		theory of Raman effect-Comparison of Raman and IR Spectra.		
27 th October to 02 November 2020	II CA Examination			
03 rd November to 10 th November	Revisions			

Subject: Everyday Physics

Week	Portions to be covered	Reference	Platform (LMS)
18 th to 23 rd September, 2020	Velocity – Acceleration – Force – Momentum - Law of Conservation Momentum	Basic Physics-Study material	Online – google Meet
23 rd to 29 th September,2020	Newton’s Law’s of Motion - Construction and Working of Aeroplanes Jet Planes – Rockets - Relative Velocity - Apparent Change in the Velocity - When Trains Move in the Same and Opposite Directions. Problems		Online – google Meet Offline
30 th September to 7 th October, 2020	Jet Planes – Rockets - Relative Velocity - Apparent Change in the Velocity - When Trains Move in the Same and Opposite Directions.		
8 th to 15 th October,2020	Circular Motion - Centripetal Force and its Applications - Centrifugal Force		Online – google Meet
22 nd to 31 th October,2020	Motion of a Cyclist along a Circular Path and Reason		Online – google Meet

	for Bending		
November 02 nd to 06 th 2020	Centrifuge and its Applications – Escape velocity – Orbital velocity – Parking orbits		Online – google Meet
PEPHA20: Elective IA: Electronic Devices and applications			
Week	Portions to be covered	Reference	Platform (LMS)
October 13 th 2020	Light units - Light emitting diodes – Operation and construction	Principles of electronic devices and circuits by B.L.Theraja and R.S.Sedha	Online – google Meet
OCTOBER 15 TH 2020	Photoconductive cells – Construction – Characteristics and Parameters – Applications	E –Book	offline work
October 16th 2020	Seven-segment displays – LED seven-segment display	Principles of electronic devices and circuits by B.L.Theraja and R.S.Sedha	Online – google Meet
October 21 2020	Characteristics and parameters of LED	Principles of electronic devices and circuits by B.L.Theraja and R.S.Sedha	Online – google Meet
October 23 rd 2020	Photodiodes and Solar cells – Photodiode operation – characteristics – specification – construction – Applications – Solar cells	Principles of electronic devices and circuits by B.L.Theraja and R.S.Sedha	Offline work
October 27 2020	Phototransistors (BJT) – Characteristics and specifications – Applications – Photo-Darlington- Photo-FET	Principles of electronic devices and circuits by B.L.Theraja and R.S.Sedha	Online – google Meet
November 1,2020	liquid crystal cells – LCD seven-segment displays	Principles of electronic devices and circuits by B.L.Theraja and R.S.Sedha	Online – google Meet
NOVEMBER 5 TH 2020	Optocouplers – Operation and constructions –	Principles of electronic devices	Online – google Meet

	specification – Applications	and circuits by B.L.Theraja and R.S.Sedha	
November 10, 2020	Laser diode – Operation – Characteristics and parameters- Drive circuits – Modulator	Principles of electronic devices and circuits by B.L.Theraja and R.S.Sedha	Online

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Lesson Plan for the year 2020 – 2021

Dr. A. Priyadarshini, Assistant Professor, Department of Physics

B.SC PHYSICS – III YEAR [DIGITAL ELECTRONICS AND COMMUNICATIONS]

Week	Portions to be covered	Reference	Platform (LMS)
I	Modulation, Amplitude modulation, Mathematical analysis of AM wave	Principles of Electronics by Mehta V.K.	Google meet
II	Modulation index (modulation factor), Power in AM wave	Principles of Electronics by Mehta V.K.	Google meet
III	Frequency modulation, Expression for frequency modulated voltage	Principles of Electronics by Mehta V.K.	Google meet
IV	Demodulation, Ratio Detector	Modern Physics by R.Murugesan	Google meet
V	Block diagram of AM transmitting system, AM receiver: Principle of Superhetrodyne receiver	Principles of Electronics by Mehta V.K. and Modern Physics by R.Murugesan	Google meet
VI	Block diagram of FM transmitting & receiving system	Principles of Electronics by Mehta V.K. and Modern Physics by R.Murugesan	Google meet
VII	Antenna, Dipole Antenna, Folded type Antenna, Array of antennas	Applied Electronics by A.Subramanyam	Google meet
VIII	Propagation of Radio waves, Propagation of ground waves, Space wave	Modern Physics by R.Murugesan	Google meet

	propagation, Sky wave propagation		
IX	The ionosphere, Effect of ionosphere on propagation of radio waves – Eccles Larmor theory	Modern Physics by R.Murugeshan	Google meet
X	Skip distance and maximum usable frequency, Fading, Principle and working of radar, Applications of Radar.	Modern Physics by R.Murugeshan	Google meet
XI	Duplexer, Range equation for radar	Applied Electronics by A.Subramanyam	Google meet
XII	Synchronous counters, mod8 parallel counter,	Applied Electronics by A.Subramanyam	Google meet
XIII	Combination counter, Decade counter.	Applied Electronics by A.Subramanyam	Google meet
XIV	Binary weight, Resistance divider method, Binary ladder method	Applied Electronics by A.Subramanyam	Google meet
XV	Simultaneous conversion	Applied Electronics by A.Subramanyam	Google meet

B.SC PHYSICS – III YEAR [BASIC ELECTRONICS]

Week	Portions to be covered	Reference	Platform (LMS)
I	Semiconductors, P-type and N-type semiconductor	Principles of Electronics by Mehta V.K.	Google meet
II	PN junction diode, V-I characteristics.	Principles of Electronics by Mehta V.K.	Google meet
III	Zener diode, Zener diode as a voltage regulator	Principles of Electronics by Mehta V.K.	Google meet
IV	Half wave rectifiers, Full wave rectifier, Theory of full wave rectifier, Bridge rectifiers.	Principles of Electronics by Mehta V.K.	Google meet
V	Expression for efficiency and ripple factor for half wave and full wave rectifiers	Principles of Electronics by Mehta V.K.	Google meet
VI	Filters, Types of filter circuits, Action of filter circuits, π section filter.	Modern Physics by R.Murugeshan	Google meet
VII	Diode voltage doubler, Diode voltage multiplier.	Applied Electronics by Sedha R.S	Google meet
VIII	Clipping and Clamping.	Applied Electronics by Sedha R.S	Google meet
IX	Junction transistors, CB, CE modes, α , β of a transistor	Principles of Electronics by Mehta V.K.	Google meet
X	Transistor amplifier, Methods of transistor biasing, voltage divider method.	Applied Electronics by Sedha R.S	Google meet
XI	Two-port representation of a transistor, h-parameters – AC equivalent circuit of a transistor amplifier	Modern Physics by R.Murugeshan	Google meet

	(common emitter only).		
X	Expressions for current gain, voltage gain, input impedance, output admittance and power gain.	Modern Physics by R.Murugesan	Google meet
XI	RC coupled amplifier, Frequency response curve, Power amplifiers, Classification of amplifiers	Principles of Electronics by Mehta V.K.	Google meet
XII	Class A power amplifier, Push -pull amplifiers, class B power amplifier, Emitter follower.	Principles of Electronics by Mehta V.K.	Google meet
XIII	Feedback in amplifier Positive and negative Feedback, Advantages of negative feedback, Oscillators.	Principles of Electronics by Mehta V.K.	Google meet
XIV	Oscillations in tank circuit, Barkhausen criterion	Applied Electronics by Sedha R.S	Google meet
XV	Hartley and Colpitts oscillators parameters.	Principles of Electronics by Mehta V.K.	Google meet
XVI	Phase shift and Wien Bridge oscillators	Principles of Electronics by Mehta V.K.	Google meet
XVII	Expressions for the frequency of oscillation and conditions for oscillations in h	Principles of Electronics by Mehta V.K.	Google meet

B.SC PHYSICS – I YEAR [PROPERTIES OF MATTER AND ACOUSTICS]

Week	Portions to be covered	Reference	Platform (LMS)
I	Bending of beams, Expression for bending moment	Properties of Matter and acoustics by R.S.Murugesan	Google meet
II	Cantilever, Determination of Young's Modulus by cantilever oscillations	Properties of Matter and acoustics by R.S.Murugesan	Google meet
III	Non-uniform bending, Experiment to determine young's modulus using pin and microscope	Properties of Matter and acoustics by R.S.Murugesan	Google meet
IV	Uniform bending, Expression for elevation	Properties of Matter and acoustics by R.S.Murugesan	Google meet
V	Determination of Young's Modulus by Koenig's method	Properties of Matter and acoustics by R.S.Murugesan	Google meet
VI	Progressive wave, Characteristics of progressive wave, Simple harmonic motion	Sound by Brijilal & N.Subramaniyam	Google meet
VII	Expression for free, Damped and Forced oscillations	Sound by Brijilal & N.Subramaniyam	Google meet
VIII	Expression for velocity and sound in a string.	Sound by Brijilal & N.Subramaniyam	Google meet
IX	Melde's string, Determination of frequency of the vibrator in transverse and longitudinal mode, Determination of Specific gravity of solid and liquid by Melde's string	Sound by Brijilal & N.Subramaniyam	Google meet
X	Reverberation Time,	Sound by Brijilal &	Google meet

	Sabine's Formula - Absorption coefficient, Acoustic aspects of halls and auditorium..	N.Subramaniam	
XI	Ultrasonics, Characteristic properties of ultrasonic waves, Stationary waves and resonance (Half wave length and quarter wave length resonance).	Properties of Matter and acoustics by R.S.Murugesan	Google meet
XII	Attenuation, Sources of ultra sound, Piezo electric method, Magnetostriction Method	Properties of Matter and acoustics by R.S.Murugesan	Google meet

B.SC MATHS – I YEAR 'B' SECTION [ALLIED PHYSICS]

Week	Portions to be covered	Reference	Platform (LMS)
I	Definition of surface tension, Excess of Pressure inside curved surface (curvilinear co-ordinates), Spherical and cylindrical drops and bubbles	Allied Physics by R.Murugesan	Google meet
II	Determination of surface tension and Interfacial tension by the method of drops.	Allied Physics by R.Murugesan	Google meet
III	Viscous force, Stream line and turbulent motions, Coefficient of	Allied Physics by R.Murugesan	Google meet

	viscosity of a liquid.		
IV	Poiseuille's formula, Determination of coefficient of viscosity using graduated burette	Allied Physics by R.Murugesan	Google meet
V	Comparison of coefficient viscosities of two liquids using graduated burette and Ostwald's viscometer method.	Allied Physics by R.Murugesan	Google meet
VI	Specific Heat of Capacity, Definition, Determination of specific heat of capacity of a liquid by method of mixtures	Allied Physics by R.Murugesan	Google meet
VII	Half time radiation correction, Callender and Barne's method.	Allied Physics by R.Murugesan	Google meet
VIII	Newton's law of cooling, Determination of specific heat of a liquid using Newton's law of cooling.	Allied Physics by R.Murugesan	Google meet
IX	Joule Kelvin effect, Temperature of inversion.	Allied Physics by R.Murugesan	Google meet
X	Linde's Process, Liquefaction of Helium, Properties of Helium I and II - Lambda point, Applications of low temperature.	Allied Physics by R.Murugesan	Google meet
XI	Superconductors, Meissner effect, Applications, Magnetic levitation.	Allied Physics by R.Murugesan	Google meet
XII	Interference Definition, Conditions for	Allied Physics by R.Murugesan	Google meet

	interference, interference in thin films (reflected light)		
XIII	Newton's ring, Determination of radius of curvature of lens by forming Newton's rings, Determination of diameter of a thin wire by air wedge method, Test for optical flatness.	Allied Physics by R.Murugesan	Google meet

B.SC. II YEAR SBE [ALLIED PHYSICS]

Week	Portions to be covered	Reference	Platform (LMS)
I	Basic concepts of current, voltage, potential difference, Electrical measuring meters, Ammeter, Voltmeter Multimeter	Basic Electrical Engineering by M.L.Anwani	Google meet
II	Ohms law, verification of Ohms law, Conductors, Insulators, Uses of conductors and insulators.	Basic Electrical Engineering by M.L.Anwani	Google meet
III	Resistance, Laws of resistance, Resistances in series and parallel	Basic Electrical Engineering by M.L.Anwani	Google meet
IV	Colour coding, Capacitors, Laws of Capacitance, Capacitors in series and parallel.	Basic Electrical Engineering by M.L.Anwani	Google meet
V	Inductors , Self	Basic Electrical	Google meet

	inductance and mutual inductance.	Engineering by M.L.Anwani	
VI	Effects of electric current, safety precautions to be taken when working with electricity, Causes of fire on electrical appliances, Precautions and remedial measures.	Engineering Physics by Dr.P.Mani	Google meet
VII	Light effect, Working of electric bulb and Fluorescent tube, Grouping of lamps	Engineering Physics by Dr.P.Mani	Google meet
VIII	Basic Construction and working of domestic appliances: Electric iron box, Immersion heater.	Engineering Physics by Dr.P.Mani	Google meet
IX	Electric stove, washing machine, Air conditioner	Engineering Physics by Dr.P.Mani	Google meet
X	Magnetic effect, Electromagnets, Applications, Electric bell	Engineering Physics by Dr.P.Mani	Google meet
XI	Electric motor	Engineering Physics by Dr.P.Mani	Google meet
XII	Electromagnetic waves, Applications- Microwave oven, television	Engineering Physics by Dr.P.Mani	Google meet

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Lesson Plan for the year 2020 – 2021

Dr.P.E.Saranya, Assistant Professor, Department of Physics

B.SC PHYSICS – III YEAR [DIGITAL ELECTRONICS AND COMMUNICATIONS]

Week	Portions to be covered	Reference	Platform (LMS)
I	Decimal and binary systems – Decimal to binary and binary to decimal conversion – Boolean operations	Digital electronics Principles, Devices and Applications by Anil K, Maini	Google meet
II	Logic expressions, rules and laws of Boolean algebra – DeMorgan's theorems	Digital electronics Principles, Devices and Applications by Anil K, Maini	Google meet
III	Simplification of Boolean expressions using Boolean algebra techniques – Fundamental products	Digital systems principles and applications by Ronald J Tocci Neals S.Widmer	Google meet
IV	Sum of products – Karnaugh map	Digital systems principles and applications by Ronald J Tocci Neals S.Widmer	Google meet
V	Karnaugh map – pairs	Introduction to integrated electronics by Vijayendran	Google meet
VI	Quads - Octet	Introduction to integrated electronics by Vijayendran	Google meet
VII	NOT gate, OR gate, NAND gate, NOR gate	Introduction to integrated electronics by Vijayendran	Google meet
VIII	EX-OR , EX-NOR	Introduction to	Google meet

	gates, NAND and NOR as universal gates	integrated electronics by Vijayendran	
IX	Arithmetic circuits - Adders	Introduction to integrated electronics by Vijayendran	Google meet
X	Half adder – Full adder	Introduction to integrated electronics by Vijayendran	Google meet
XI	Parallel binary adders – BCD adder – Multiplexers and Demultiplexers with suitable example	Introduction to integrated electronics by Vijayendran	Google meet
XII	Digital logic family – RTL NOR gate – DTL NAND gate	Digital systems principles and applications by Ronald J Tocci Neals S.Widmer	Google meet
XIII	TTL NAND gate – characteristics of TTL family	Digital systems principles and applications by Ronald J Tocci Neals S.Widmer	Google meet
XIV	Flip flops – RS flip flop – clock pulses – clocked RS flip flop	Digital systems principles and applications by Ronald J Tocci Neals S.Widmer	Google meet
XV	Preset and clear – JK flip flop - Race around condition – JK Master slave flip flop – D flip flop – T flip flop	Digital systems principles and applications by Ronald J Tocci Neals S.Widmer	Google meet
XVI	Asynchronous counter – 3 Bit binary counter – Mod 7 counter – Asynchronous counter with feedback	Digital systems principles and applications by Ronald J Tocci Neals S.Widmer	Google meet

B.SC PHYSICS – II YEAR [MATHEMATICAL METHODS AND CLASSICAL MECHANICS]

Week	Portions to be covered	Reference	Platform (LMS)
I	Mechanics for a system of particles	Classical mechanics by B.D.Gupta	Google meet
II	Constraints – Holonomic and Non-Holonomic constraints – Degrees of freedom – Generalized coordinates	Classical mechanics by JC Uppadhaya	Google meet
III	Principle of virtual work – D’Alembert’s principle – Lagrange’s equation from D’Alembert’s principle	Classical mechanics by JC Uppadhaya	Google meet
IV	Lagrange’s equation for system containing dissipative forces - Applications of Lagrange’s equation	Classical mechanics by B.D.Gupta	Google meet
V	Atwood’s Machine – Simple pendulum	Classical mechanics by B.D.Gupta	Google meet
VI	Compound pendulum – central force – Equation of first integrals	Classical mechanics by B.D.Gupta	Google meet
VII	Phase space – Hamiltonian function - Hamilton’s equation’s equation - Physical significance of Hamiltonian	Classical mechanics by B.D.Gupta	Google meet

	function		
VIII	Application of Hamiltonian equations – simple pendulum - compound pendulum	Classical mechanics by B.D.Gupta	Google meet
IX	Poisson's bracket – Properties of poisson's bracket- Lagrangian and Hamiltonian of a charged particle	Classical mechanics by B.D.Gupta, Classical mechanics by JC Uppadhaya	Google meet
X	Arithmetic mean, median	Statistical methods by P.N.Arora	Google meet
XI	Mode, Measure of dispersion,	Statistical methods by P.N.Arora	Google meet
XII	Range, Quartile deviation, Mean deviation	Statistical methods by P.N.Arora	Google meet
XIII	Measure of skewness – Karl Pearson's coefficient of skewness	Statistical methods by P.N.Arora	Google meet
XIV	Bowley's coefficient of skewness	Statistical methods by P.N.Arora	Google meet

B.SC MATHS – I YEAR ‘B’ SECTION [ALLIED PHYSICS]

Week	Portions to be covered	Reference	Platform (LMS)
I	Hooke's law – Definitions of Young's Modulus, bulk modulus and rigidity modulus – Defintion of Poisson's ratio - Bending of beams – Expression for internal bending moment	Allied Physics by R.Murugesan	Google meet
II	Cantilever – Depression at the loaded end of a cantilever – Experiment to determine Young modulus by non- uniform bending using pin and microscope	Allied Physics by R.Murugesan	Google meet
III	I form girders – Torsional couple – Potential energy stored in a twisted wire – Expression for couple per unit twist	Allied Physics by R.Murugesan	Google meet
IV	Torsional Pendulum – Determination of rigidity modulus by Torsional oscillation (without masses) and by static torsion method.	Allied Physics by R.Murugesan	Google meet
V	Velocity and frequency of	Allied Physics by R.Murugesan	Google meet

	transverse vibrations along a stretched string – Laws of vibrations along a stretched string		
VI	Determination of A.C. frequency using Sonometer – Ultrasonics – Production of ultrasonic waves by Piezo electric oscillator	Allied Physics by R.Murugesan	Google meet
VII	Magnetostriction oscillator – Applications of Ultrasonics	Allied Physics by R.Murugesan	Google meet
VIII	Acoustics of buildings – Reverberation – Reverberation time	Allied Physics by R.Murugesan	Google meet
IX	Absorption coefficient – Sabine's formula (Without derivation).	Allied Physics by R.Murugesan	Google meet
X	Diffraction – Definition – Plane transmission Grating – Theory of plane transmission grating- Experimental determination of wavelength using transmission grating.	Allied Physics by R.Murugesan	Google meet
XI	Definition of polarization - Brewster's law – Double refraction - Optical activity	Allied Physics by R.Murugesan	Google meet
XII	Function of a half shade –	Allied Physics by R.Murugesan	Google meet

	Determination Specific rotatory power of sugar solution using Laurent's half shade polarimeter – Uses of polarised light		
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Auxilium college(Autonomous)

Gandhinagar, Vellore 632 006.

Lesson Plan for the Year 2020 to 2021

Ms. B. Rajalakshmi, Assistant Professor, Department of Physics

B.Sc physics II year (Mathematical methods & Classical mechanics)

Week	Portions covered	Reference	Platform (LMS)
06/7/2020 to 11/07/2020	Gradient of scalar field and it's physical interpretation Gradient of a scalar field problem solving	1 . Mathematical methods & classical mechanics – Sathya Prakash 2 . Mathematical methods & classical mechanics – H.K Dass	Google Meet
13/7/2020 to 18/07/2020	Gradient of a scalar field problem solving Line,surface,volume integral Line, surface, volume integrals problem solving	1 . Mathematical methods & classical mechanics – Sathya Prakash 2 . Mathematical methods & classical mechanics – H.K Dass	Google Meet
20/7/2020 to 25/07/2020	Divergence of a vector function, curl of a vector function and it's physical interpretation Divergence of a vector function,curl of a vector function problem solving Vector identities and its problem solving	1 . Mathematical methods & classical mechanics – Sathya Prakash 2 . Mathematical methods & classical mechanics – H.K Dass	Google Meet
27/7/2020 to 01/08/2020	Half portions test conducted Gauss divergence theorem and its problem solving Applications of vectors to hydrodynamics	1 . Mathematical methods & classical mechanics – Sathya Prakash 2 . Mathematical methods & classical mechanics – H.K Dass	Google Meet

03/8/2020 to 08/08/2020	Applications of vectors – heat flow in solids , Poisson's equation Applications of vectors – gravitation & electro magnetic field Introduction to matrices,eigen value &eigen vector, problem solving	1 . Mathematical methods & classical mechanics – Sathya Prakash 2 . Mathematical methods & classical mechanics – H.K Dass	Google Meet
10/8/2020 to 14/08/2020	Characteristics equation Caley Hamilton theorem , and its problem solving Caley Hamilton theorem problem solving	1 . Mathematical methods & classical mechanics – Sathya Prakash 2 . Mathematical methods & classical mechanics – H.K Dass	Google Meet
17/8/2020 to 21/08/2020	Diagonalization of matrix and it's problem solving Another half portion test conducted Revision – Gradient of a scalar field Line, surface, volume integral and its problem solving	1 . Mathematical methods & classical mechanics – Sathya Prakash 2 . Mathematical methods & classical mechanics – H.K Dass	Google Meet
24/8/2020 to 02/09/2020	Revision - Divergence & curl of a vector function and its problem solving Revision - Vector identities & Gauss divergence theorem and its problem solving Revision – Applications of vectors heat flow equation, gravitation & electro magnetic field Revision – eigenvalue&eigenvector,Caley Hamilton theorem Revision - Applications of vectors	1 . Mathematical methods & classical mechanics – Sathya Prakash 2 . Mathematical methods & classical mechanics – H.K Dass	Google Meet
3/9/2020 – 8/9/2020	CA EXAM		
9/9/2020 to 12/09/2020	I year orientation program 2 nd unit Special functions - gamma,beta,error function	1 . Mathematical methods & classical mechanics – Sathya Prakash 2 . Mathematical methods	Google Meet

		& classical mechanics – H.K Dass	
14/9/2020 to 19/09/2020	Properties of beta function Bessel's differential equation Recurrence formula for Bessel's equation	1 . Mathematical methods & classical mechanics – Sathya Prakash 2 . Mathematical methods & classical mechanics – H.K Dass	Google Meet
21/9/2020 to 26/09/2020	Legendre's differential equation Practical demonstration – Surface tension capillary method Properties legendre's polynomial Orthogonality properties of legendre's polynomial	1 . Mathematical methods & classical mechanics – Sathya Prakash 2 . Mathematical methods & classical mechanics – H.K Dass Practical physics - M.N srinivasan	Google Meet
28/9/2020 to 01/09/2020	Generating function for legendre polynomial Test – Bessel's differential equation Recurrence formula for legendre polynomial	1 . Mathematical methods & classical mechanics – Sathya Prakash 2 . Mathematical methods & classical mechanics – H.K Dass	Google Meet
05/10/2020 to 10/10/2020	Evaluation of Gamma function, Beta function Practical II Spectrometer Diffraction grating Normal incidence.	1 . Mathematical methods & classical mechanics – Sathya Prakash 2 . Mathematical methods & classical mechanics – H.K Dass 1.Practical – M.N Srinivasan	Google Meet
12/10/2020 to 16/10/2020	III Unit– Statistics– distribution model– binomial distribution Poisson, Normal distribution	PN Arora	Google Meet

<p>19/10/2020 to 23/10/2020</p>	<p>Practical II– Potentiometer – Calibration of low range ammeter Revision (Bessels Differential equation, Legendres Differential equation, Orthogonality Properties of Legendres polynomials.</p>	<p>1.Practical – M.N Srinivasan 1 . Mathematical methods & classical mechanics – Sathya Prakash 2 . Mathematical methods & classical mechanics – H.K Dass</p>	<p>Google Meet</p>
<p>27/10/2020 to 02/11/2020</p>	<p>II CA Exam</p>		

Dr.N.V.Lakshmi

I Year- B.Sc Physics

Properties of Matter and Acoustics

WEEK	PORTION TO BE COVERED	REFERENCE	TEACHING METHOD
I	Basic ideas of elastic moduli –Hooke’s law- Work done in stretching and Twisting a wire	Properties of matter- Murugeshan. R.S.	Online
II	Twisting couple on a cylinder- Determination of Rigidity modulus and moment of inertia using torsional pendulum (with and without mass)	Properties of matter- Murugeshan. R.S.	Online
III	q, n, σ by Searle’s method	Properties of matter- Murugeshan. R.S.	Online
IV	Compound pendulum – moment of inertia – determination of radius of gyration by graph.	Properties of matter- Murugeshan. R.S.	Online
V	Definition and dimension of surface tension-Excess of pressure-Relation between curvatures, pressure and surface tension-Its application to Spherical and cylindrical drops, bubbles	Properties of matter- Murugeshan. R.S.	Online
VI	Jaegar’s method- Variation of surface tension with temperature-Viscosity - definition – stream line flow _ turbulent flow – Reynold’s number	Properties of matter- Murugeshan. R.S.	Online
VII	Searle’s Viscometer- Meyer’s formula for the rate of flow of a gas through a capillary tube – Poissuille’s formula- Comparison of Viscosity using Oswald’s Viscometer	Properties of matter- Murugeshan. R.S.	Online
VIII	Stoke’s formula – determination of co-efficient of viscosity- Osmosis and osmotic pressure-Laws of osmotic pressure-Determination of osmotic pressure by Berkeley and Hartley method	Properties of matter- Murugeshan. R.S.	Online
IX	Osmosis and vapour pressure of a solution- Osmosis and boiling point of a solution – Osmosis and freezing point of a solution	Properties of matter- Murugeshan. R.S.	Online

X	Low frequency /high intensity applications (Welding, Echo Sounder, sensor for temperature and pressure)	Properties of matter- Murugesan. R.S.	Online
XI	High frequency/ low intensity applications(NDT, Holography)- Different types of scans	Properties of matter- Murugesan. R.S.	Online
XII	Clinical Applications (Obstetrics, Examination of heart) – SONAR.	Properties of matter- Murugesan. R.S.	Online

Dr.N.V.Lakshmi
III Year- B.Sc Physics
Electricity and Magnetism

WEEK	PORTION TO BE COVERED	REFERENCE	TEACHING METHOD
I	Transient current (DC) – Growth and decay of current in a circuit containing inductance and resistance (LR)- Growth and decay of charge in a circuit containing capacitance and resistance (CR) – Determination of high resistance by leakage	Electricity and Magnetism- R.Murugesan	Online
II	Growth and decay of charge in LCR circuit – Conditions for oscillations	Electricity and Magnetism- R.Murugesan	Online
III	Alternating current – Peak, average and RMS values of AC voltage	Electricity and Magnetism- R.Murugesan	Online
IV	Power factor and current values in an AC circuit containing LCR – Series resonant circuit – sharpness of resonance – Power in AC circuit.	Electricity and Magnetism- R.Murugesan	Online
V	Magnetic Induction (B) – Magnetization (M) – Magnetic susceptibility - Permeability – Relation between B, H and M	Electricity and Magnetism- R.Murugesan	Online
VI	Hysteresis loss - Experiment to draw M-H curve (hysteresis-horizontal model) – Importance of hysteresis curves - Ferrites	Electricity and Magnetism- R.Murugesan	Online
VII	Properties of dia, para and ferro magnetic materials	Electricity and Magnetism- R.Murugesan	Online
VIII	Langevin's theory of dia and para magnetism	Electricity and Magnetism- R.Murugesan	Online
IX	Weiss theory of ferro magnetism.	Electricity and Magnetism- R.Murugesan	Online

Dr.N.V.Lakshmi
III Year- B.Sc Physics
Basic Electronics

WEEK	PORTION TO BE COVERED	REFERENCE	TEACHING METHOD
I	Field effect transistor-JFET – construction and working – Output characteristics – difference between FET and bipolar transistor	Applied Electronics-Subramanyam .A	Online
II	Parameters of JFET – MOSFET –Depletion and Enhancement type MOSFETS- Description and working	Applied Electronics-Subramanyam .A	Online
III	Silicon controlled rectifier – construction and working – V-I Characteristics.	Applied Electronics-Subramanyam .A	Online
IV	UJT – construction and working – V-I-characteristics	Applied Electronics-Subramanyam .A	Online
V	Differential amplifier – Differential gain - Common mode rejection ratio (CMRR)	Principles of electronics-Mehta V.K.	Online
VI	Operational amplifiers – characteristics of an ideal OP-AMP – Expression for voltage gain – inverting and non-inverting amplifier	Principles of electronics-Mehta V.K.	Online
VII	Voltage follower - Summer - Differentiator – Integrator.	Principles of electronics-Mehta V.K.	Online
VIII	Multivibrators – Astable-Monostable and Bistable multivibrators using transistors	Principles of electronics-Mehta V.K.	Online
IX	Multivibrators – Astable-Monostable and Bistable multivibrators using op- amp	Principles of electronics-Mehta V.K.	Online

Dr.N.V.Lakshmi

III Year- B.Sc Physics

Skill Based Elective: Physics for Competitive Examination

WEEK	PORTION TO BE COVERED	REFERENCE	TEACHING METHOD
I	Mechanics: Newton's laws of motion and its application Conservative forces and frictional forces -Centrifugal and Coriolis forces– Kepler's laws – Escape velocity and artificial satellite - Gravitational Law and field- Motion under a central force- Moments of Inertia and products of Inertia	Properties of matter- Murugeshan. R.S.	Online
II	Principal moments and axes- Rigid body motion, fixed axis rotations - Bernoulli's theorem - Elasticity Waves: Waves and Simple Harmonic motion – Lissajous figures- Damped and Undamped oscillators – Wave equation -Resonance – Doppler effect in sound- Ultrasonics and applications.	Properties of matter- Murugeshan. R.S.	Online
III	Thick lens formulae - power of a lens - Fermat's Principle–Rayleigh criterion - resolving power of a prism and grating- Conditions for constructive and destructive interferences- Newton's rings - Calculation of radius of curvature – Air wedge	Properties of matter- Murugeshan. R.S.	Online
IV	Calculation of bandwidth- Fresnel and Fraunhofer diffraction – Linear, circular and elliptic polarization- double refraction and optical rotation- Specific rotatory power of an optically active substance	Properties of matter- Murugeshan. R.S.	Online

V	Electric Charge- Coulomb law – Gauss law – Electric potential - Capacitors – Energy stored in a capacitor–Dielectric and polarization- Ampere’s law -Biot Savart law – Faraday’s laws of electromagnetic induction – Self- inductance – Mutual inductance	Applied Electronics- Sedha R.S	Online
VI	Alternating currents- Growth and decay of current and charge in LR circuit – RC circuit – LCR circuit - Magnetic permeability and susceptibility, Dia, para and ferromagnetism, Measurement of susceptibility, Hysteresis loop	Applied Electronics- Sedha R.S	Online
VII	Atomic physics: X-ray spectrum – Compton Effect – Compton wavelength - Photoelectric effect – Calculation of DeBroglie wavelength of electrons- wave velocity and group velocity for DeBroglie waves-Uncertainty principle - Pauli Exclusion Principle	Atomic and Molecular Phyd- C.L.Arora	Online
VIII	Mass defect - Binding energy – Radioactive disintegration law – half life – Q value of nuclear reactions – Nuclear fission and fusion	Nuclear Physics-C.L.Arora	Online
IX	Semiconductors - Rectifiers –Zener diode as voltage regulator- Transistor as an Amplifiers – Relation between α and β	Applied Electronics- Sedha R.S	Online
X	Feedback amplifier – Oscillators - Amplitude and frequency modulation- OR, AND, NOR and NAND gates – OP amps	Applied Electronics- Sedha R.S	Online

Lesson Plan
2020-2021
(Even Semester)

LESSON PLAN

SEMESTER - VI

CLASS : III B.Sc Physics

Programme

B.Sc

Programme Code

U28

Semester

VI

Course

Relativity and Quantum
Mechanics

Course Code

UCPHK19

Hours

3 hours/week

Credits

Total hours

3 hours

Maximum hours

5 hours/week

Course Instructors

Hours/ Week	No. of Hours	unit	Topics	Teaching methodology	Learning Resources	Method of Evaluation
I (I week)	1	1	Inertial and non-inertial frames of reference - Galilean Transformation Equation	Power point Presentation	Text Book Modern physics by Murugesan	oral test.
II	1	1	Michelson Morley Experiment - postulates of special theory of relativity.	power point presentation	Modern physics by Murugesan	oral test
III	1	1	Lorentz Transformation Equation & Inverse Length Contraction and Time dilation.	power point Presentation	Modern physics by Murugesan	weekly test
IV	1	1	Relativity of Simultaneity - Addition of velocities - Variation of mass with velocity.	slide Share	Internet sources.	Self Assessment
Feb V	1	1	Mass energy relation - Minkowski's four dimensional space.	Power point presentation	Modern physics by Murugesan.	oral Questions.

II

1 Elementary ideas of general theory of relativity and its significance.

Power point presentation

Modern physics by Murugesan

slip test

Red Shift

III
4

1 Free particle solution of Schrodinger's equation - Bound state problems: Particle in a box.

Chalk & Board

Modern Physics by Murugesan
Quantum mechanics

slip test

IV
4
I

1 wave equation and solution for the particle - Eigen values of energy

Chalk & Board

by Sathya Prakash.

oral test

II
4

1 Normalization of the wave functions - Simple Harmonic Oscillator.

Chalk & Board

oral Test

III

12/5

1 Square well potential of finite depth. Rectangular potential barrier. Tunneling effect. chalks Board

Quantum mechanics by Sathya prakash + Gupta Kumar sharma.

oral test

1 Rigid Rotator - Moment of inertia of a rigid rotator - wave equation for rigid rotator and its energy levels.

chalks Board

J wave functions for the rigid rotator. and solutions -

chalks Board

oral Test

SBE - Everyday physics.

SEMESTER - II

programme - B-SC

programme code - U28

course - Everyday physics

course code - USPHA121

Hours - 2

credits - -

Total hours - 2

Maximum hours - 2

Course Instructor - shalini B.

I	I	1	Velocity - Acceleration - Momentum - Newton's laws of motion.	power point presentation	Study materials.	Oral test.
II	I		Newton's First Law of motion - Second law of motion - Third law of motion.	power point presentation		Oral test.
III	I		Construction and working of Aeroplane - Jet plane.	power point presentation		Oral test.
IV	I	2	Rocket - Satellite - Relative velocity - Case (i) : Object moves with same direction Case (ii) : Object moves with opposite direction.	power point presentation.		Self Assessment.
	I	2	Centripetal Force - centrifugal force Applications -			

- | | | | |
|---|---|---------------------------|-----------|
| 2 | Motion of cyclist along the circular path. | Power point presentation | Oral Test |
| 2 | Centrifuge - parking orbit - Escape velocity - orbital velocity | Power point presentation. | Oral Test |
| 3 | Photo electric effect - Nuclear fission - Nuclear fusion - carbon-Nitrogen cycle (Stellar energy) Thermo Nuclear energy | " | Oral Test |
| | Proton - proton cycle - Semi conductors doping - dopants - p-type & n-type | " | Oral Test |
| | Semi-conductor diode. | " | Oral Test |
| | LED and its application - Seven segment display | " | Oral Test |

4

1

Current - voltage - ohm's law
(AC & DC)

"

oral
Test

photo electric principle construction
and working of emergency lamp.

"

principle construction and working of
Sodium and mercury Vapour lamp.

"

oral
Test.

5

1

House wiring Accessories - switches -

Types of switches - Lamp Holders.

"

oral
Test

Types of Lamp Holders - Ceiling Roses -

socket outlets.

plugs - wires and cables - Types of
wiring system (tree & distribution system)

"

oral
Test.

Supply of electricity to the
Houses - Fuse - Earthing.

power
point
presentation

study or al
materials. Test.

SEMESTER - IV

programme - M.Sc

programme code - U28

Course - Condensed Matter
physics

Course code -

Hours - 3

credits -

Total hours - 5

January
I
week

Crystal Physics

Types of Lattices - Miller indices - simple crystal structure.

Power point presentation

Solid State physics by Gupta Kumar Sharma

oral test

II
week

Crystal diffraction - Bragg's law
Reciprocal lattice [sc, bcc, fcc]
Laue equation.

power point presentation

Solid state physics by Illangovan

oral test

III
week

Structural factor - Atomic form factor. Types of crystal bonding.

power point presentation

Solid state physics by Gupta Kumar Sharma.

oral test

IV
week

Cohesive energy of ionic crystals - Madelung constant - Types of crystal bonding.

power point presentation

"

"

Feb
I
week

4

Elementary ideas of dia para and ferro magnetism - Quantum theory of paramagnetism.

Solid state
Physics by
S.O. Pillai

Chalk &
Board

Oral
test

II
week

4

Rare earth ion - Hund's rule - Quenching of orbital angular momentum
Adiabatic demagnetization - Quantum theory of ferro magnetism.

Solid state
Physics
by
Illangovan

Chalk &
Board

Slip
test

III
week

4

Curie point exchange integral - Heisenberg's interpretation of Weiss Field.

Solid state
Physics
by
Gupta Kumar
Sharma

Chalk &
Board

Self
Assessment

Ferro magnetism domains - Bloch wall - spin waves Quantization - Magnons

"

Chalk &

March

I week

4 Thermal excitation of magnons - curie temperature and susceptibility of ferromagnetisms

Board

II week

4 Theory of anti-ferromagnetism - Neel Temperature.

" Chalk & Board

III

5 Super conductivity - Experimental facts occurrence - Effect of magnetic fields Meissner effect.

" Chalk & Board

April

I

5 Entropy and heat capacity - Energy gap Microwave and infra red property - Type I & II super conductors - Theoretical Explanations.

" Chalk & Board

II

5 Thermodynamics of super conducting transition - London equation - Coherence length

Chalk & Board

EU

1

5 Single particle tunneling - Josephson tunneling
DC & AC Josephson's effect - High Temperature
Superconductors - Squids:

NAME : DR. A. PRIYADHARSHINI

DEPARTMENT : PHYSICS

ACADEMIC YEAR : 2020 - 2021

Lesson plan for the year 2020-2021

Even Semester

UEPHCI7 - Elective II A: Solid State physics and material science

Week	Portions to be covered	Reference	Teaching methodology Platform
1	Energy bands in solids - Electron in a periodic potential	Solid state physics by S.O. Pillai	Boards Chalk
2	Brillouin Zones construction - crystal Imperfections	Solid state physics by S.O. Pillai	Boards Chalk
3	Point defect - line defect	Engineering physics by P. Mani	Boards Chalk
4	Surface defects - Effects of crystal Imperfections.	Engineering physics by P. Mani	Boards Chalk
5	Dielectrics - Dielectric polarisability - Dielectric Constant	Engineering physics by P. Mani	Boards Chalk
6	Different types of Electrical polarization (Ionic, Electronic)	Solid state physics by S.O. Pillai	Boards Chalk
7	Orientation polarization - frequency and temperature effect on polarization	Engineering physics by P. Mani	Boards Chalk

Week	Topics to Be Covered	Reference	Teaching Method
8	Dielectric loss - Local field (Or) Internal field	Engineering physics by P. Mani	Board & chalk
9	Maxwell's relation - Determination of Dielectric constant	Engineering physics by P. Mani	Board & Chalk
10	Dielectric breakdown Properties of different types of Insulating materials.	Engineering physics by P. Mani	Board & Chalk
11	Electron Interaction - Meissner effect	Solid state physics by P.K. Palaniswamy	Board & chalk
12	AC Josephson effect	Solid state Physics by S.L. Kakani	Board & chalk
13	DC Josephson effect	Solid state Physics by S.L. Kakani	Board & chalk
14	High temperature Superconductors	Solid state physics by P.K. Palaniswamy	Board & Chalk
15	Application of Superconductors	Solid state physics by P.K. Palaniswamy	Board & Chalk.

UCPHB20: Thermal physics and statistical Mechanics

Week	Topics to be covered	Reference	Teaching Methodology
1	Introduction - Thermodynamic system Zeroth Law of thermo- dynamics - Quasistatic Process	Heat and Thermodynamics by Brijlal Subrahmanyam	Board & Chalk
2	Statement of first & Second law of Thermodynamics - Heat Engines and Ideal heat engine	Heat and thermodynamics by Brijlal Subrahmanyam	Board & Chalk
3	Concept of Entropy - Entropy of an Ideal gas Reversible and Irreversible process and their entropy	Heat and thermodynamics by Brijlal Subrahmanyam	Boards Chalk
4	Cannot theorem and Proof of cannot theorem	Heat and thermodynamics by Brijlal Subrahmanyam	Board & Chalk
5	Construction and working of Internal Combustion Engine - Petrol and Diesel Engines	Heat and thermodynamics by Brijlal Subrahmanyam	Board & Chalk
6	First Latent Heat Equation - Clausius - Clapeyron equation & Second Latent heat Equation	Heat and thermodynamics by Brijlal Subrahmanyam	Board & Chalk

Week	Topics to be covered	Reference	Teaching methods
7	Thermodynamic scale of temperature ¹⁰⁰ work scale of temperature and its Relation to perfect gas scale	Brijlal Subrahmanyam - Heat and thermodynamics	Board & chalk
8	Entropy Temperature Diagram - Maxwell's thermodynamic equations and its Applications	Heat and thermodynamics by Brijlal Subrahmanyam	Board & chalk
9	Thermodynamic potential free energy - Enthalpy - Internal Energy - Helmholtz free energy - Significance of thermodynamic potential	Heat and thermodynamics by Brijlal Subrahmanyam	Board & chalk
10	Gibbs function - Gibbs Helmholtz Equation - Third law of thermodynamics	Heat and thermodynamics by Brijlal Subrahmanyam	Board & chalk
11	Third law of thermodynamics Phase transition - Expression for the first order and second order transition	Heat and thermodynamics by Brijlal Subrahmanyam	Board & chalk
12	Expression for fermi Dirac Statistics	Thermal physics and statistical mechanics by Dr. D. Jayaram	Board & chalk
13	Derivation for Bose Einstein Statistics	Thermal physics and statistical mechanics by Dr. D. Jayaram	Board & chalk
14	Comparison of three Statistics	Thermal physics and statistical mechanics by Dr. D. Jayaram	Board & chalk

UAPHB20 : Allied II : Physics II

Week	Topics to be covered	Reference	Teaching methodology
1	Wave Mechanics - Dual nature of matter - De Broglie wavelength - Problems - Definition of Phase and group velocity Relationship between them.	Modern physics by R. Murugesan	Board & Chalk
2	Experimental study of matter waves - Davisson and Germer's Experiment	Allied physics by R. Murugesan	Board & Chalk
3	Heisenberg's Uncertainty Principle - Applications - Determination of position of an electron with γ ray microscope	Allied physics by R. Murugesan	Board & Chalk
4	Crystal - Definition of Unit cell - Miller Indices - Seven types of crystal system - Definition of Bravais lattices - Definition of reciprocal lattice and its properties	Allied physics by R. Murugesan	Board & Chalk
5	Derivation of Bravais lattice Bragg's law - Fiber Optics - Introduction - Optical fiber - Construction principle - Acceptance angle and condition for propagation through optical fiber	Modern physics by R. Murugesan	Board & Chalk
6	Diffraction of electron beam through a slit - Proof for non-existence of	Modern physics by R. Murugesan	Board & Chalk

Week	Topics to be Covered	Reference	Teaching Methods
	electron inside the nucleus		
7	Wave function - Properties of wave function - Basic postulates of wave mechanics	Modern Physics by R. Murugesan	Board & Chalk
8	Derivation of time dependent Schrodinger's equation - Time Independent Schrodinger's equation	Modern Physics by R. Murugesan	Board & Chalk
9	Classification of optical fibers - Single mode and multimode fibres Step index and graded Index fiber.	Modern Physics by R. Murugesan	Board & Chalk
10	Step Index Single mode fiber - Step Index multimode fiber - Graded Index multimode fiber - fiber optic Communication system with block diagram	Engineering physics by R. Murugesan	Board & Chalk
11	Laser - principle - types of Laser - Semi conductor Laser - Nd-YAG Laser Application of Laser	Engineering physics by R. Murugesan	Board & Chalk
12	Rectifiers - Half and full wave Rectifiers - full wave Bridge Rectifier construction - Working and Mathematical Analysis	Modern physics by R. Murugesan	Board & Chalk

Week	Topics to be covered	Reference	Teaching Methodology
13	Filters - types of filters Circuits - capacitor filter	Modern Physics by R. Murugesan	Board & Chalk
14	Choke input filter - π section filter - Zener diode	Modern Physics by R. Murugesan	Board & Chalk
15	Characteristics of Zener diode - Zener diode as voltage regulator	Modern Physics by R. Murugesan	Board & Chalk.

Semester - IV

USPHB417 - Skill Based Elective:

Home Appliances

Week	Topics to be covered	Reference	Teaching Methodology
1	Basic concepts of current - voltage - Potential difference	Basic Electrical Engineering by M. L. Anwani	Board & Chalk
2	Ohms law - Electrical measuring meters - Ammeter - Voltmeter	Basic Electrical Engineering by M. L. Anwani	Board & Chalk
3	Verification of Ohms law - multimeter	Basic Electrical Engineering by M. L. Anwani	Board & Chalk
4	Conductors - Insulators - Use of Conductors and Insulators	Basic Electrical Engineering by M. L. Anwani	Board & Chalk
5	Resistance - law of resistance Resistance in series and parallel	Basic Electrical Engineering by M. L. Anwani	Board & Chalk

Week	Topics to be covered	Reference	Teaching Methodology
6	Cotown coding - Capacitors - law of capacitance - Capacitors in series and parallel	Basic Electrical Engineering by M.L. Anwani	Board & Chalk
7	Inductors - self Inductance and Mutual Inductance	Basic Electrical Engineering by M.L. Anwani	Board & Chalk
8	Effect of electric current - safety Precautions to be taken when working with electricity	Basic Electrical Engineering by M.L. Anwani	Board & Chalk
9	causes of fire on electrical appliances Precautions and Remedial measures	Basic Electrical Engineering by M.L. Anwani	Board & Chalk
10	light effect - Working of electric bulb and fluorescent tube	Basic Electrical Engineering by M.L. Anwani	Board & Chalk
11	Grouping of lamps - Electric Iron box - Immersion heater	Basic Electrical Engineering by M.L. Anwani	Board & Chalk
12	Electric stove - washing machine - Air conditioner	Basic Electrical Engineering by M.L. Anwani	Board & Chalk
13	Magnetic effect - Electromagnets - Applications - Electric bell - Electric motor	Basic Electrical Engineering by M.L. Anwani	Board & Chalk
14	Electromagnetic waves - Applications - microwave oven - television	Basic Electrical Engineering by M.L. Anwani	Board & Chalk

LESSON PLAN

SEMESTER - VI

CLASS - III B.Sc PHYSICS

PROGRAMME	B.Sc
PROGRAMME CODE	U28
SEMESTER	<u>VI</u>
COURSE	NUCLEAR PHYSICS
COURSE CODE	UCPHJ17
HOURS	3 HOURS / WEEK
CREDITS	
MAXIMUM MARKS	100
COURSE INSTRUCTOR	DR. N. V. LAKSHMI

WEEK	PORTIONS TO BE COVERED	REFERENCE
1	Fundamental laws of radioactivity - Laws of radioactive disintegration - Mean life - Half life - Measurement of decay constant	Modern Physics by R. Murugesan
2	Law of successive disintegration - Age of earth - Biological effect of nuclear radiations - Discovery of natural radioactivity	Modern Physics by R. Murugesan
3	Gamow's Theory of Alpha decay - Alpha ray spectra	Modern Physics by R. Murugesan
4.	Beta decay - Beta decay spectra - origin of the line and continuous spectrum - neutrino theory of beta decay	Modern Physics by R. Murugesan

WEEK	PORTIONS TO BE COVERED	REFERENCE
5	Gamma ray spectra - origin of gamma rays - nuclear isomerism	Modern Physics by R. Murugesan
6	Geiger Muller counter - Wilson cloud chamber - Bubble chamber	Modern Physics by R. Murugesan
7	Scintillation counter - ionization chamber - Linear Accelerator	Modern Physics by R. Murugesan
8	Betatron - synchrocyclotron - Proton synchrotron	Modern Physics by R. Murugesan
9	Nuclear Fusion - source of stellar energy - thermo nuclear reaction	Modern Physics by R. Murugesan

WEEK	PORTIONS TO BE COVERED	REFERENCE
10	Carbon - nitrogen cycle, Proton - proton cycle - Hydrogen bomb	Modern Physics by R. Murugesan
11	Elementary particles - Baryons - Hyperons - leptons - mesons - the quark model	Modern Physics by R. Murugesan
12	Problems Revision	Modern Physics by R. Murugesan

LESSON PLAN

SEMESTER - VI

CLASS - III B.Sc PHYSICS

PROGRAMME	B.Sc
PROGRAMME CODE	U28
SEMESTER	<u>VI</u>
COURSE	SOLID STATE PHYSICS AND MATERIAL SCIENCE
COURSE CODE	UEPHCI7
HOURS	3 HOURS / WEEK
CREDITS	
MAXIMUM MARKS	100
COURSE INSTRUCTOR	DR. N.V. LAKSHMI

WEEK

PORTIONS TO BE COVERED

REFERENCE

1 crystal lattice - primitive and unit cell - seven classes of crystals

solid state
Physics
by
Gupta kumar

2 Bravais lattice - Miller indices - structure of crystals - simple cubic

solid state
Physics
by
Gupta kumar

3 Face centered cubic structure - body centered cubic structure - Hexagonal close packed structure

solid state
Physics
by
Ilango varan

4. Reciprocal Lattice - Properties of reciprocal lattice

solid state
Physics
by
Ilango varan

5. Bragg's law - Determination of crystal structure

solid state
Physics
by
Gupta kumar

WEEK	PORTIONS TO BE COVERED	REFERENCE
6	The laue method of x-ray diffraction - powder crystal method (Debye - Scherrer method)	solid state Physics by Ilangoan
7	Dielectrics - Dielectric Polarizability - Dielectric constant	solid state Physics by P.K. Palaniswamy
8	Different types of electric Polarization (Ionic, electronic and orientational polarization)	solid state Physics by P.K. Palaniswamy
9	Frequency and temperature effects on polarization - Dielectric loss	solid state Physics by P.K. Palaniswamy
10	Local field or internal field - Clausius - Mosotti relation - Determination of Dielectric constant -	solid state Physics by P.K. Palaniswamy

WEEK

PORTIONS TO BE COVERED

REFERENCE

Dielectric breakdown -
Properties of different
types of insulating materials

11 Introduction - Properties of
Superconductors - Type I and
Type II superconductors

Solid State
Physics
by
Gurpita Kumar

12 BCS Theory of superconductors
- Cooper pair - Lattice-Electron
interaction - Meissner effect

Solid State
Physics
by
Gurpita Kumar

LESSON PLAN

SEMESTER - VI

CLASS - III B.SC PHYSICS

PROGRAMME	B.SC
PROGRAMME CODE	U 28
SEMESTER	<u>VI</u>
COURSE	MICRO PROCESSOR - 8085
COURSE CODE	UEPHE 17
HOURS	2 HOURS / WEEK
CREDITS	
MAXIMUM MARKS	100
COURSE INSTRUCTOR	DR. N.V. LAKSHMI

WEEK	PORTIONS TO BE COVERED	REFERENCE
1	Binary and Hexa decimal system - Binary coded decimal and basic logic gates - High impedance state - ① Flip flop	Fundamentals of Microprocessor 8085 by V. Vijayendran
2	① latches - Registers - Multiplexers and Demultiplexers	Fundamentals of Microprocessor 8085 by V. Vijayendran
3	ROM and RAM - Microprocessor as CPU	Fundamentals of Microprocessor 8085 by V. Vijayendran
4	Input and output unit - System and Bus structure	Fundamentals of Microprocessor 8085 by V. Vijayendran

WEEK	PORTIONS TO BE COVERED	REFERENCE
5	Execution of an instruction - Pin functions and Architecture 8085	Fundamentals of Microprocessor 8085 by v. vijayendran
6	Memory interface basics - Demultiplexing address/ data bus - Generating control signals	Fundamentals of Microprocessor 8085 by v. vijayendran
7	ROM / EPROM interface (2K x 8 EPROM, 4K x 8 ROM)	Fundamentals of Microprocessor 8085 by v. vijayendran
8	RAM interface (2K x 8 RAM interface, 2K x 8 RAM using decoders)	Fundamentals of Microprocessor 8085 by v. vijayendran

WEEK	PORTIONS TO BE COVERED	REFERENCE
9	out instruction and its timing diagram - IN instruction and its timing diagram	Fundamentals of Microprocessor 8085 by V. Vijayendran
10	Memory mapped I/O - difference between Memory mapped I/O and I/O mapped I/O	Fundamentals of Microprocessor 8085 by V. Vijayendran
11	Arranging number in ascending and descending orders - 16 bit addition using DAC	Fundamentals of Microprocessor 8085 by V. Vijayendran
12	Problems Revision	Fundamentals of Microprocessor 8085 by V. Vijayendran

LESSON PLAN

SEMESTER - II

CLASS - I B.SC PHYSICS

PROGRAMME	B.SC
PROGRAMME CODE	U28
SEMESTER	<u>II</u>
COURSE	THERMAL PHYSICS AND STATISTICAL MECHANICS
COURSE CODE	UCPHB17
HOURS	3 HOURS / WEEK
CREDITS	
MAXIMUM MARKS	100
COURSE INSTRUCTOR	DR. N. V. LAKSHMI

WEEK	PORTIONS TO BE COVERED	REFERENCE
1	Co-efficient of Thermal conductivity - Thermal diffusivity - Rectilinear flow of heat along a Bar - Forbe's method	Thermal Physics by R. Murugeshan
2	Thermal conductivity of Bad conductors - Lee's disc method - Relation between Thermal and Electrical conductivities	Thermal Physics by R. Murugeshan
3	widemann - Franz Law - Stefan's Law - Derivation of Newton's Law of cooling from Stefan's Law - Laboratory determination of Stefan's constant	Heat and Thermodynamics by Brijlal & Subrahmanyam

WEEK

PORTIONS TO BE COVERED

REFERENCE

4

Planck's Quantum Theory
of radiation - Deduction
of Wien's Law and Rayleigh
- Jeans Law from Planck's
Law

Heat and
Thermodynamics
by
Brijlal &
Subrahmanyam

5

Solar constants - Temperature
of sun - solar spectrum

Heat and
Thermodynamics
by Brijlal
& Subrahmanyam

6

Joule Kelvin Effect -
Temperature of inversion -
Theory of Joule Kelvin
effect - Liquefaction of
Hydrogen

Thermal
Physics
by
R. Murugesan

7

Liquefaction of Helium -
Kammerling on's Method
- Helium I and Helium II

Thermal
Physics
by
R. Murugesan

WEEK	PORTIONS TO BE COVERED	REFERENCE
8	Lambda point - Production of low temperature - Adiabatic demagnetization	Thermal Physics by R. Murugesan
9	Practical Applications of Low temperature - Refrigerators and Air condition machines - Super fluidity.	Thermal Physics by R. Murugesan
10	Definition of Phase space - Micro and Macro states - Different types of Ensembles - Definition of Probability	Thermal Physics by R. Murugesan
11	Relation between Entropy and Probability - classical statistics - Maxwell Boltzmann statistics	Thermal Physics by R. Murugesan
12	Problems Revisior	Thermal Physics by R. Murugesan

Name : Ms. C. Manju
Department : Physics
Academic Year : 2020-2021

Month/ Date	Topics to be covered	Reference
<p>Jan - 2021 4th to 13th January</p>	<p><u>UEPHEIT - Microprocessor 8085</u> 2 hours / week</p> <p>Machine language and assembly language - Programmer's model of 8085</p> <p>Mnemonic form of instructions - Label - opcode - operand - comment - Types of registers - Various buses in 8085</p>	<p>Fundamentals of Microprocessor 8085 by V. Vijayendran</p>
<p>January - 2021 18th to 22nd Jan</p>	<p>Data transfer instructions I - Arithmetic, logic and special instructions</p> <p>Move Instructions - Move between register and register - Move between register and memory - Move immediate - Load immediate register pair - Store Accumulator direct</p>	<p>Microprocessor Architecture by Ramesh Chandra</p>

Month/
Date

Topics to be covered

Reference

Jan - 2021

25th to 29th

Jan

Arithmetic and logic instruction -
Addition instruction - Add with register -
Add immediate - Add with carry -
subtraction instruction - subtract with
register - sub with borrow - Increment/
decrement register

logic instruction - AND instruction -
OR - instruction - EX-OR instruction -
compare instruction - Rotate instruction

Feb - 2021

1st to 5th

Feb

special instructions - Assembly
language to Hex code - Data transfer
instruction II.

decimal adjust Accumulator instruction -
complement Accumulator - set carry -
complement carry - store / load
Accumulator direct

store H and L Direct - load H and L
direct - Exchange the register
pairs - copy H and L registers to
stack pointer.

Feb 2021

8th - 12th

Feb

Branch instructions - Stack and
Stack related instructions

Jump instruction - call and return
instructions - Restart instructions -

Load Program Counter with PC contents.

Stack related instruction - Push
instruction - pop instruction.

15th - 19th

Feb

I/O and Machine control instructions
- 8085 Addressing modes.

I/O instructions - Machine control
instruction - Addressing modes -
Direct - Register - Register indirect -
Immediate - Implied addressing mode.

22nd to 26th

Feb

I CA Examination

March
1st to 5th

March

Introduction - memory read cycle -

memory write - cycle - wait cycle -

Halt state - Tstates - machine cycle -

Instruction cycle

8th to 12th

March

Timing diagram for MOV instruction -
Timing diagram for DCX instruction -
Timing diagram for MVI instruction -
Timing diagram for LXI instruction -
Timing diagram for STA instruction.

15th to 19th

March

Delay calculations - Interrupts -
Time delay using single register -
Delay using two registers - Introduction
to Interrupts - INTR and \overline{INTA} -
Interrupt pulse width - Generation of
RST codes - Interrupt acknowledge
Machine cycle with RST 7.

22nd to 26th

March

RST 5.5, RST 6.5, RST 7.5 and
TRAP - SIM instruction - RIM
instruction - Triggering levels -
INTR - RST 5.5 and RST 6.5 - RST 7.5
Interrupt priority - TRAP - RST 7.5 -
INTR

II CA Examination

Assembly level programming - simple
programs - code conversion - BCD to Hex -

Hex to BCD conversion - 8 bit
addition - subtraction - multiplication -
Division.

USPHDIT - Mobile Communication

2 hours / week

Month / Date	Topics to be covered	Reference
Jan-2021 4th to 13th Jan	Introduction to mobile communication - zero generation - push to talk First generation - Technology used in first generation - Advantages - Disadvantages - NMT, AMPS, CDPD.	Wireless & Mobile communication by R. Nakkeeran
Jan-2021 18th to 22nd Jan	second Generation (2G) mobile communication - Advantages - Disadvantages GSM (Global system for mobile communication) - GPRS (General packet Radio Service) (2.5 G technology), CDMA 2000	Wireless & Mobile communication by R. Nakkeeran T.G. Palanivelu
Jan-2021 25th to 29th Jan	Third Generation (3G) mobile communication - International Telecommunication	

Union (ITU) - Freedom of mobile
multimedia access (FOMA) - Spectrum
allocation - Evaluation Data Optimized
(EVO) - Advantages - Disadvantages
Fourth Generation

Feb 2021
5th to 5th
February

cellular concept - Frequency reuse
concept - channel Assignment -
properties of cells - channel reuse -
Frequency reuse factor -

Feb -2021
8th to 12th
February

Hand off techniques - Trunking and
Grade of service - strategies -
Factors on which handoff depends -
Transmitted signal strength - vehicle
speed - Types of trunked system -
Blocked calls cleared - Blocked calls
delayed - set-up Time - Holding
time - Traffic Intensity - Load.

15th to 19th
February.

cell splitting - cell sectoring -
Types of cell splitting - permanent

splitting - Dynamic splitting - Techniques involved - cell sectoring in various directions - Advantages - Disadvantages.

22nd to 26th
February

I CA Examination

March
1st to 5th

Mobile Radio Propagation - Free space propagation model - Fraunhofer Region - Introduction - Large scale - small scale propagation - Isotropic Radiator - Effective Isotropic Radiated Power - Path loss

3th to 12th
March

Properties of Radio waves - Concept of Reflection - Introduction - Reflection from Dielectrics - Reflection coefficients - Brewster Angle - Reflection from Perfect conductors - Concept of Diffraction - Scattering - Interference

22nd to 26th
March

cell coverage for signal and traffic - Introduction - Propagation in near distance - Curves for near in propagation - Long distance propagation - Doppler shift.

II CA Examination

Multiple Access Techniques - FDMA -
TDMA - CDMA - Synchronous CDMA -
soft handover - hard handover -
Roaming - SDMA.

UCPHE 17 - OPTICS (3 hours / week)

Month / week

Topics to be covered

Reference

Jan-2021
1st week

Convex lens - optic center
of the lens - Principal points
Principal foci - thick lens
formula - power of thick
lens - defects in lenses -
Aberration in lenses - various
defects and its minimizing
method.

Optics &
Spectroscopy
by
Murugesan.R

Jan 2021
2nd week

Methods of minimum spherical
aberration - stops - Two lens
separated by distance - using
aplanatic lens - using crossed
lens - condition for two
thin lens in contact method

A text book
of optics
by
Subramanyam
Brijlal

Jan 2021
3rd week

Chromatic aberration in
lenses - condition for
achromatism of two thin
lenses in contact and out
of contact with each
other.

February 2021

1st week

Minimization of spherical aberration
condition for achromatism of two
thin lenses in contact and out of
contact method - convex and concave
lenses.

February
2nd week

Basic ideas of eyepiece - Ramsden's
and Huygen's eyepiece and the
comparison between Ramsden's
and Huygen's eyepiece.

February
3rd week

Revision

February
4th week

I CA Examination

March

1st week

Interference - condition for interference -
theory of interference in reflected
system

Interference in thin films - thin
films - air wedge - determination of
diameter of a thin wire by air wedge
method - test for optical flatness

March

2nd week

Newton's rings - Determination of refractive index of a liquid - Michelson's interferometer - Theory and Applications - conditions for sustained Interference of light waves.

March

3rd week

Michelson's interferometer - determination of wavelength and resolution of spectral lines - refractive index of gases - Jamin's and Rayleigh's interferometer Fabry - Perot interferometer - Holography

II (A) Examination

Polarization - Double refraction - Huygen's explanation of double refraction in uniaxial crystals - Nicol prism as a polarizer and analyser - Quarter and half wave plates - production and detection of a plane, circularly and elliptically polarized light.

VAPHBIT - ATTIED II - PHYSICS - II

(2 hours / week)

Month / week	Topics to be covered	Reference
Jan - 2021 1 st week	Transient current (DC) - Growth of charge in a circuit containing resistance and capacitor (RC circuit) Decay of charge in a circuit containing resistance and capacitance (RC circuit)	Electricity & Magnetism by R. Murugesan
Jan - 2021 2 nd week	Growth of current in a circuit containing inductance and resistance (LR circuit) Decay of current in a circuit containing inductance and resistance (LR circuit)	Waves & Oscillations by N. Subramaniam N. Brijlal
Jan - 2021 3 rd week	Measurement of high resistance by leakage method - Magnetic Induction (B) - Magnetization (M)	

VAPBIT - ARIJED II - PHYSICS - II

(2 hours / week)

Month / week	Topics to be covered	Reference
Jan - 2021 1st week	Transient current (DC) - Growth of charge in a circuit containing resistance and capacitance (RC circuit) Decay of charge in a circuit containing resistance and capacitance (RC circuit)	Electricity & Magnetism by R. Murugesan
Jan - 2021 2nd week	Growth of current in a circuit containing inductance and resistance (LR circuit) Decay of current in a circuit containing inductance and resistance (LR circuit)	Waves & Oscillations by N. Subramanian N. Brijlal
Jan - 2021 3rd week	Measurement of high resistance by leakage method - Magnetic Induction (B) - Magnetization (M)	

February 2021

1st week

Magnetic susceptibility - Permeability -
relation between B, H and M - Hysteresis
loss - Importance of hysteresis
curves

February

2nd week

Dia magnetic - paramagnetic and
Ferro magnetic materials - properties
of Dia - para - Ferro magnetic
materials.

February

3rd week

Revision

February

4th week

I CA Examination

March

1st week

Artificial transmutation - Rutherford's
experiment - Types of nuclear reactions -
Energy balance in nuclear reactions -
and the Q value - Q value equation
for a nuclear reaction.

March

2nd week

Threshold energy of an endoergic reaction - Neutron - Properties of neutron - classification of Neutrons - Neutron detection

March

3rd week

Boron detectors (slow neutrons) - Proton recoil detectors (fast neutrons) - Particle Accelerators - Linear Accelerators - Betatron - particle detectors - Wilson cloud chamber

II CA Examination

Electronics - Full-wave Bridge Rectifier - Filters - types of filters circuits - capacitor filter - choke input filter - P section filter - Zener diode - characteristics of Zener diode - Zener diode as voltage regulator.

B. RAJALAKSHMI

WORK DONE REGISTER
PHYSICS DEPARTMENT
(SHIFT II)

PROGRAMME	B.Sc
PROGRAMME CODE	U28
SEMESTER	<u>VI</u>
COURSE	B.Sc. PHYSICS, Relativity & Quantum mech.
COURSE CODE	UCPHK19
HOURS	2
CREDITS	5
TOTAL HOURS	5
MAXIMUM MARKS	100 MARKS
COURSE INSTRUCTOR	B. RAJALAKSHMI

B.Sc III YEAR PHYSICS

Relativity and Quantum mechanics

YEAR PLAN

WEEKS	PORTIONS TO BE COVERED
<u>I</u>	de-Broglie wavelength - phase velocity and group velocity of de-Broglie waves - relationship between phase velocity and group velocity - Experimental study of matter waves - Davison and Germer's experiment
<u>II</u>	G.P. Thomson's experiment - wavelength of motion of particles like electron - Electron microscope.
<u>III</u>	Heisenberg's uncertainty principle - x-ray microscope - Application - Diffraction of electron beam by single slit
<u>IV</u>	Non existence of electrons inside the nucleus - Explanation of Bohr radius - Minimum energy of simple Harmonic oscillator.
<u>V</u>	Schrodinger Equation - wave function - Physical interpretation of wave function - Schrodinger's equation - Time dependent and time independent equation.
<u>VI</u>	Eigen value equation - Eigen values and Eigen functions.

WEEKS	PORTIONS TO BE COVERED .
<u>VII</u>	Postulates of quantum mechanics - Operators for physical quantities - Expectation values.
<u>VIII</u>	Expectation values of observables - Ehrenfest's theorem - Hermitian operator and its properties
<u>IX</u>	Spherically symmetric potential problems - Schrodinger equation in spherical polar co-ordinates - Reduction of two body problems in to one body problem
<u>X</u>	Hydrogen atom - wave equations for the hydrogen atom - separation of variables
<u>XI</u>	Azimuthal, polar and Radial wave equations.
<u>XII</u>	solution for Azimuthal and polar wave equation.

PROGRAMME	B.Sc
PROGRAMME CODE	U28
SEMESTER	<u>VI</u>
COURSE	B.Sc PHYSICS NUCLEAR PHYSICS
COURSE CODE	UCPHJ17
HOURS	2
CREDITS	5
TOTAL HOURS	5
MAXIMUM MARKS	100
COURSE INSTRUCTOR	B. RAJALAKSHMI

B.Sc. III YEAR - PHYSICS

NUCLEAR PHYSICS

WEEKS	PORTIONS TO BE COVERED
<u>I</u>	Properties of Nuclei and Nuclear structure. - Introduction - classification of nuclei - General properties of Nucleus.
<u>II</u>	Binding energy - mass defect, packing fraction - Nuclear stability.
<u>III</u>	Nuclear forces - meson theory of Nuclear forces - Nuclear models - liquid drop model.
<u>IV</u>	Weizacker's semi empirical mass formula - Shell model - Evidences for magic numbers - collective model.
<u>V</u>	Artificial transmutation of elements - Nuclear reactions - Q value for a nuclear reaction.
<u>VI</u>	Types of nuclear reactions - conservation laws of nuclear reactions - threshold energy of an endoergic reaction.

Weeks	portions to be covered
<u>VII</u>	Discovery of neutron - detection and properties of neutron - thermal neutron.
<u>VIII</u>	Induced radioactivity - applications of radio isotopes in medicine, agriculture, Industry - carbon dating.
<u>IX</u>	Nuclear fission and fusion - Discovery - Nuclear fission - calculation of energy in amu.
<u>X</u>	Energy released in fission - Bohr Wheeler's theory of nuclear fission
<u>XI</u>	chain reaction - atom bomb - Nuclear reactor
<u>XII</u>	power reactor - Applications. Breeder reactor - Applications.

PROGRAMME	B.Sc
PROGRAMME CODE	
SEMESTER	<u>VI</u>
COURSE	B.Sc. PHYSICS Non-major Elective
COURSE CODE	UG1PHA617
HOURS	3
CREDITS	5
TOTAL HOURS	5
MAXIMUM MARKS	100
COURSE INSTRUCTOR	B. RAJALAKSHMI

III YEAR - NON - MAJOR ELECTIVE

Fundamentals of Physics

Weeks	portions to be covered
<u>I</u>	Position and displacement - velocity - Speed - Newton's law of motion - Applications of Newton's third law - Fundamental forces in nature - Apparent weight of a man in lift.
<u>II</u>	Work, power and energy - applications of centripetal and centrifugal forces.
<u>III</u>	Heat, measure of Heat (Temperature) specific heat - Heat of fusion.
<u>IV</u>	Heat of vaporization - Transmission of heat - conduction, convection, radiation.
<u>V</u>	Peltier effect - superconductors - Application of super conductors.
<u>VI</u>	Sound - properties of sound - ultrasonics - Different types of scans - medical applications of ultrasonics
<u>VII</u>	clinical applications of different types of scans (obstetrics, early pregnancy, kidney and liver)
<u>VIII</u>	Acoustics of Buildings - Reverberation - Acoustic aspects of hall and auditorium - light - properties of light

Weeks	portions to be covered
<u>IX</u>	Different types of lenses - Human eye - Defects of vision - lens laser - and its medical applications.
<u>X</u>	Atom - Nucleus - Atomic number - mass number - Nuclear fission - chain reaction - uncontrolled chain reaction - Application.
<u>XI</u>	Atom bomb - controlled chain reaction - Application - nuclear reactor - Nuclear fusion - application.
<u>XII</u>	Hydrogen bomb - X-rays - production - properties and medical applications of X-rays.
<u>XIII</u>	Gravitation - Newton's law of Gravitation satellite motion escape velocity.
<u>XIV</u>	Weightlessness in a satellite - Geocentric theory - Heliocentric theory - Kepler's law - The solar system.
<u>XV</u>	Individual planets - comets - asteroids - and other constituents of the solar system - Formation of stars.

PROGRAMME	B.Sc
PROGRAMME CODE	U28
SEMESTER	<u>IV</u>
COURSE	B.Sc PHYSICS OPTICS
COURSE CODE	UCPHE17
HOURS	2
CREDITS	5
TOTAL HOURS	5
MAXIMUM MARKS	100
COURSE INSTRUCTOR	B. RAJALAKSHMI

B.Sc II YEAR

OPTICS

WEEKS	PORTIONS TO BE COVERED
<u>I</u>	Dispersion produced by a thin prism - angular dispersion - dispersive power of a prism
<u>II</u>	Resolving power of a prism - combinations of prisms to produce - dispersion without deviation
<u>III</u>	deviation without dispersion - achromatic prism - direct vision spectroscope - constant deviation spectrometer - determination
<u>IV</u>	Determination of refractive index of the material of small angled prism.
<u>V</u>	Fresnel's diffraction - Fresnel's idea of wavefronts - Fresnel's explanation of rectilinear propagation of light -
<u>VI</u>	half period zones - comparison of half period zone and convex lens - diffraction at a circular aperture -
<u>VII</u>	straight edge - Fraunhofer diffraction - Fraunhofer diffraction at a single slits - and double slits

WEEKS	PORTIONS TO BE COVERED
<u>VIII</u>	Theory of plane diffraction grating - determination of wavelength using grating.
<u>IX</u>	Dispersive power of a grating - absent spectra - overlapping spectra
<u>X</u>	Optical activity - Fresnel's explanation - experimental verification - specific rotatory power
<u>XI</u>	determination of specific rotatory power by Laurent's half shade polarimeter
<u>XII</u>	Kerr effect and Faraday effect - LCDs

LESSON PLAN
PG DEPARTMENT OF PHYSICS
SHIFT –I
2020-2021 (ODD Semester)

STAFF MEMBERS:

- 1. Dr. Nisha Santhakumari P.**
- 2. Sr. Venci X.**
- 3. Mrs. Mary Jamila R.**
- 4. Dr. Devi N. R.**
- 5. Dr. Sarjila R.**
- 6. Dr. Reena Devi S.**

Auxilium College (Autonomous), Gandhi Nagar, Vellore – 632 006.
Lesson Plan for the year 2020–2021 (Odd Semester)

Staff: Dr. P. Nisha Santhakumari

Class: II M.Sc. Physics

Paper: Quantum Mechanics-II

Paper code: PCPHJ19

Week	Portions to be covered	Reference	Platform (LMS)
1	UNIT I – Scattering theory: The scattering problem – Scattering amplitude – Scattering cross sections – Relationship between scattering amplitude and differential scattering cross section.	Quantum Mechanics by 1. G.Aruldas 2. Satya Prakash	Google Meet https://meet.google.com/mnh-ddef-rsd
2	Partial wave analysis – Optical theorem.		
3	Scattering by an attractive square well potential – Breit Wigner formula.		
4	Scattering length - Born approximation and its validity.		
5	Scattering by screened coulomb potential.		
6	Transformation from centre of mass to laboratory frame - Relationship between the cross sections and kinetic energy in centre of mass and laboratory systems.		
7	UNIT II- Perturbation theory: Time dependent perturbation theory.	Quantum Mechanics by G. Aruldas	
8	Constant perturbation-Harmonic perturbation.		
9	Transition to a discrete state – Transition to a continuous state (Fermi's Golden rule).		
10	Selection rules for dipole transition – Adiabatic approximation.		
11	Sudden approximation – Semi classical treatment of an atom with electromagnetic radiation.		
12	Density matrix – Spin density matrix -Magnetic resonance.		
13	UNIT V -Quantization of Fields: Introduction to second quantization - Second quantization of Klein-Gordon field.	Quantum Mechanics by G.Aruldas	
14	Quantization of Dirac field.		
15	Quantization of electromagnetic field - Creation and annihilation operators		

Auxilium College (Autonomous), Gandhi Nagar, Vellore – 632 006.
Lesson Plan for the year 2020–2021 (Odd Semester)

Staff: Dr. P. Nisha Santhakumari

Class: I M.Sc. Physics

Paper: Mathematical Physics-I

Paper code: PCPHA20

Week	Portions to be covered	Reference	Platform (LMS)
1	Unit II: Matrix Theory 2.1 Introduction to Matrices — Square matrix – Identity matrix - Transpose of a matrix - Conjugate - Conjugate transpose - Symmetric and Skew-symmetric matrices - Hermitian and Skew-Hermitian matrices – (K1,K2)	Mathematical Physics by Satya Prakash	Google Meet https://meet.google.com/mnh-ddef-rsd
2	2.2 Determinant – Co-factors – Minors of a matrix – Singular and non-singular matrices – Adjoint of a matrix - Inverse of a matrix – Orthogonal matrices – Unitary matrices – (K2,K3,K4)		
3	2.3 Characteristic equation of a matrix – Evaluation of eigen values and eigen vectors – (K4,K5)		
4	2.4 Cayley-Hamilton's theorem – Inverse of a matrix using Cayley Hamilton theorem – (K3,K4,K5)		
5	2.5 Important theorems on eigen values and eigen vectors – (K2,3K,K5) – 5 Theorems		
6	2.5 Important theorems on eigen values and eigen vectors – (K2,3K,K5) – 5 Theorems		
7	2.6 Stochastic matrices – Theorem on Stochastic matrix - Diagonalization of matrices - (K2,K3,K4)		
8	Unit IV: Special Functions 4.1 Series solution and Generating function of Bessel function – (K2,K3,K5)		
9	4.2 Rodrigues formula for Bessel - Evaluation of recurrence relations – (K2,K3,K4,K5)		
10	4.3 Series solution and Generating function of Legendre polynomial – (K2,K3,K5)		
11	4.4 Rodrigues formula and Orthogonal properties of Legendre Polynomial – Evaluation of recurrence relations – (K2,K3,K4,K5)		
12	4.5 Series solution and Generating function of Hermite polynomial – (K2,K3,K5)		
13	4.6 Rodrigues formula and Orthogonal properties of Hermite Polynomial – Evaluation of recurrence relations –(K2,K3,K4,K5)		
14	UNIT V- Green's function: 5.4 Eigen function Expansion of Green's function – Problem - (K1,K2,K4) 5.5 Green's function for Poisson's equation and solution of Poisson's equation.		
15	Green's function for three dimensional Helmholtz equation –(K1,K2,K4) 5.6 Green's function for Quantum mechanical scattering problem - (K1,K2,K4)		

Auxilium College (Autonomous), Gandhi Nagar, Vellore – 632 006.
Lesson Plan for the year 2020–2021 (Odd Semester)

Staff: Dr. P. Nisha Santhakumari

Class: II B. Sc. Chemistry

Paper: Allied Physics-I

Paper Code: UAPHA19

Week	Portions to be covered	Reference	Platform (LMS)
1	Unit I-Elasticity: Hooke's law – Definitions of Young's Modulus, bulk modulus and rigidity modulus – Definition of Poisson's ratio- –	Allied Physics by Murugesan	Google Meet https://meet.google.com/mnh-ddef-rsd
2	Bending of beams – Expression for internal bending moment		
3	Cantilever – Depression at the loaded end of a cantilever	Properties of matter by Brijlal & Subramanyam	
4	Experiment to determine Young modulus by non-uniform bending using pin and microscope – I form girders		
5	Problems		
6	UNIT IV-Sound: Ultrasonics – Piezoelectric effect – Inverse Piezoelectric effect.		
7	Production of ultrasonic waves by Piezo electric oscillator		
8	Production of ultrasonic waves by and Magnetostriction oscillator	Sound by Brijlal & Subrahmanyam	
9	Applications of Ultrasonics		
10	Acoustics of buildings – Reverberation – Reverberation time – Absorption coefficient – Sabine's formula (Without derivation).		
11	Factors affecting the acoustics of buildings		
12	UNIT V-Polarization: Definition of polarization - Brewster's law.		
13	Double refraction - Optical activity – Function of a half shade		
14	Determination Specific rotatory power of sugar solution using Laurent's half shade polarimeter		
15	Uses of Polarised light - Problems		

Auxilium College (Autonomous), Gandhi Nagar, Vellore – 632 006.
Lesson Plan for the year 2020 – 2021 (Odd Semester)

Staff: Dr. P. Nisha Santhakumari

Class : SEMESTER III – II B.Sc. CHEMISTRY

Paper : ALLIED I - PHYSICS I

Paper Code : UAPHA19

Week	Portions to be covered	Reference	Platform (LMS)
I	Viscosity: Viscous force – Stream line and turbulent motions - Coefficient of viscosity of a liquid - Poiseuille's formula – volume of the rate of flow of liquid in a horizontal capillary tube	Allied Physics – R.Murugesan Properties of matter - R. Murugesan	Google Meet PPT presentation Short videos on the topic Derivation will be presented through online video using paper and pen.
II	Determination of coefficient of viscosity using graduated burette – Comparison of coefficient viscosities of two liquids using graduated burette and Ostwald's viscometer method.	Allied Physics – R.Murugesan Properties of matter - R. Murugesan	Google Meet PPT presentation .
III	Surface Tension: Introduction to surface tension in nature - Definition – unit and dimension - Excess of Pressure inside curved surface (curvilinear coordinates) – Spherical and cylindrical drops and bubbles	Allied Physics – R.Murugesan Properties of matter - R. Murugesan	Google Meet PPT presentation Short videos on the topic Derivation will be presented through online video using paper and pen
IV	Determination of surface tension and Interfacial tension by the method of drops. Torsional couple – Potential energy stored in a twisted wire	Allied Physics – R.Murugesan Properties of matter - R. Murugesan	Google Meet PPT presentation Short videos on the topic
V	Expression for couple per unit twist – Torsional Pendulum - Determination of rigidity modulus by Torsional oscillation (without masses) and by static torsion method.	Properties of matter - R. Murugesan Allied Physics – R.Murugesan	Google Meet PPT presentation Short videos on the topic Derivation will be presented through online video using paper and pen.
VI	I CA EXAMINATIONS		
VII	Unit III: Specific Heat of Capacity – Definition – Determination of specific heat of capacity of a liquid by method of mixtures – Half time radiation correction -	Heat and Thermodynamics - Brjilal and Subramanian A text book of Practical Physics M.N.Srinivasan & Co	Google Meet PPT presentation Short videos on the topic. Derivation will be presented through online video using paper and pen.
VIII	Callender and Barne's method of determining the specific heat capacity of a liquid - Newton's law of cooling – Determination of specific heat of a liquid using Newton's law of cooling.	Heat and Thermodynamics - Brjilal and Subramanian	Google Meet PPT presentation

		A text book of Practical Physics M.N.Srinivasan & Co	Derivation will be presented through online video using paper and pen
IX	Joule Kelvin effect – Experimental study and theory of Joule Kelvin effect - - Temperature of inversion Linde’s Process - Liquefaction of Helium – Properties of Helium I and II - Lambda point	Heat and Thermodynamics - Brjilal and Subramanian Allied Physics R. Murgeshan	Google Meet PPT presentation
X	Applications of low temperature: Superconductors – Meissner effect - Applications – Magnetic levitation train.	Internet materials for the superconductors, Meissner effect and magnetic levitation train	videos will be shown for the topic Meissner effect and Magnetic levitation train
XI	Sound: Velocity and frequency of transverse vibrations along a stretched string – Laws of vibrations along a stretched string – Determination of A.C. frequency using Sonometer	Allied Physics R.Murugeshan	Google Meet PPT presentation Derivation will be presented through online video using paper and pen
XII	II CA EXAMINATIONS		
XIII	Unit V: Physical Optics: Interference – Definition – Conditions for interference – interference in thin films (reflected light)	Allied Physics R.Murugeshan Optics and Spectroscopy R.Murugeshan	Google Meet PPT presentation Short videos on the topic. Derivation will be presented through online video using paper and pen.
XIV	Newton's ring - Determination of radius of curvature of lens by forming Newton’s rings - Determination of diameter of a thin wire by air wedge method – Test for optical flatness.	Allied Physics R.Murugeshan A text book of Practical Physics M.N.Srinivasan & Co Optics and Spectroscopy R.Murugeshan	Google Meet PPT presentation Short videos on the topic. Derivation will be presented through online video using paper and pen.
XV	Diffraction: Diffraction – Definition – Plane transmission Grating – Theory of plane transmission grating – Experimental determination of wavelength using transmission grating.	Allied Physics R.Murugeshan Optics and Spectroscopy R.Murugeshan	Google Meet PPT presentation Short videos on the topic. Derivation will be presented through online video using paper and pen

Auxilium College (Autonomous), Gandhi Nagar, Vellore – 632 006.
Lesson Plan for the year 2020 – 2021 (Odd Semester)

Staff: Dr. P. Nisha Santhakumari

Class : SEMESTER I – I B.Sc. MATHEMATICS

Paper : ALLIED I - PHYSICS I

Paper Code : UAPHA20

Week	Portions to be covered	Reference	Platform (LMS)
I	2.1 Viscosity: Viscous force – Stream line and turbulent motions - Coefficient of viscosity of a liquid – 2.2 Poiseuille’s formula – volume of the rate of flow of liquid in a horizontal capillary tube	Allied Physics – R.Murugeshan Properties of matter - R. Murugeshan	Google Meet PPT presentation Short videos on the topic Derivation will be presented through online video using paper and pen.
II	Determination of coefficient of viscosity using graduated burette – 2.3 Comparison of coefficient viscosities of two liquids using graduated burette and Ostwald’s viscometer method	Allied Physics – R.Murugeshan Properties of matter - R. Murugeshan	Google Meet PPT presentation .
III	2.4 Terminal velocity – Stokes law- Experimental determination of coefficient of viscosity of highly viscous liquid 2.5 Surface Tension: Introduction to surface tension in nature - Definition – unit and dimension - Excess of Pressure inside curved surface (curvilinear co-ordinates) – Spherical and cylindrical drops and bubbles	Allied Physics – R.Murugeshan Properties of matter - R. Murugeshan	Google Meet PPT presentation Short videos on the topic Derivation will be presented through online video using paper and pen
IV	2.6 Determination of surface tension by the method of drops - Interfacial tension between two immiscible liquids – Determination of interfacial tension by the method of drops	Allied Physics – R.Murugeshan Properties of matter - R. Murugeshan	Google Meet PPT presentation Short videos on the topic
V	1.5 Torsional couple – Potential energy stored in a twisted wire – Expression for couple per unit twist 1.6 Torsional Pendulum - Experimental determination of rigidity modulus by Torsional oscillation (without masses) - Experimental determination of rigidity modulus by static torsion method..	Properties of matter - R. Murugeshan Allied Physics – R.Murugeshan	Google Meet PPT presentation Short videos on the topic Derivation will be presented through online video using paper and pen.
VI	I CA EXAMINATIONS		
VII	Unit III: 3.1 Heat: Specific Heat of Capacity – Definition –	Heat and Thermodynamics - Brjilal and Subramanian	Google Meet

	Determination of specific heat of capacity of a liquid by method of mixtures – Half time radiation correction 3.2 Specific heat capacity by Callender and Barne’s method – Merits and demerits	A text book of Practical Physics M.N.Srinivasan & Co	PPT presentation Short videos on the topic. Derivation will be presented through online video using paper and pen.
VIII	3.3 Newton’s law of cooling – Statement - Determination of specific heat of a liquid using Newton’s law of cooling – Experiment and theory	Heat and Thermodynamics - Brjilal and Subramanian A text book of Practical Physics M.N.Srinivasan & Co	Google Meet PPT presentation Derivation will be presented through online video using paper and pen
IX	3.4 Joule Kelvin effect – Definition - Temperature of inversion – Porous plug experiment – Results – Theory of Joule Kelvin effect – 3.5 Liquefaction of air by Linde’s Process - Liquefaction of Helium	Heat and Thermodynamics - Brjilal and Subramanian Allied Physics R. Murgeshan	Google Meet PPT presentation Demonstration and lecture method
X	Properties of Helium I and II - Lambda point 3.6 Superconductors – Definition of type I and II Superconductors - – Meissner effect - Applications – Magnetic levitation train	Allied Physics R. Murgeshan Internet materials for the superconductors, Meissner effect and magnetic levitation train	PPT presentation Demonstration and lecture method videos will be shown for the topic Meissner effect and Magnetic levitation train
XI	Sound: 4. Properties of sound – Longitudinal and transverse waves - Expression for Velocity of transverse vibrations along a stretched string - frequency of transverse vibrations along a stretched string. 4.2 Laws of transverse vibrations of strings - Determination of A.C. frequency using Sonometer - Problems	Allied Physics R.Murugeshan	Google Meet PPT presentation Derivation will be presented through online video using paper and pen
XII	II CA EXAMINATIONS		
XIII	Unit V: Physical Optics: 5.1 Interference – Definition – Conditions for interference – interference in thin films (reflected light)	Allied Physics R.Murugeshan Optics and Spectroscopy R.Murugeshan	Google Meet PPT presentation Short videos on the topic. Derivation will be presented through online video using paper and pen.
XIV	5.1 Interference – Definition – Conditions for interference – interference in thin films (reflected light)	Allied Physics R.Murugeshan	Google Meet PPT presentation

	5.2 Newton's ring - Determination of radius of curvature of lens by forming Newton's rings	A text book of Practical Physics M.N.Srinivasan & Co Optics and Spectroscopy R.Murugesan	Short videos on the topic. Derivation will be presented through online video using paper and pen.
XV	5.3 Air wedge – Expression for fringe width – Experiment to measure the diameter of a thin wire by air wedge method – Test for optical flatness. 5.4 Diffraction – Definition – Plane transmission Grating – construction - Theory of plane transmission grating – Experimental determination of wavelength using transmission grating – Problems	Allied Physics R.Murugesan Optics and Spectroscopy R.Murugesan	Google Meet PPT presentation Short videos on the topic. Derivation will be presented through online video using paper and pen

Auxilium College (Autonomous), Gandhi Nagar, Vellore – 632 006.
Lesson Plan for the year 2020 – 2021 (Odd Semester)

Staff: Dr. P. Nisha Santhakumari

Class : SEMESTER I – I M.Sc. PHYSICS

Paper : CLASSICAL MECHANICS

Paper Code : PCPHB20

WEEK	PORTIONS TO BE COVERED	REFERENCE	Platform (LMS)
I	Unit I: Rigid Body Dynamics 1.1 Introduction – Generalized coordinates of a rigid body – Body and space reference systems - 1.2 Euler’s angles	Classical Mechanics J.C.Uphadahya	Google Meet PPT presentation Short videos on the topic Derivation will be presented through online video using paper and pen.
II	Infinitesimal rotations as vectors – 1.3 Components of angular velocity – Angular momentum and Inertia tensor 1.4 Principle axes – Principle moments of inertia	Classical Mechanics J.C.Uphadahya Classical Mechanics Gupta Kumar Sharma	PPT presentation. Lecture method with the explanation of each slide Short videos on the topic shown and explained.
III	Rotational Kinetic energy of a rigid body - Moment of inertia for different body systems - Euler’s equations of motion of rigid body – Torque free motion of a rigid body	Classical Mechanics J.C.Uphadahya Classical Mechanics Gupta Kumar Sharma	PPT presentation Short videos on the topic Derivation will be presented through online video using paper and pen.
IV	1.6 Motion of a symmetrical top under the action of gravity – First integrals of equation of motion – Precession without nutation – Nutational motion	Classical Mechanics J.C.Uphadahya Classical Mechanics Gupta Kumar Sharma	PPT presentation Derivation will be presented through online video using paper and pen.
V	ICA EXAMIANTIONS		
VI	4.1 Hamilton–Jacobi equations - 4.2 Hamilton’s Characteristic function – Physical Significance of Hamilton Jacobi equation	Classical Mechanics J.C.Uphadahya Classical Mechanics Gupta Kumar Sharma	PPT presentation Derivation will be presented through online video using paper and pen
VII	4.3 Linear Harmonic Oscillator problem by Hamilton Jacobi method	Classical Mechanics J.C.Uphadahya	PPT presentation

		<p>Classical Mechanics</p> <p>Gupta Kumar Sharma</p> <p>Classical Mechanics</p> <p>Sathya Prakash</p>	<p>Lecture method for the explanation of each slide.</p> <p>Derivation will be presented through online video using paper and pen</p>
VIII	4.4 Action Angle variables - Problem of harmonic oscillator using action angle variables (deduction of frequency of motion)	<p>Classical Mechanics</p> <p>J.C.Uphadahya</p> <p>Classical Mechanics</p> <p>Gupta Kumar Sharma</p> <p>Classical Mechanics</p> <p>Sathya Prakash</p>	<p>PPT presentation</p> <p>Lecture method for the explanation of each slide.</p> <p>Derivation will be presented through online video using paper and pen</p>
IX	4.5 Hamilton Jacobi method and Motion of a particle in a plane under a central force	<p>Classical Mechanics</p> <p>J.C.Uphadahya</p> <p>Classical Mechanics</p> <p>Gupta Kumar Sharma</p> <p>Classical Mechanics</p> <p>Sathya Prakash</p>	<p>PPT presentation</p> <p>Lecture method for the explanation of each slide.</p> <p>Derivation will be presented through online video using paper and pen</p>
X	4.6 Application to Kepler's problem based on Hamilton Jacobi method	<p>Classical Mechanics</p> <p>J.C.Uphadahya</p> <p>Classical Mechanics</p> <p>Gupta Kumar Sharma</p> <p>Classical Mechanics</p> <p>Sathya Prakash</p>	<p>PPT presentation</p> <p>Lecture method for the explanation of each slide.</p> <p>Derivation will be presented through online video using paper and pen</p>
XI	II CA EXAMINATIONS		
XII	5.3 one dimensional oscillator – The Lagrangian of one dimensional oscillator and its solution	<p>Classical Mechanics</p> <p>J.C.Uphadahya</p> <p>Classical Mechanics</p> <p>Gupta Kumar Sharma</p>	<p>PPT presentation</p> <p>Lecture method for the explanation of each slide.</p> <p>Derivation will be presented through online video using paper and pen</p>

		Classical Mechanics Sathya Prakash	
XIII	5.4 Two coupled oscillators– Lagrangian equation of two coupled oscillators and its solution	Classical Mechanics J.C.Uphadahya Classical Mechanics Gupta Kumar Sharma Classical Mechanics Sathya Prakash	PPT presentation Lecture method for the explanation of each slide. Derivation will be presented through online video using paper and pen
XIV	5.5 Example of two coupled oscillator: Two coupled pendulum	Classical Mechanics J.C.Uphadahya Classical Mechanics Gupta Kumar Sharma Classical Mechanics Sathya Prakash	PPT presentation Lecture method for the explanation of each slide. Derivation will be presented through online video using paper and pen
XV	5.6 Vibrations of linear triatomic molecule	Classical Mechanics J.C.Uphadahya Classical Mechanics Gupta Kumar Sharma Classical Mechanics Sathya Prakash	PPT presentation Lecture method for the explanation of each slide. Derivation will be presented through online video using paper and pen

Auxilium College (Autonomous), Gandhi Nagar, Vellore – 632 006.
Lesson Plan for the year 2020 – 2021 (Odd Semester)

STAFF : Mrs. R. Mary Jamila
SUBJECT NAME : SPECTROSCOPY
SEMESTER : III
SUBJECT CODE : PCPHI20

Week	Portions to be covered	Reference	Platform (LMS)
1	Unit I: MICROWAVE SPECTROSCOPY Introduction – Pure rotational spectra of diatomic molecules.	C.N. Banwell and E.M. Mc Cash - Fundamentals of Molecular Spectroscopy	Online class – Google meet
2	Study of linear molecules and symmetric top molecules. Polyatomic molecules.	C.N. Banwell and E.M. Mc Cash - Fundamentals of Molecular Spectroscopy	Online class – Google meet
3	Hyperfine structure and quadruple moment of linear molecules	G. Aruldas - Molecular Structure and Spectroscopy	Online class – Google meet
4	Experimental techniques. Molecular structure determination–Stark effect–Applications to chemical analysis	G. Aruldas - Molecular Structure and Spectroscopy	Online class – Google meet
5	Unit IV: NMR AND NQR TECHNIQUES Theory of NMR – Bloch equations –	G. Aruldas - Molecular Structure and Spectroscopy	Online class – Google meet
6	Steady state solution of Bloch equations. Theory of chemical shifts.	G. Aruldas - Molecular Structure and Spectroscopy	Online class – Google meet
7	Experimental methods – Single coil and double coil methods –	B.K. Sharma – Spectroscopy	Online class – Google meet
8	Pulse Method – High resolution method.	G. Aruldas - Molecular Structure and Spectroscopy	Online and Offline mode. PPT and PDF
9	Applications of NMR to quantitative measurements.	G. Aruldas - Molecular Structure and Spectroscopy	Online class – Google meet
10	Introduction to NQR - Quadruple Hamiltonian of NQR.	G. Aruldas - Molecular Structure and Spectroscopy	Online class – Google meet
11	Nuclear quadruple energy levels for axial and non-axial symmetry.	G. Aruldas - Molecular Structure and Spectroscopy	Online class – Google meet
12	Experimental techniques and applications.	G. Aruldas - Molecular Structure and Spectroscopy	Online class – Google meet
13	Unit V: ESR AND MOSSBAUER SPECTROSCOPY Quantum mechanical treatment of ESR –	G. Aruldas - Molecular Structure and Spectroscopy	Offline mode. Power point presentation
14	Nuclear interaction and hyperfine structure – Relaxation effects.	G. Aruldas - Molecular Structure and Spectroscopy	Offline mode. Power point presentation
15	Basic principles of spectrograph – Applications of ESR method.	G. Aruldas - Molecular Structure and Spectroscopy	Offline mode. Power point presentation

Auxilium College (Autonomous), Gandhi Nagar, Vellore – 632 006.
Lesson Plan for the year 2020 – 2021(Odd Semester)

STAFF : Mrs. R. Mary Jamila
SUBJECT NAME : MICROPROCESSOR AND MICROCONTROLLER
SEMESTER : III
SUBJECT CODE : PCPHK20

Week	Portions to be covered	Reference	Platform (LMS)
1	Unit II: INSTRUCTION SET AND PROGRAMMING OF 8085 Introduction - Classification of instructions and format- 8 - bit data transfer instructions.	R.S. Gaonkar - Microprocessor Architecture, Programming and Application with the 8085	Online class – Google meet
2	Arithmetic and Logic - Logical rotate and compare instructions.	R.S. Gaonkar	Online class – Google meet
3	Branch instructions – Stack and subroutine instructions –	R.S. Gaonkar	Online class – Google meet
4	Special and machine control instructions. Addressing modes	R.S. Gaonkar	Online class – Google meet
5	Assembly language programming: Picking up Largest / smallest number – Arranging an array in ascending / descending order	V.Vijayendran - Fundamentals of Microprocessor 8085 - Architecture, Programming and interfacing	Online class – Google meet
6	Code conversion - 8 bit code conversion: Binary to BCD and BCD to Binary.	V.Vijayendran	Online class – Google meet
7	Binary to ASCII, ASCII to Binary and ASCII to BCD and BCD to ASCII.	V.Vijayendran	Online class – Google meet
8	Unit III: 8255 PERIPHERAL INTERFACING Pin out configuration- Internal Architecture	N. Nagoor Kanni – Microprocessor and Microcontroller	Online and Offline mode. PPT and PDF
9	Interfacing of 8255	N. Nagoor Kanni	Online class – Google meet
10	ADC interface –	V.Vijayendran	Online class – Google meet
11	DAC interface	N. Nagoor Kanni	Online class – Google meet
12	Hex keyboard interface	V.Vijayendran	Online class – Google meet
13	Dynamic message display interface	N. Nagoor Kanni	Offline mode. Power point presentation
14	Stepper motor interface	N. Nagoor Kanni	Offline mode. Power point presentation
15	Traffic regulation interface	N. Nagoor Kanni	Offline mode. Power point presentation

Auxilium College (Autonomous), Gandhi Nagar, Vellore – 632 006.
Lesson Plan for the year 2020 – 2021 (Odd Semester)

STAFF – Mrs. R. Mary Jamila

SUBJECT NAME : ELECTIVE III A. NUMERICAL METHODS AND C PROGRAMMING

SEMESTER : III

SUBJECT CODE : PEPHE19

Week	Portions to be covered	Reference	Platform (LMS)
1	Unit III: Programming in C Introduction – Basic structure of C Programming ——	E.Balagurusamy - Computing Fundamentals and Programming, ANSI C.	Online class – Google meet
2	Character set – Key words	E.Balagurusamy	Online class – Google meet
3	Identifiers – Variables	E.Balagurusamy	Online class – Google meet
4	Assigning values to variables	E.Balagurusamy	Online class – Google meet
5	Symbolic constant	E.Balagurusamy	Online class – Google meet
6	Unit IV: Operators, Arrays and Strings Operators – Arithmetic, relational, logical, ——	E.Balagurusamy	Online class – Google meet
7	Assignment, increment, decrement conditional and special type conversion in Expressions	E.Balagurusamy	Online class – Google meet
8	Arrays – Multi dimensional arrays – Initialising two dimensional arrays	E.Balagurusamy	Online and Offline mode. Video lectures
9	Initializing string variables	E.Balagurusamy	Online class – Google meet
10	Reading and writing Strings on the Arithmetic operations on strings.	E.Balagurusamy	Online class – Google meet
11	Unit V: Simple Programmes User defined functions – their needs ——	E.Balagurusamy	Online class – Google meet
12	Multi function programme - Calling functions – Categories of functions	E.Balagurusamy	Online class – Google meet Video lectures
13	Return values and their types	E.Balagurusamy	Offline mode. PDF
14	Multiplication – Diagonalisation and inversion	E.Balagurusamy	Online class – Google meet Youtube video
15	Solution and C programming – Lagrangian interpolation – Simpson’s rule – Euler method- Runge – Kutta method.	E.Balagurusamy	Online class – Google meet Youtube video

Auxilium College (Autonomous), Gandhi Nagar, Vellore – 632 006.
Lesson Plan for the year 2020-2021 (Odd Semester)

STAFF: Dr. N. R. DEVI

M.Sc Physics – II Year (Shift –I)

Subject :Quantum Mechanics – II

Subject Code : PCPHJ19

Week	Portions to be covered	Reference	Platform (LMS)
I	Klein-Gordon equation – Failures	Quantum mechanics by Gupta, Kumar and Sharma Quantum Mechanics by Aruldhas	Google meet
II	Dirac's equation - Dirac Matrices - Traces	Quantum mechanics by Gupta, Kumar and Sharma	Google meet
III	Plane Wave solutions – Interpretation of negative energy states - Antiparticles	Quantum mechanics by Gupta, Kumar and Sharma	Google meet
IV	Spin of the electron	Quantum mechanics by Gupta, Kumar and Sharma. Quantum Mechanics by Sathyaprakash	Google meet
V	Magnetic moment of the electron due to spin	Quantum mechanics by Gupta, Kumar and Sharma. Quantum Mechanics by Sathyaprakash	Google meet
VI	Particle in a Coulomb field	Quantum mechanics by Gupta, Kumar and Sharma. Quantum Mechanics by Sathyaprakash	Google meet
VII	Introduction – Lagrangian and Hamiltonian formulations of field	Quantum Mechanics by Aruldhas	Google meet
VIII	Classical field equations interms of Lagrangian density	Quantum Mechanics by Aruldhas	Google meet
IX	Classical field equations interms of Hamiltonian	Quantum Mechanics by Aruldhas	Google meet
X	Quantization of Schrödinger field, System of Bosons	Quantum Mechanics by Aruldhas	Google meet
XI	Covariant form of Dirac equation, Separation of equation	Quantum Mechanics by Aruldhas Quantum mechanics by Gupta, Kumar and Sharma.	Google meet
XII	Hydrogen atom problem	Quantum Mechanics by Aruldhas	Google meet
XIII	Invariance of Dirac equation under Lorentz transformation	Quantum Mechanics by Devanathan	Google meet
XIV	T-Transformation for the Dirac equation in the presence of electromagnetic field	Quantum Mechanics by Devanathan	Google meet
XV	Projection operators for energy and spin	Quantum Mechanics by Aruldhas	Google meet

Auxilium College (Autonomous), Gandhi Nagar, Vellore – 632 006.
Lesson Plan for the year 2020-2021 (Odd Semester)

STAFF : Dr. N. R. DEVI
M.Sc Physics – II Year (Shift –I)
Subject : Spectroscopy

Subject Code : PCPHI19

Week	Portions to be covered	Reference	Platform (LMS)
I	Vibrational spectroscopy of diatomic molecule	Spectroscopy by Gupta, Kumar and Sharma Spectroscopy by Aruldhas	Google meet
II	Harmonic Oscillator	Spectroscopy by Gupta, Kumar and Sharma Spectroscopy by Aruldhas	Google meet
III	Anharmonic Oscillator	Spectroscopy by Gupta, Kumar and Sharma Spectroscopy by Aruldhas	Google meet
IV	Rotational vibrators	Spectroscopy by Gupta, Kumar and Sharma Spectroscopy by Aruldhas	Google meet
V	Normal modes of vibration of polyatomic molecules – Inversion spectrum of ammonia	Spectroscopy by Aruldhas	Google meet
VI	Experimental techniques - Infrared spectro- photometer	Spectroscopy by Aruldhas	Google meet
VII	Reflectance spectroscopy, Applications of infrared spectroscopy.	Spectroscopy by Aruldhas	Google meet
VIII	Classical and quantum theory of Raman Scattering	Spectroscopy by Gurdeep R.Chatwal and Sham K.Anand	Google meet
IX	Raman effect and molecular structure – Raman effect and crystal structure	Spectroscopy by Aruldhas	Google meet
X	Raman effect in relation to inorganic, organic and physical chemistry	Spectroscopy by Gurdeep R.Chatwal and Sham K.Anand	Google meet
XI	Experimental techniques, Coherent and Stokes Raman Spectroscopy	Spectroscopy by B.K. Sharma	Google meet
XII	Applications of infrared and Raman spectroscopy in molecular structural confirmation of water and CO ₂ molecules.	Spectroscopy by Aruldhas	Google meet
XIII	Mossbauer effect – Recoilless emission and absorption, Isomer and Chemical shift	Spectroscopy by Aruldhas	Google meet
XIV	Mossbauer spectrum – Experimental methods – Mossbauer spectrometer	Spectroscopy by Aruldhas	Google meet
XV	Magnetic hyperfine interactions – Electric quadruple interactions – Simple biological applications.	Spectroscopy by Aruldhas	Google meet

Auxilium College (Autonomous), Gandhi Nagar, Vellore – 632 006.
Lesson Plan for the year 2020-2021 (Odd Semester)

STAFF: Dr. N. R. DEVI

M. Sc. Physics – I Year (Shift –I)

Subject : Classical Mechanics

Subject Code : PCPHB20

Week	Portions to be covered	Reference	Platform (LMS)
I	Newton's equation and conservation laws for system of particles, Constraints	Classical Mechanics by J.C. Upadhyaya	Google meet
II	Generalized co-ordinates, Principle of Virtual work	Classical Mechanics by J.C. Upadhyaya	Google meet
III	D'Alembert's Principle – Lagrange's equation from D'Alembert's Principle, Procedure for formation of Lagrange's equation	Classical Mechanics by J.C. Upadhyaya	Google meet
IV	Kinetic energy in generalized coordinates – Lagrange's equation from Hamilton's Principle	Classical Mechanics by J.C. Upadhyaya	Google meet
V	Hamilton's equations	Classical Mechanics by J.C. Upadhyaya	Google meet
VI	Δ variations - Principle of least action	Classical Mechanics by J.C. Upadhyaya	Google meet
VII	Applications (Atwood's Machine, Compound pendulum and LC circuit)	Classical Mechanics by J.C. Upadhyaya	Google meet
VIII	Introduction - Canonical Transformations and their generators	Classical Mechanics by J.C. Upadhyaya	Google meet
IX	Procedure for Applications of Canonical transformations – Condition for canonical transformations,	Classical Mechanics by J.C. Upadhyaya	Google meet
X	Problems on canonical transformation (Simple Harmonic Oscillator), Infinitesimal contact transformation	Classical Mechanics by J.C. Upadhyaya	Google meet
XI	Lagrange and Poisson Brackets notation	Classical Mechanics by J.C. Upadhyaya	Google meet
XII	Proof of invariance of Poisson's Bracket under canonical transformations	Classical Mechanics by J.C. Upadhyaya	Google meet
XIII	Introduction – General theory of small oscillations	Classical Mechanics by J.C. Upadhyaya	Google meet
XIV	Secular equations and eigen value equations – solution to eigen value equations	Classical Mechanics by J.C. Upadhyaya	Google meet
XV	one dimensional oscillator – The Lagrangian of one dimensional oscillator and its solution	Classical Mechanics by J.C. Upadhyaya	Google meet

Auxilium College (Autonomous), Gandhi Nagar, Vellore – 632 006.
Lesson Plan for the year 2020 – 2021 (Odd Semester)

STAFF: Dr. R. Sarjila

M.Sc. PHYSICS – II YEAR

Subject Title : Microprocessor & Microcontroller

Subject Code : PCPHP19

Week	Portions to be covered	Reference	Platform (LMS)
I	Introduction to Microprocessor 8085	R.S. Gaonkar - Microprocessor Architecture, Programming and Application with the 8085	Google meet
II	Pin out configuration- Architecture	R.S. Gaonkar - Microprocessor Architecture, Programming and Application with the 8085	Google meet
III	Bus Address bus, data bus, multiplexing address/data bus- Machine and instruction cycle- timing diagrams	R.S. Gaonkar - Microprocessor Architecture, Programming and Application with the 8085	Google meet
IV	Interrupts of the 8085 Microprocessor Maskable and non maskable interrupts - RIM and SIM interrupt instructions	R.S. Gaonkar - Microprocessor Architecture, Programming and Application with the 8085	Google meet
V	ROM and RAM memory - Memory interface: 2K X 8, 4K x 8 ROM and RAM interface.	V. Vijayendran - Fundamentals of Microprocessor 8085 - Architecture, Programming and interfacing	Google meet
VI	Introduction to Microcontroller 8051	Muhammed Ali Mazidi & Janice Gillespie Mazidi - The 8051 Microcontroller and Embedded Systems	Google meet
VII	Pin configuration and Architecture	Muhammed Ali Mazidi & Janice Gillespie Mazidi - The 8051 Microcontroller and Embedded Systems	Google meet
VIII	Internal registers Memory organizations	Muhammed Ali Mazidi & Janice Gillespie Mazidi - The 8051 Microcontroller and Embedded Systems	Google meet
IX	Instruction set - Addressing modes	Muhammed Ali Mazidi & Janice Gillespie Mazidi - The 8051 Microcontroller and Embedded Systems	Google meet
X	Assembly Language Programming Addition and Subtraction - Multiplication and Division - Arranging an array in ascending/descending order - Sorting out the maxima and minima.	Muhammed Ali Mazidi & Janice Gillespie Mazidi - The 8051 Microcontroller and Embedded Systems	Google meet
XI	Memory Interface - Counters and timers	Muhammed Ali Mazidi & Janice Gillespie Mazidi - The 8051 Microcontroller and Embedded Systems	Google meet
XII	Serial data input , output interrupts	Muhammed Ali Mazidi & Janice Gillespie Mazidi - The 8051 Microcontroller and Embedded Systems	Google meet
XIII	I/O port Interface	Muhammed Ali Mazidi & Janice Gillespie Mazidi - The 8051 Microcontroller and Embedded Systems	Google meet
XIV	Interfacing 8051 with ADC, DAC	Muhammed Ali Mazidi & Janice Gillespie Mazidi - The 8051 Microcontroller and Embedded Systems	Google meet
XV	LED Display - Hex Keyboard interfacing	Muhammed Ali Mazidi & Janice Gillespie Mazidi - The 8051 Microcontroller and Embedded Systems	Google meet

Auxilium College (Autonomous), Gandhi Nagar, Vellore – 632 006.
Lesson Plan for the year 2020 – 2021 (Odd Semester)

STAFF: Dr. R. Sarjila

M.Sc. PHYSICS – II YEAR

Subject Title : Numerical Methods & C Programming

Subject Code : PEPHE19

Week	Portions to be covered	Reference	Platform (LMS)
I	Methods of false position	G.Balaji - Numerical Methods	Google meet
II	Newton's method	G.Balaji - Numerical Methods	Google meet
III	Fixed point - Iteration method	G.Balaji - Numerical Methods	Google meet
IV	Interpolation - Lagrangian polynomials	T. Veerarajan and T. Ramachandran, Numerical Methods with Programming in C	Google meet
V	Divided differences	G.Balaji - Numerical Methods	Google meet
VI	Newton's forward and backward difference formulae	G.Balaji - Numerical Methods	Google meet
VII	Derivatives – Newton's forward / backward interpolation	T. Veerarajan and T. Ramachandran, Numerical Methods with Programming in C	Google meet
VIII	Stirling formula	G.Balaji - Numerical Methods	Google meet
IX	Numerical integration by Trapezoidal solutions of equations	G.Balaji - Numerical Methods	Google meet
X	Simple iterative methods – Newton method	G.Balaji - Numerical Methods	Google meet
XI	Numerical integration – Simpsons 1/3 and 3/8 rules	T. Veerarajan and T. Ramachandran, Numerical Methods with Programming in C	Google meet
XII	Solution to first order differential equations : Taylor series method	G.Balaji - Numerical Methods	Google meet
XIII	Euler Method	T. Veerarajan and T. Ramachandran, Numerical Methods with Programming in C	Google meet
XIV	Modified Euler method	T. Veerarajan and T. Ramachandran, Numerical Methods with Programming in C	Google meet
XV	Runge-kutta method	G.Balaji - Numerical Methods	Google meet

Auxilium College (Autonomous), Gandhi Nagar, Vellore – 632 006.
Lesson Plan for the year 2020 – 2021 (Odd Semester)

STAFF: Dr. R. Sarjila
M.Sc. PHYSICS – I YEAR
Subject Title : Electronic Devices

Subject Code : PEPHA20

Week	Portions to be covered	Reference	Platform (LMS)
I	4-bit Binary adder/subtractor IC 7483	V. Vijayendran - Introduction to Integrated Electronics	Google meet
II	Multiplexer IC 74150 and Demultiplexer IC 74154)	V. Vijayendran - Introduction to Integrated Electronics	Google meet
III	Counters: Binary Counter – BCD Counter – Parallel Counters	V. Vijayendran - Introduction to Integrated Electronics	Google meet
IV	D/A Converters: Binary Weighted Resistor method - R-2R Ladder method	V. Vijayendran - Introduction to Integrated Electronics	Google meet
V	A/D Converters: Counter type, Successive Approximation	V. Vijayendran - Introduction to Integrated Electronics	Google meet
VI	Dual Slope method – Parallel comparator A/D converter	V. Vijayendran - Introduction to Integrated Electronics	Google meet
VII	Multi gate transistors – need of FinFET – Structure of FinFET - Fabrication Mechanism of FinFET Technology-	FinFETs and Other Multi-Gate Transistors by J.-P. Colinge	Google meet
VIII	Bulk FinFET- SOI FinFET - FinFET Classifications: Gate shorted (SG), Insulated Gate (IG) and Low Power (LP)	FinFETs and Other Multi-Gate Transistors by J.-P. Colinge	Google meet
IX	n-FinFET and p-FinFET - working of FinFET – I-V characteristics of FinFET - Applications of FinFET	FinFETs and Other Multi-Gate Transistors by J.-P. Colinge	Google meet
X	Design of Switches, logic gates, flip-flops and Schmidt trigger using FinFET	FinFETs and Other Multi-Gate Transistors by J.-P. Colinge	Google meet
XI	Single Electron Transistor: Principle-quantum dots - Coulomb blockade and electron tunneling –Construction and operation of SET	Hybrid CMOS Single-Electron-Transistor Device And Circuit Design by Santanu Mahapatra, Adrian Mihai Ionescu	Google meet
XII	Single island RC equivalent circuit of SET- operation Temperature –	Hybrid CMOS Single-Electron-Transistor Device And Circuit Design by Santanu Mahapatra, Adrian Mihai Ionescu	Google meet
XIII	different ways to increase Coulomb energy Ec-I-V characteristics of symmetric and asymmetric junction (Coulomb Stair-Case) SET	Hybrid CMOS Single-Electron-Transistor Device And Circuit Design by Santanu Mahapatra, Adrian Mihai Ionescu	Google meet
XIV	Design of logic gates using SET - realization of AND, OR and NOT gates using SET	Hybrid CMOS Single-Electron-Transistor Device And Circuit Design by Santanu Mahapatra, Adrian Mihai Ionescu	Google meet
XV	Advantages and disadvantages of SET- Difference between SET and FET - Applications of SET	Hybrid CMOS Single-Electron-Transistor Device And Circuit Design by Santanu Mahapatra, Adrian Mihai Ionescu	Google meet

Auxilium College (Autonomous), Gandhi Nagar, Vellore – 632 006.
Lesson Plan for the year 2020 – 2021 (Odd Semester)

STAFF: Dr. R. Sarjila

UG – II YEAR

Subject Title : SBE-Home Appliances

Subject Code : UCPHB319

Week	Portions to be covered	Reference	Platform (LMS)
I	Basic Concepts of Current-voltage-potential difference-Ohms Law	Dr. P. Mani – A Text Book of Engineering Physics	Google meet
II	Electrical measuring meters : Ammeter – Voltmeter - Verification of Ohms Law – Multimeter	Dr. P. Mani – A Text Book of Engineering Physics	Google meet
III	Conductors – Insulators – Uses of Conductors & Insulators	Dr. P. Mani – A Text Book of Engineering Physics	Google meet
IV	Resistance – Laws of resistance – Resistance in series and Parallel	Dr. P. Mani – A Text Book of Engineering Physics	Google meet
V	Resistance Colour coding – Capacitors – Law of Capacitance – Capacitance in Series & Parallel	Dr. P. Mani – A Text Book of Engineering Physics	Google meet
VI	Inductors – Self & Mutual Inductance	Dr. P. Mani – A Text Book of Engineering Physics	Google meet
VII	Effects of Electric current – Safety precautions to be taken when working with electricity	Dr. P. Mani – A Text Book of Engineering Physics	Google meet
VIII	causes of fire on electrical appliances – Precautions and remedial measures	Dr. P. Mani – A Text Book of Engineering Physics	Google meet
IX	Light effect – working of electric bulb and fluorescent tube – Grouping of lamps	Dr. P. Mani – A Text Book of Engineering Physics	Google meet
X	Construction & Working of domestic appliances : Electric Iron Box	M. L. Anwani – Basic Electrical Engineering	Google meet
XI	Immersion heater – Electric Stove	M. L. Anwani – Basic Electrical Engineering	Google meet
XII	Washing Machine – Air Conditioner	M. L. Anwani – Basic Electrical Engineering	Google meet
XIII	Magnetic effect – Electromagnets – Applications	M. L. Anwani – Basic Electrical Engineering	Google meet
XIV	Electric Bell – Electric Motor – Electromagnetic Waves – Applications	M. L. Anwani – Basic Electrical Engineering	Google meet
XV	Microwave Oven – Television	M. L. Anwani – Basic Electrical Engineering	Google meet

Auxilium College (Autonomous), Gandhi Nagar, Vellore – 632 006.
Lesson Plan for the year 2020 – 2021 (Odd Semester)

Staff : Dr. S. REENA DEVI

Class : I M.Sc. Physics

Subject Title : STATISTICAL MECHANICS

Subject Code : PCPHC 20

Week	Portions to be covered	Reference	Platform (LMS)
1	Introduction – Thermodynamic potentials, Phase equilibrium	Statistical Mechanics by Sathya prakash and Statistical Mechanics by Gupta kumar sharma	Online – google Meet
2	Gibb's phase rule – Entropy of mixing and Gibb's paradox	Statistical Mechanics by Sathya prakash and Statistical Mechanics by Gupta kumar sharma	Online – google Meet
3	Phase transition and Ehrenfest's Classification-Landau theory of Phase transition.	Statistical Mechanics by Sathya prakash and Statistical Mechanics by Gupta kumar sharma	Online – google Meet
4	Critical indices- Scale transformation and dimensional analysis	Statistical Mechanics by Sathya prakash and Statistical Mechanics by Gupta kumar sharma	Online – google Meet
5	Introduction – Phase space.- Microcanonical, Canonical and grand canonical ensembles	Statistical Mechanics by Sathya prakash and Statistical Mechanics by Gupta kumar sharma	Online – google Meet
6	Trajectories and density of states. Liouville's theorem-Partition function - Calculation of statistical quantities	Statistical Mechanics by Sathya prakash and Statistical Mechanics by Gupta kumar sharma	Online – google Meet
7	Energy and density fluctuations. Postulates of classical and quantum statistics-Density of matrix – Statistics of indistinguishable particles.	Statistical Mechanics by Sathya prakash and Statistical Mechanics by Gupta kumar sharma	Online – google Meet
8	Maxwell- Boltzmann distribution function – Broadening of spectral lines- Bose-Einstein statistics – Bose-Einstein distribution of gas Equation of states – black body radiation.	Statistical Mechanics by Sathya prakash and Statistical Mechanics by Gupta kumar sharma	Online – google Meet
9	Bose - Einstein condensation -Landau's theory of Liquid Helium II.	Statistical Mechanics by Sathya prakash and Statistical Mechanics by Gupta kumar sharma	Online – google Meet
10	Fermi-Dirac distribution – Equation of states Free electron gas in metals -Heat capacity. Thermionic emission- Superconductivity	Statistical Mechanics by Sathya prakash and Statistical Mechanics by Gupta kumar sharma	Online – google Meet

11	Ising model – Mean field theories of the Ising model in three, two and one dimension.-Exact solutions in one dimension-Correlation of space-time dependent fluctuations	Statistical Mechanics by Sathya prakash and Statistical Mechanics by Gupta kumar sharma	Online – google Meet
12	Fluctuations and transport phenomena- Brownian motion – Langevin theory- Fluctuation-dissipation theorem – The Fokker- Planck equation.	Statistical Mechanics by Sathya prakash and Statistical Mechanics by Gupta kumar sharma	Online – google Meet

Auxilium College (Autonomous), Gandhi Nagar, Vellore – 632 006.
Lesson Plan for the year 2020 – 2021 (Odd Semester)

Staffe : Dr. S. REENA DEVI

Class : I M. Sc. Physics

Subject Title : MATHEMATICAL PHYSICS

Subject Code : PCPHA19

Week	Portions to be covered	Reference	Platform (LMS)
1	Vector analysis, important vector identity, problems, Orthogonal curvilinear co-ordinates, Expression for gradient, divergence curl and Laplacian	Mathematical Physics by sathya prakash	Online – google Meet
2	Spherical polar co-ordinates and differential operators, Expression for gradient, divergence curl and Laplacian	Mathematical Physics by sathya prakash	Online – google Meet
3	Cylindrical co-ordinates and differential operators, Expression for gradient, divergence curl and Laplacian, Stoke's theorem, Simple applications, Gauss theorem, Simple applications, Linear independence of vectors, Basis and Expansion theorem	Mathematical Physics by sathya prakash	Online – google Meet
4	Linear vector space Inner product and Unitary vector spaces, Orthonormal sets, Schwarz inequality, Schmidt's orthogonalization method. Completeness	Mathematical Physics by sathya prakash	Online – google Meet
5	Differential equations – Order and degree of a differential equation – Solution of first order differential equation by the method of separation of variables –	Mathematical Physics by sathya prakash	Online – google Meet
6	Solution of Linear differential equation of first order by the method of Integrating factor – Problems	Mathematical Physics by sathya prakash	Online – google Meet
7	Solution of first order differential equation reducible to linear form (Bernoulli's equation) - Problems	Mathematical Physics by sathya prakash	Online – google Meet
8	Solution of Second order differential equations with constant coefficients – Problems	Mathematical Physics by sathya prakash	Online – google Meet
9	Power series solution: Frobenius' method	Mathematical Physics by sathya prakash	Online – google Meet
10	Linear independence of solutions: Wronskian method – Problems, Eigen function Expansion of Green's function – Problem	Mathematical Physics by sathya prakash	Online – google Meet
11	Green's function for Poisson's equation and solution of Poisson's equation - Green's function for three dimensional Helmholtz equation	Mathematical Physics by sathya prakash	Online – google Meet
12	Green's function for Quantum mechanical scattering problem	Mathematical Physics by sathya prakash	Online – google Meet

Auxilium College (Autonomous), Gandhi Nagar, Vellore – 632 006.
Lesson Plan for the year 2020 – 2021 (Odd Semester)

Staff : Dr. S. REENA DEVI,

Class : I Year B.Sc. Mathematics & II Year B.Sc. Chemistry

Subject Title : ALLIED PHYSICS

Subject Code : UAPHA20

Week	Portions to be covered	Reference	Platform (LMS)
1	Elasticity, Stress, Strain, Hooke's law, Different moduli of Elasticity	Allied Physics and Properties of Matter by R. Murugesan	Online – google Meet
2	Poisson's ratio, Work done in a stretched wire, problems solved for Elasticity	Allied Physics and Properties of Matter by R. Murugesan	Online – google Meet
3	Bending of beams, Bending moment, Neutral axis, Cantilever, Expression for bending moment	Allied Physics by R. Murugesan	Online – google Meet
4	Depression at the loaded end of a cantilever, Determination of Young's modulus by non-uniform bending, I section girders, problems, Ultrasonics	Allied Physics and Properties of Matter by R. Murugesan	Online – google Meet
5	Piezo electric effect, Inverse piezo-electric effect, Production of ultrasonic waves by Piezo electric oscillator, Application of Ultrasonics,	Allied Physics and Properties of Matter by R. Murugesan	Online – google Meet
6	Scientific, industrial and medical applications, Reverberation, problems,	Allied Physics and Properties of Matter by R. Murugesan	Online – google Meet
7	Acoustics of Building, Reverberation time, coefficient- Sabine's formula, Absorption Factors affecting the buildings	Allied Physics and Properties of Matter by R. Murugesan	Online – google Meet
8	Scientific, industrial and medical applications, Reverberation, problems,	Allied Physics and Properties of Matter by R. Murugesan	Online – google Meet
9	Definition of polarization – Polarization by reflection(Brewster's law)–	Allied Physics and Properties of Matter by R. Murugesan	Online – google Meet
10	Double refraction - Optical activity – specific rotatory power	Allied Physics and Properties of Matter by R. Murugesan	Online – google Meet
11	Function of a half shade – Determination Specific rotatory power of sugar solution	Allied Physics and Properties of Matter by R. Murugesan	Online – google Meet
12	Laurent's half shade polarimeter– Uses of polarised light	Allied Physics and Properties of Matter by R. Murugesan	Online – google Meet

LESSON PLAN
PG DEPARTMENT OF PHYSICS
SHIFT –I
2020-2021 (EVEN Semester)

STAFF MEMBERS:

- 1. Dr. Nisha Santhakumari P.**
- 2. Sr. Venci X.**
- 3. Mrs. Mary Jamila R.**
- 4. Dr. Devi N. R.**
- 5. Dr. Sarjila R.**
- 6. Dr. Reena Devi S.**

Even Semester -
Allied Physics - II UAPH 19

II CHEMISTRY

WEEK

PORTION TO COMPLETE

- I Unit II:- Wave mechanics - Dual nature of matter - DeBroglie wavelength - problems
- II Definition of Phase velocity and group velocity - Relationship between them.
- III Experimental study of matter waves - Davisson and Germer's experiment.
- IV Heisenberg's uncertainty principle - Application - Determination of position of an e^- with γ -ray microscope
- V Application II - Diffraction of electron beam
- VI proof for non-existence of electrons inside the nucleus
- VII Fiber optics and Laser:- Fiber optic communication - Introduction - Optical fibre - Construction - Principle
- VIII Acceptance angle and condition for propagation through optical fibre
- IX Classification of optical fibres - Single mode and multimode fibres - Step index and graded index fibres
- X Step index single mode fibre - step index multimode fibre.
- XI Graded index multimode fibre
- XII Fiber optic communication system with block diagram.

Even semester -
Quantum Mechanics - I PCPHF20
I M.Sc. PHYSICS

WEEK	PORTION TO COMPLETE
<u>I</u>	Unit I: Basic Formalism:- Limitations of classical mechanics - Wave function for a free particle - Physical significance of wave function - Linear operator - Eigen functions and eigen values - Hermitian operator - Theorem on Hermitian operator - Derivation of operators for momentum and total energy - Postulates of quantum mechanics
<u>II</u>	Time dependent and time independent Schroedinger equations - Derivation of expectation value of a normalized wave function - Ehrenfest's theorem - Defn. of orthonormality - Schroedinger eqn in spherical polar co-ordinates - Operator and eigen values of orbital angular momentum.
<u>III</u>	Unit II: Applications:- Linear harmonic oscillator - zero point energy - Ladder operator - Particle in a spherically symmetric potential - System of two interacting particles - Rigid rotator in three dimensions
<u>IV</u>	problem of hydrogen atom - Particle in a spherical well - Three dimensional square well potential - The Deuteron Unit III:- General formalism:- Dirac's notation and Hilbert space - Types of eqns of motion -

WEEK

PORTION TO COMPLETE

V

Schroedinger representation - Heisenberg and interaction representations - Defn. of momentum representation - Probability density and operator for position in momentum representation.

Operator for momentum and eqn. of motion in momentum repr. - Defn. of unitary transformation - Symmetry transformation - Translation in space -

VI

Conservation of linear momentum - Translation in time - Conservation of energy - Rotation in space - conservation of angular momentum - Space inversion - Parity conservation.

Unit IV: Angular momentum :- Orbital angular momentum operators - Total angular momentum J -

VII

Derivation of orbital angular momentum commutation relations - Eigen values of J^2 and J_z - Matrix repr. of J^2 and J_z *

Matrices for J_+ , J_- , J_x and J_y - Construction of total angular momentum matrices for different values of j - Spin angular momentum - Pauli's

VIII

spin matrices - Spin vectors for spin half systems - Symmetric and anti-symmetric wave fns.

IX

Addition of two angular momenta - Clebsch-Gordan coeffs - Selection rules - procedure for computation of CG coeffs - Computation of CG coeffs for different values of j_1 and j_2 .

WEEK

PORTION TO COMPLETE

X

Unit V :- Approximation methods :- Time independent perturbation theory - Derivation of first order, second order perturbation eqns - Defn. of degeneracy - Non-degenerate energy levels - First order correction to energy and wave fn. - Second order correction to energy and wave fn.

XI

Applications - Ground state of anharmonic oscillator - Effect of electric field on the ground state of hydrogen (Stark effect) - Degenerate energy levels - First order correction - Variational method - principle - Application to ground state of Helium atom.

XII

WKB approximation - General solution - Validity of WKB approximation - Classical turning point - Connection formula - Bound states in a potential well (WKB quantization rule) - Application to simple harmonic oscillator.

YEAR : I

PAPER : Mathematical Physics - II [PCPHD20]

UNIT II : Tensors

Introduction - Transition of co-ordinates - Einstein's summation convention - Contravariant, Co-Variant and mixed tensors - Rank of a Tensor - Tensors of higher ranks - Kronecker delta symbol - Invariant tensors - Algebraic operations of tensors - Outer product, Contraction, Inner product & Quotient Law - Symmetric & anti-symmetric tensors - Levi-civita symbol - Basic idea of Christoffel's 3-index symbols - Covariant derivative of a tensor - Reciprocal tensors - Relative & absolute tensors.

UNIT III : Integral Transforms

Laplace transforms & inverse Laplace transforms - solution of linear differential equations with constant co-efficients - evaluation of integrals - Fourier transforms - Fourier sine and cosine transforms - convolution theorem - simple applications.

UNIT IV : Group Theory

Character table - Construction of character table for C_{3v} and C_{4v} group - Continuous and Lie groups - Symmetry group of Schrodinger equation - Two dimensional Rotation group $R^+(2)$ - Three dimensional Rotation group $R^+(3)$.

Mathematical Physics - II.

WEEK

PORTIONS TO BE COVERED

1. UNIT I : Introduction - Transition of co-ordinates
Einstein's Summation convention.

2. Contravariant, co-variant and mixed tensors -
Rank of a Tensor - Tensor of higher ranks.

3. Kronecker delta symbol - Invariant tensors -
Algebraic operations of tensors - Outer product.

4. Contraction - Inner product & Quotient
Law - Symmetric & anti-symmetric
Tensor.

WEEK	PORTIONS TO BE COVERED
5.	Levi-civita symbol - Basic idea of Christoffel's symbol - Covariant derivative of a tensor
6.	Reciprocal tensors - Relative & Absolute tensors.
7.	UNIT III : Laplace transforms - properties - problems.
8.	Inverse Laplace transform - properties problems.
9.	Solution of Linear differential equations with constant coefficients - Evaluation of Integrals.
10.	Fourier Transforms - Fourier sine & cosine transforms - convolution theorem - simple applications.
11.	UNIT V : Character table - construction of character table for C_{3v} and C_{4v} group.
12.	Continuous and Lie groups - symmetry group of Schrodinger equation - Two dimensional Rotation group $R^+(2)$ - Three dimensional Rotation group $R^+(3)$.

YEAR : II

SEMESTER : IV

PAPER : Nuclear Physics & Particle Physics [PCPHV2]

UNIT I : Nuclear Interactions

Nuclear forces - Two body problem - Ground state of deuteron - Magnetic moment - Quadrupole moment - Tensor forces - Meson theory of nuclear forces - Yukawa potential - Nucleon - Nucleon scattering - Low energy n-p scattering - Effective range theory - Spin dependence, charge independence and charge symmetry of nuclear forces - Isospin formalism.

UNIT II : Nuclear Reactions

Breit-Wigner one level formula - Resonance scattering - Continuum theory - Optical model.

UNIT III : Nuclear Models

Liquid drop model - Semi empirical mass formula of Weizsacker - Nuclear stability - Mass parabolas - Bohr-Wheeler theory of fission - Shell model - Spin-orbit coupling - Magic numbers - Angular momenta and parities of nuclear ground states - Collective model of Bohr and Mottelson - Nilsson Model - Oblate & Prolate deformations of Nucleus.

UNIT IV : Nuclear Decay.

Beta decay - Fermi theory of beta decay - Fermi-Curie Plot - Fermi & Gamow - Tellar selection rules - Allowed & Forbidden decays - Decay rates - Theory of neutrino - Helicity of neutrino - Theory

of electron capture - Non conservation of parity -
Gamma decay - Multipole transitions in nuclei -
Internal conversion - Nuclear Isomerism.

LESSON PLAN

WEEK	PORTIONS TO BE COVERED
1.	UNIT I : Nuclear forces - Two body problem - - Ground state of deuteron - Magnetic moment
2.	Quadrupole moment - Tensor forces - Nucleon- Nucleon scattering - Low energy n-p scatter- ing - spin dependence
3.	Effective range theory - Charge indepen- -dence & charge symmetry of nuclear forces.
4.	Isospin formalism - Meson theory of nuclear forces - Yukawa potential
5.	UNIT II : Breit-Wigner one level formula - Resonance scattering
6.	Continuum theory - Optical model -
7.	UNIT III : Nuclear Models - Introduction - Liquid drop model - Semi-empirical mass formula of Weizsacker.
8.	Nuclear stability - Mass parabolas - Bohr - Wheeler theory of fission.
9.	Shell model - Spin-orbit coupling - Magic numbers - Angular momenta & parities of nuclear ground states.

WEEK	PORTIONS TO BE COVERED
10.	Collective model of Bohr and Mottelsson - Nilsson model - Oblate & Prolate deformations of Nucleus.
11.	UNIT IV : Beta decay - Fermi theory of beta decay - Fermi - Curie plot - Fermi & Gamow - Teller selection rules. Allowed & Forbidden decays
12.	Theory of neutrino - Helicity of neutrino - Theory of electron capture - Non conservation of parity - Gamow decay - Multipole transitions - Internal conversion - Nuclear Isomerism.

LESSON PLAN

Week I

Unit: I COMPLEX VARIABLES:

Analytic functions - Cauchy-Reimann conditions - Single and Multivalued functions - Cauchy's integral theorem and formula - Taylor's theorem II and Laurent's theorem - Poles and Residues - Cauchy's residue theorem - Application to evaluation of definite integrals of round unit circle and an infinite semi circle.

Unit: IV PROBABILITY THEORY

Probability densities, and Probability distributions - Binomial, Poisson's and Normal distributions - Moments and Generating functions - Discrete distribution - Casual and Uniform distribution - Cauchy continuous distribution.

Unit: V GROUP THEORY

Definitions of group, subgroups and conjugate classes - Invariant subgroup - Homomorphism and isomorphism between groups - Point groups - Representation of a group - Reducible and irreducible representations

Books for Study:

1. Mathematical Physics by Satyaprakash
2. Mathematical Physics by B.D. Gupta
3. Mathematical Physics by H.L. Phass.

LESSON PLAN

WEEK - PORTIONS TO BE COVERED.

I Week Analytic functions, Cauchy Riemann conditions, Problems, Single valued functions.

II Week Multivalued functions, Problems, Cauchy's integral theorem and formula

III Week Taylor's theorem and Laurent's theorem, Poles and Residues

IV Week Cauchy's residue theorem, Solved Problems, Application to evaluation of definite integrals of round unit circle

V Week Application to evaluation of definite of an infinite semi circle, Probability densities.

VI Weeks Probability distributions, Binomial, Poisson's and Normal distribution Solved problems.

VII Week Moments and generating functions discrete distributions, Problems.

VIII Week Casual and uniform distribution Solved Examples Problems.

IX Week Cauchy continuous distribution

LESSON PLAN

WEEK	PORTIONS TO BE COVERED
<u>I</u> WEEK	Definition of groups, subgroups and conjugate classes, Invariant subgroups.
<u>XI</u> WEEK	Homomorphism and isomorphism between groups, problems.
<u>XII</u> WEEK	Point groups, Representation of a group, Reducible and irreducible representations.

PCPH20 - ELECTROMAGNETIC THEORY

Unit - I : ELECTROSTATICS

Electrostatic potential, - Poisson's equation and Laplace's equation from Gauss's law - Solution of Laplace's equation in spherical co-ordinates - solution to Laplace's equation in cylindrical co-ordinates - solution to Laplace's equation in Cartesian co-ordinates - polar molecules - Clausius-Mossotti relation - Polarization vector - Electric field at external and internal points due to Polarization - Displacement vector - Conducting sphere in a uniform field - Dielectric sphere in a uniform field.

Unit - II : MAXWELL'S EQUATION

Faraday's Laws of Electromagnetic induction. Faraday's law in vector form - Maxwell's displacement vector - Maxwell's equations - Derivations - Electromagnetic potentials A and ϕ (vector and scalar potentials) Maxwell's equation in terms of Electromagnetic Potentials - non uniqueness of Electromagnetic potentials

Gauge invariance - Lorentz gauge and Coulomb gauge
Conservation laws for a system of charges and
electromagnetic fields - Equation of continuity -
(charge) - Momentum in EM fields - Energy in EM
fields (Poynting theorem) - Wave equation in general
Plane wave solution of for free space.

Unit - V WAVE PROPAGATION

Propagation of EM waves in isotropic and
anisotropic dielectrics - Propagation in conducting
Media - Calculation of phase velocity - Refractive
index - Skin depth - linear and circular
Polarization - Reflection and Refraction of a Plane
interface - Propagation of waves in a rectangular
Wave Guide - TE waves - TM waves - cavity
resonator - TE mode - TM mode - Faraday and
Kerr effects.

Books for Study:

1. Electromagnetic theory by Chopra, Agarwal
2. Electromagnetic theory by Satya Prakash
3. Electromagnetic theory by Gupta Kumar Singh.

Lesson Plan

Week	Portions to be covered.
<u>I</u>	Electrostatic potential, Poisson's equation and Laplace's equation from Gauss's law, solution of Laplace's equation in Cartesian coordinate
<u>II</u>	solution to Laplace's equation spherical and cylindrical coordinates, Polar molecules Langevin's equation.
<u>III</u>	Non-polar molecules, Clausius-Mossotti relation Polarization vector, Electric field at external and internal points due to polarization.
<u>IV</u>	Displacement vector, conducting sphere in a uniform field, Dielectric sphere in a uniform field. Faraday's laws of EM induction
<u>V</u>	Faraday's laws in vector form, Maxwell's displacement current, Maxwell's equations, Derivation.
<u>VI</u>	EM potentials A and ϕ (vector and scalar potentials), Maxwell's equation in terms of EM potentials, Non uniqueness of EM potentials, Gauge invariance.
<u>VII</u>	Lorentz Gauge and Coulomb Gauge, Conservation laws for a system of charges & EM fields.
<u>VIII</u>	Equation of continuity (charge), Momentum in EM wave, Energy in EM fields (Poynting theorem), wave equation in general Plane wave solution for free space.
<u>IX</u>	Propagation of EM wave in isotropic and anisotropic dielectrics, Propagation in conducting media.

Weeks	Portions to be covered.
<u>X</u>	calculation of phase velocity, Refractive index - skin depth, linear and circular Polarization
<u>XI</u>	Reflection and Refraction of Plane waves, Propagation of waves in a rectangular wave Guide.
<u>XII</u>	TE waves, TM waves, Cavity resonator, TE ₁₀ mode, TM mode, Faraday and Kerr effects.

II M. Sc., PHYSICS.

PCPHN20 - CONDENSED MATTER PHYSICS

UNIT - II: LATTICE DYNAMICS

Monatomic lattices - lattices with two atoms per primitive cell - First Brillouin zone - Group and Phase velocities - Quantization of lattice vibrations - Phonon model
 In elastic scattering by phonons - Debye's theory of lattice heat capacity - Einstein model and Debye's model of specific heat - Thermal Expansion - Thermal Conductivity - Umklapp Processes.

UNIT - III: THEORY OF METALS AND SEMICONDUCTORS

Free electron gas in three dimensions - Electronic heat capacity - Wiedemann Franz law - Hall effect - Bloch theorem - Kronig Penney model - Band theory of metals and semiconductors - semiconductors - Density of states - Intrinsic and extrinsic carrier concentration - Mobility - Impurity conductivity - Fermi surfaces - construction - De Haas Van Alphen Effect.

Books for study:

1. Solid state physics by S.O. Pillai
2. solid state physics by Gupta Kumar
3. Solid state physics by C.L. Arora.

Lesson Plan

Week	Portions to be covered
I	Monatomic lattices, lattices with two atoms per primitive cell, First Brillouin zone
II	Group and phase velocities, Quantization of lattice vibrations - phonon, momentum
III	Inelastic scattering by phonons, Debye's theory of lattice heat capacity
IV	Einstein model and Debye's model of specific heat
V	Thermal Expansion, Thermal conductivity
VI	Umklapp process, Free electron gas in three dimension
VII	Electronic heat capacity, Wiedemann Franz law
VIII	Hall effect, Bloch theorem
IX	Kronig penny model, Band theory of metals and semiconductors, semiconductors
X	Density of states, intrinsic and extrinsic carrier concentration
XI	Mobility, Impurity conductivity, Fermi surfaces
XII	Fermi surface construction, Dr. Hall Van Alphen Effect.

Unit - II WAVE MECHANICS

Wave mechanics - Dual nature of matter - De Broglie wavelength - problems - Definition of phase and group velocity - relationship between them. Experimental Study of matter waves - Davisson and Germer's Experiment - Heisenberg's uncertainty principle. Applications - Determination of position of an electron with γ -ray microscope - vibration of electron beam inside the nucleus - wave function - properties of wave function - Basic postulates of wave mechanics. Derivation of time dependent Schrodinger's equation - Time independent Schrodinger's Equation.

Unit - V ELECTRONICS

Rectifiers - Half and full wave rectifiers - Full wave Bridge Rectifier - construction and working - mathematics. Analysis - Filters - types of filter circuits - Capacitor filter - choke input filter - π section filter - Zener diode - characteristics of zener diode - zener diode as voltage regulator - opto Electronic devices - Photo diode - Principle - characteristic of photo diode - Applications - Alarm circuit - counter circuit - light emitting diode LED - principle - characteristic of LED. Applications - Power Indicator - seven segment display. Solar cell - construction - working, characteristics.

Books for study:

1. Modern Physics by R. Nurugesan
2. Principle of Electronics by V.K. Mehta
3. Modern Physics by Arulthan.

Lesson Plan

Week	Portions to be covered.
I	Wave mechanics, Dual nature of matter, De Broglie wavelength, Problems.
II	Definition of phase and group velocities, Relationship between them.
III	Experimental study of matter waves, Davison and Germer's Experiment, Heisenberg's Uncertainty principle
IV	Applications, Determination of position of an electron, with γ -ray microscope, Diffraction of electron beam through a slit
V	Proof for non existence of electrons inside the nucleus, wave function, properties of wave functions.
VI	Basic postulates of wave mechanics, derivation of time dependent and time independent Schrodinger wave equation.
VII	Rectifiers, Half wave and full wave rectifiers, Bridge rectifier, construction and working
VIII	Mathematical Analysis, Filters, types of filter circuits, Capacitor filter.
IX	Choke input and π -section filter, Zener diode characteristics, voltage regulator
X	Opto Electronic devices, Photo diode, principle characteristics of photo diode, Applications, Alarm circuit
XI	Counter circuit, LED characteristics, Applications
XII	Power indicator, 7-segment display, Solar cell construction, working, characteristics, Uses.

Work Plan

class	Topics covered	References
<p>II M.Sc Condensed Matter</p>	<p>04-01-2021 - 08-01-2021 Free electron gas in three dimension, Electronic heat capacity</p> <p>11-01-2021 - 16.01.2021 Wiedemann Franz law, Hall effect</p> <p>18-01.2021 - 22.01.2021. Hall angle, Hall coefficient, Applications.</p> <p>25-01-2021 - 29-01.2021. Bloch theorem, Kronig Penny model, Band theory of metals and semi-conductors.</p> <p>Analytic functions Introduction.</p>	<p>I</p> <p>II</p> <p>III</p> <p>Solid state Physics by S.O. Pillai & C.L. Anra.</p> <p>IV</p> <p>V</p> <p>Mathematical Physics by Satya Prakash.</p>
<p>PV 1/2/2021/M.Sc M.P.V</p> <p>II M.Sc Chem. Math. Phys.</p> <p>I M.Sc M.P. II</p> <p>I M.Sc EMT</p>	<p>01-02-21 - 05-02-21. Semi-conductors, Problems, Density of states.</p> <p>Cauchy Riemann conditions, Problems, single valued functions.</p> <p>Electrostatic Potential, Poisson's equation, Laplace's equation Gauss's law</p>	<p>Solid state Physics by S.O Pillai</p> <p>VI Mathematical Physics by Satya Prakash</p> <p>VII EMT by Satya Prakash</p>

Class	Topics covered	References
I M.Sc EMT	Laplace equations in spherical, cylindrical & cartesian coordinates.	EMT by Satya Prakash
I B.Sc Applied physics	Wave mechanics, Dual nature of matter, De Broglie wavelength, problems.	Applied physics by R. Mungesan.

08/2/2021

II M.Sc.	08-02-21 - 12-02-21. Derivation of Bloch theorem, Explanation of Kronig-Penny model.	Solid state physics by S.O. Pillai and C.L. Arora.
I M.Sc M.P-II	Cauchy's Integral theorem problems, Taylor's theorem	Mathematical physics by H.K. Dhas.
I M.Sc EMT	Laplace equations in cylindrical coordinates, problems.	Electromagnetic theory by Satya Prakash
I B.Sc (A.P) Maths	Wave mechanics, Dual nature of matter, De Broglie wavelength, problems, Phase velocity and group velocity	Modern Physics by Mungesan R.

PN
12/2/2021

Work Plan

class	Topics covered	References
<p><u>II</u> M.Sc., Condensed Matter</p>	<p>15-02-21 to 20-02-21</p> <p>Density of states, semiconductors.</p>	<p>Solid State Physics by C.L. Arora</p>
<p><u>I</u> M.Sc., Physics EMT.</p>	<p>Polar molecules & Non-polar molecules, Lorentz equation, Clausius Mossotti relation, Displacement vector</p>	<p>EMT by Chopra & Sethya Prakash</p>
<p><u>I</u> M.Sc. II M.P. = <u>II</u></p>	<p>Cauchy's Integral theorem problem, sequences, infinite series.</p>	<p>Mathematical Physics by H.K. Dhar.</p>
<p><u>I</u> B.Sc (Advanced Phys)</p>	<p>Davison and Croemer's Experiment, Heisenberg's Uncertainty principle.</p>	<p>Modern Physics by R. Murugesan</p>
22-02-21 to 29-02-21		
<p><u>II</u> M.Sc, Condensed Matter.</p>	<p>Intrinsic Semiconductor, concentration of electrons in an n-type semiconductor</p>	<p>Solid state Physics by C.L. Arora</p>
<p><u>I</u> M.Sc. Physics EMT</p>	<p>Polarization vector, Displacement- current.</p>	<p>EMT by Chopra.</p>
<p><u>I</u> M.Sc M.P. - <u>II</u></p>	<p>Taylor's Theorem & Problems.</p>	<p>Mathematical Physics by Sethya Prakash</p>
<p><u>I</u> B.Sc Advanced physics <u>II</u></p>	<p>Heisenberg's Uncertainty principle Applications.</p>	<p>Modern Physics by R. Murugesan</p>

class	TOPICS COVERED	References.	methodology
	01-03-2021 to 6-3-2021. I CA Exam Begins.		
II M.Sc.,	08-03-2021 to 12-3-2021 Practical classes. (General & microprocessor).		M.Sc., Physic lab.
I B.Sc., Allyed Physic-II	2-ray microscope, Diffraction of electron beam through a slit, Basic postulates of wave mechanics.	Modern Physics by R. Mungesan	Black Board.
II M.Sc Condensed Matter Physic.	15-03-2021 to 19-3-2021. Extrinsic semiconductor, density of electrons and density of holes in an n-type and P-type semiconductor, Fermi level of Extrinsic semiconductor.	Solid state Physics by Upton Kumar.	PPT and Black Board.
I M.Sc., EMT.	Polarization of Polar molecules Langevin's equation, Debye's relation.	EMT by Chopra and Sathya Prakash	PPT and Black Board.
I M.Sc Mathematical Physic.	Partial functions, Taylor's theorem Problems.	Mathematical Physics by Sathya Prakash and H.K. Dhas.	PPT and Black Board and Chalk method.

Class	Topics Covered	References
<p>II M.Sc Physics</p> <p>I M.Sc. Physics</p> <p>I B.Sc Maths</p>	<p>22.03.2021 to 31.03.2021</p> <p>Model Practicals and semester practicals for PG Students.</p> <p>Semester Practicals for Allied physics.</p>	
<p>II M.Sc Physics</p> <p>I M.Sc, Physics Emt.</p>	<p>07-04-2021 to 10-4-2021.</p> <p>Mobility, conductivity, De-Haas-van Alphen effect, Monoatomic lattices One-dimensional and two dimensional, Group velocity, phase velocity, Brillouin Zone.</p> <p>Electric field inside and outside Polarized sphere, Faraday's laws of EM induction, Maxwell's equation, Gauge invariance, Lorentz gauge, Coulomb gauge, Non uniqueness of EM potential.</p>	<p>Solid State Physics by C.L. Arora and Gupta Kumar.</p> <p>Electromagnetic theory by Jitendra Prakash & Chopra</p>
<p>Mathematical Physics II</p>	<p>Laurant's theorem and problems, Residue theorem and problems, methods of finding residues, Applications of Residue theorem.</p>	<p>Mathematical Physics by H.K. Dhas.</p>

class	Topics to be covered	References.
II M.Sc., (MP)	12-04-2021 to 17-04-2021 Quantization of lattice vibration, Phonon momentum, Inelastic Scattering of phonon, Debye's theory of lattice heat and Einstein's theory of lattice heat capacity	Solid State Physics by C.L. Arora, Gupta Kumar.
I M.Sc., EMT	Conservation laws for a system of charges and EM fields, Equation of continuity, Poynting theorem, Poynting vector, momentum and Energy in an EM fields.	EMT by Satyaprakash, Chopra.
I M.Sc MP-II	Definition of groups, subgroups, conjugate classes, Invariant Sub group, Homomorphism and Isomorphism.	Mathematical Physics by H.K. Dhall.
I B.Sc A-P-II Pw 19/4/2021	Time dependent and Independent Schrodinger wave equation, Properties of wave function, Fibre Optics, construction, Light Propagation in fibres, fibre optic communication system, Acceptance angle, Numerical Aperture Problems.	Optics and Spectroscopy by Bijal Subramanian Engineering physics by Vijayakumar.

class	Topics Covered	References
	19-04-2021 to 20-04-2021	Li.
I MISC EMT	Propagation of EM waves, conducting media, phase velocity, refractive index, skin depth, linear and circular polarisation.	EMT by Chopra.
I MISC M.P II	Point group, representation of point group, reducible and irreducible representation.	M.P by Satyapratim
II MISC CMP	Thermal Expansion, thermal conductivity.	Solid State Physics by S.L. Arora.
I BSC AP-II	Types of fibres, step-index and graded index fibre, multimode fibre.	Engineering Physics by vijaykumari
	26-04-2021 to 30-04-2021.	
I MISC EMT	TE mode, TM mode, Faraday effect, Kerr Effect.	EMT by Chopra.
MP-III	Revision for III Unit.	
II MISC CMP.	Revision for II Unit.	
I BSC AP-II	Revision for fibre optics.	

class	TOPICS covered	References
I M.Sc, EMT	03-05-2021 - 05-05-2021. Syllabus completed.	
Mathematical Physics	Syllabus completed.	
II M.Sc Condensed matter physics	Syllabus completed	
I B.Sc Maths	Syllabus completed.	$\frac{10}{100} = \frac{1}{10}$

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Even Semester

ii M.Sc PHYSICS 2021-2022

Elective - Paper IVA-PEPH019

A Fiber optics and Non linear optics

LESSON PLAN

Unit-I: optical fiber waveguides and Sources.

Ray theory Transmission - Total Internal Reflection, acceptance angle - Numerical aperture, Skew rays - evanescent field and Goos-Hachen shift - Sources - LED - Structure - Principle - modulation bandwidth - transient response - Laser - Laser diode Structure - threshold conditions - Modulation of laser diode - Mode locking laser - Source Linearity and Reliability.

Unit II: Types of optical fibers.

Glass and plastic fibers - Step-Graded index fibers - Electro magnetic wave propagation - Fiber modes - Single and Multimode fibers - Step index Single mode and multimode fibers - GRIN multimode fiber - fiber bandwidth - fiber loss - Attenuation coefficient - Material absorption.

Unit III: Fabrication and connection of optical
Glass fibers - preparation of optical fibers
fibers - melting technique and vapour phase
deposition techniques - characteristics of
single mode, multimode, plastic clad and
all plastic fibers.

Unit IV: Characteristics Transmission

Fiber transmission characteristics - micro
bending and hydrogen adsorption - fiber
alignment and joint loss - fiber splices -
fiber connectors - cylindrical ferrule -
expanded beam connectors - fiber couplers
three and four port couplers - Star couplers

Unit V: Nonlinear optics and Solitons.

Refractive index - frequency dependent
and Intensity dependent Refractive index -
wave propagation in an anisotropic crystal
polarization response of materials to light
Second harmonic generation - phase matching
concepts of solitons - formation of solitons -
equation - Non-linear Schrodinger equation
for solitons - Soliton switching - Soliton loss
advantage of soliton based communication

Books for Study.

- 1) Optical fiber communication Principles and Practice: John M. Senior - 2nd edition
- 2) Laser fundamentals - William Silfvast.

Lesson Plan

Week	Portions to be covered.
I st week	Ray theory transmission - total Internal Reflection - acceptance angle - Numerical aperture.
II nd week	Skew rays - evanescent field - Goos-Hachen shift - LED - Laser Structure - principle - Mode locking laser.
III rd week	Modulation bandwidth - transient response - Laser diode structure - Threshold conditions for laser oscillation
IV th week	Modulation of laser diode - Source linearity and reliability
V th week	Glass and plastic fibers - Step - Graded index fibers - Single and multimode fibers - wave propagation - Step index single mode and multi mode fibers.
VI th week	GRINI multimode fibers - Fiber bandwidth - fiber loss - Attenuation coefficient - Material absorption glass fibers - preparation of optical

Week

Portion to be covered

Virth week

Liquid phase (melting) - Vapour phase deposition techniques - Characterisation of single mode multimode all plastic fibre Vapour axial deposition, chemical vapour deposition

Virth week

Fiber transmission characteristics Micro bending and hydrogen absorption - fiber alignment and joint loss - fiber splices - fiber connectors - cylindrical ferrule connectors.

Virth week

Expanded beam connectors - fiber couplers - three and four port couplers - Star couplers - Single mode joint losses - Multimode joint losses -

Virth week

Refractive index - frequency dependent and Intensity dependent Refractive index - wave propagation in anisotropic crystal.

Week

Portion to be covered.

XIth week.

Second harmonic generation
Polarization response of
materials to light - phase
mixing - concept of solitons -
KdV equation.

XIIth week

Non linear Schrödinger
solution of equation - Soliton
switching - Soliton laser -
advantages of soliton based
communications.

I M.Sc physics

PEPHB20- Electromagnetic Theory.

Unit - II - Magnetostatics

Magnetic field of steady current - Ampere's law - Lorentz force - Force on current carrying conductor and charges - force between parallel wires - Force on a point moving in a magnetic field - Magnetic scalar potential - Circular coil - Magnetic vector potential - Application to a long current carrying wire - Line Integral of vector potential over a closed curve - Lorentz condition - magnetic shielding - Energy in magnetic field.

Unit - IV - Applications of Maxwell's equations.

Field and radiation of localized sources - oscillating electric dipole - Radiation from an oscillating electric dipole - Poynting Vector and radiated power - Radiation resistance - radiation from a linear half wave antenna and full wave antenna - Antenna rays - Radio pressure - Electro magnetic oscillators.

References:

- 1) Chopra Agarwal - Electromagnetic theory.
- 2) Sathyaprakash - Electrodynamics.

Lesson plan

Week	Portions to be covered.
<u>I</u> st Week	Introduction between electrostatics and Magnetostatics Ampere's law.
<u>II</u> nd week	Ampere's law derivation - Lorentz force - Magnetic field Steady current.
<u>III</u> rd week	Biot Savart law - Force on current carrying conductor and charges - force between parallel wires - Force on a point moving in a magnetic field.
<u>IV</u> th week	Magnetic Vector potential - Lorentz Application ^{condition} to a long current carrying wire - Application to a long current carrying wire.
<u>V</u> th week	Magnetic Scalar potential - circular coil.
<u>VI</u> th week	Magnetic shielding - Energy in magnetic field.

Week	Portions to be Covered
V th week	Field and radiation of localized sources -
VI th week	Oscillating electric dipole.
XI th week	Radiation from an oscillating electric dipole - Poynting Vector
X th week	Radiated power - radiation resistance -
XI th week	Radiation from a linear antenna - half wave - full wave
XII th week	Radiation pressure - Electro magnetic oscillators - Antenna arrays - Broad side array, end fire array.

I M.Sc physics

PEPHC 20 Elective II A: Crystal growth

NanoScience and Research Methodology

~~Unit - I: Basics of Nano technology.~~

Unit II: Growth and characterization techniques

chemical reaction method - Single and double diffusion method - Advantages of gel method - Melt technique - Bridgeman technique - Basic process - Vertical Bridgeman technique - Crystal pulling technique - Czochralski technique - Experimental arrangement - Growth process X-ray Diffraction (XRD) - Powder and single crystal - Fourier transform Infrared analysis (FT-IR) - FT-Raman elemental analysis - Elemental dispersive X-ray analysis (EDAX) - Scanning Electron microscopy (SEM) - Tunneling Transmission electron microscopy (TEM) - UV-Vis-NIR Spectrometer - Etching (chemical) - Vickers Micro hardness - TGA - TDA - PL Studies

Unit IV: Fabrication Techniques and properties of Nano structure.

Vacuum techniques - Thermal evaporation - Physical vapour deposition - Ionized cluster beam deposition - Laser Vapourization (ablation) - laser pyrolysis - sputter deposition -

DC sputtering - RF sputtering - Magnetron
Sputtering - ECR plasma deposition -
Chemical vapour deposition - Electrolytic
deposition - Ion beam techniques - molecular
beam epitaxy - Nanolithography techniques -
Lithography using photons (UV-vis lasers and
X-rays)
Lithography using particle beam -
Electron and Ion beam lithography - Quantum
dots and quantum wires - size dependent
variation in magnetic properties - thermal
and electronic transport properties.

Unit - V: Research Methodology.

Logical format for writing thesis and
Paper - essential of scientific report; abstract
introduction, review of literature, materials
and methods and discussion - The use of
quotation, footnotes, tables and figures -
Referencing - Appendixes - Revising the
Paper or thesis - Oral power point
Presentation - Poster presentation - Editing
and evaluating the final product -
Proof reading - the final types of copy.

Lesson

Week

Portions to be covered.

Ist week

Chemical Reaction method
Single and double diffusion
method.

IInd week

Advantages of gel method.
Melt technique - Bridgman
technique - Basic process -
Vertical Bridgman technique

IIIrd week

Crystal pulling technique -
Czochralski technique -
Experimental arrangement
Growth process

IVth week

X-ray diffraction - powder
and single crystal - FTIR

Vth week

FT-Raman elemental
analysis - EPR - SEM

VIth week

TEM, UV-VIS-NIR, Etching,
Vickers microhardness -
TGA - DTA - PL studies.

Lesson plan

Week

Portions to be covered.

Viith week

Vacuum techniques - Thermal evaporation - physical vapour deposition - Ionized cluster beam deposition

Viiith week

Laser ablation. Laser pyrolysis - Sputter deposition - DC sputtering - RF sputtering - Magnetron sputtering

ixth week

ECR Plasma deposition, CVD, Electric arc deposition, Ion beam techniques, molecular beam epitaxy, Nanolithography techniques, Lithography using photons.

xth week

Lithography using particle beam, electron and Ion, Quantum dots and wires magnetic, thermal and electric properties.

xith week

Logical formats for writing thesis and paper - essential of scientific report, abstract Introduction, review of literature, materials and methods and discussion

Week	Portions to be covered
<p>XIIth week</p>	<p>The use of quotation, footnotes, tables and figures</p> <p>Referencing, Appendixes.</p> <p>Revisiting the paper or thesis - Oral power point Presentation - Poster Presentation - Editing and evaluating the final product - proof reading - the final types of copy.</p>

II M.Sc., Physics
PCPHM20 - Nuclear and Particle Physics

Unit II: Nuclear Reactions.

Types of reactions and conservation laws
Energetic of nuclear reaction - Dynamics of
Nuclear reaction - Q value equation - Scattering
and reaction cross section - compound nucleus
theorem, Scattering matrix - Reciprocity theorem

Lesson plan

Week

Portions to be covered

I week

Induction about Nuclear
physics & Nuclear
reactions - Types of
Nuclear reactions &
conservation laws

IInd week

Energetic of Nuclear
reaction - Dynamics
of Nuclear reaction

IIIrd week

Q-value equation -
Threshold energy

IVth week

Scattering reaction cross
section

Vth week

Compound nucleus,
Reciprocity theorem, Scattering
matrix

I M.Sc Physics

Human Rights

Unit - I Introduction to Human Rights

Human Rights - Meaning and definition -
Origin and Development - Elements of Human
rights - kinds of Human rights

Unit III: Universal Declaration and International Covenants on Human Rights

Origin of Universal Declaration - Provisions -
General - civil and political - Rights - Economic
Social and cultural rights - effects and
Influence of Universal Declaration -

Distinction between the Indian Constitution
and Universal Declaration - International
Covenants on Political Rights - Economic, Social
and cultural

Unit V: Human Rights and Vulnerable groups

Anti Human Trafficking and protection of
Vulnerable groups - policies and acts, National
Policy for children 2013, Juvenile Justice Act
2000, Prevention of Sexual Offences against
Children act 2012, Criminal Procedure &
Amendment act 2013, National Policy for
Empowerment of women 2001.

Lesson plan

week	Portions to be covered
1 st week	Human Rights - meaning and definition - Origin and development
2 nd week	Elements of Human rights and kinds of Human rights
3 rd week	Origin of Universal Declaration - Provisions
4 th week	General civil rights
5 th week	Political rights
6 th week	Economic social & cultural rights - effects of Influence Universal declaration
7 th week	Distinction between the Indian constitution & universal declaration.
8 th week	International covenants on Political rights.
9 th week	Anti-Human Trafficking & Protecting of vulnerable groups

Lesson plan

Week

Portions to be covered

Xth week

Polices and acts, National Policy for children, 2013, Juvenile Justice Act 2000

Xth week

Prevention on sexual offences against children Act 2012 Criminal procedure

Xth week

Amendment act 2013, National Policy for empowerment of women 2001.

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S/1/2021

M. Sc Physics - I YEAR

II - SEMESTER

PEPHC 20 - Crystal Growth, Nano Science & Research
Methodology.

Unit - I Nucleation and growth.

Nucleation - Different kinds of nucleation -
Modified Thomson's equation for melt - Gibbs
Thomson equation for solution - Concept of
formation of critical nucleus - Spherical and cylindrical
nucleus - Crystal growth techniques - Solution growth
Technique: Low temperature solution growth: Solubility
and super solubility - Expression for
Super Saturation - Miers T-c diagram - Gel growth
Technique: Principle - Various types - Structure of
gel - Importance of gel - Experimental Procedure.

Unit - III Basics of Nano Technology

History of Nano technology - Concept of Nano
technology and Nano machines - Atomic structure
molecules and phases - Molecular and atomic sizes -
Surfaces and dimensional space - Top down and
bottom up approach in synthesis - Nano scale formation
Strong intermolecular forces - Covalent and Coulomb
interactions - Weak inter molecular forces - Vander
Waal forces - Repulsive forces - Hydrogen bonding
Hydrophobic and hydrophilic interactions.

Unit V : Research Methodology.

Meaning of research - Objectives of research -
 Motivation of research - Types, approaches and
 significance - Methods versus Methodology - Identification
 of the problem - Literature survey - Reference collection -
 Necessity and techniques involved in defining the
 problem - Research design - Needs and features of good
 design - Different research design - Basic principles of
 experimental designs - Meaning of research report -

LESSON PLAN.

PEPHE 20 - Crystal growth, Nano Science & Research Methodology.

WEEK	PORTIONS TO BE COVERED.
I	Nucleation - Different kinds of nucleation - Theories of nucleation - Classical theory of nucleation.
II	Gibbs Thomson equation for vapour - Modified Thomson's equation for melt - Gibbs Thomson equation for solution.
III	Concept of formation of critical nucleus - spherical and cylindrical nucleus - Crystal growth techniques
IV	Solution growth technique - Low temperature solution growth - solution - solubility and super solubility - Expression for super saturation.

WEEK	PORTIONS TO BE COVERED.
V	Micro T-c diagram. - gel growth Technique - Principle - Various types - structure of gel - Importance of gel - Experimental procedure.
VI	History of Nanotechnology - Concept of Nanotechnology and Nanomachines - Nano scale formation.
VII	Atomic structure molecules and phases molecular and atomic sizes - surface and dimensional space - Top down and bottom up synthesis.
VIII	Strong intermolecular forces - Covalent and coulomb interactions. Weak inter molecular forces.
IX	Vander Waal forces - Repulsive forces - Hydrogen bonding, Hydrophobic and hydrophilic interactions.
X	Meaning of research - objectives of research - Motivation of research - Types, approaches & significance - Methods versus methodology.
XI	Identification of the problem - literature survey - Reference collection - Necessity and techniques involved in defining the problem.
XII	Research design - Needs and features of good design - Different research design - Basic Principles of experimental designs - Meaning of Research Report.

M.Sc Physics - IV Semester - II Year.

PCPHL19 - Material Science and Laser Physics.

Unit - I : Phase Diagram.

Phase diagram - Basic principles - Simple binary systems - Solid solutions - Eutectic systems - Application. Solid solution - Interstitial and substitution solid solutions - Hume - Rothery electron Compounds - long range order theory of Bragg and Williams - Super lattices - Interstitial phase - Intermetallic compounds - Elementary Ideas of Corrosion - Oxidation - Creep and fracture

Unit III :- Optical properties, Dielectric properties and Ferro Electrics.

Color centers - photo conductivity - Electronic transitions in photo conductors - Trap, Capture, recombination centers - Luminescence - Excitation and emission Decay mechanisms Thallium activated alkali halides - Sulfide phosphorus - Ferroelectrics - Ferro electricity - General Properties - Dipole theory - Ionic displacements and the behaviour of BaTiO_3 - Spontaneous polarization of BaTiO_3 - Thermodynamics of Ferro electric transitions

Unit : V : Laser physics.

Nd:YAG Laser - He-Ne Laser - Optical resonator - Types and modes of resonator - Oscillation - Threshold condition - The confocal resonant cavity - Theory - Spot size and beam divergence - quality factor (Q) of an optical cavity.

PCPH 19: Material Science and Laser physics:

<u>WEEK</u>	<u>PORTIONS TO BE COVERED.</u>
I	Phase diagram - Basic Principles - single Component - Binary diagrams - solid solutions.
II	Interstitial and substitution solid solutions Eutectic systems - Applications.
III	Hume-Rothery electron compounds - long range order theory of Bragg and Williams - Super lattices.
IV	Interstitial phase - Intermetallic compounds, Elementary ideas of Corrosion - Oxidation Creep and fracture
V	Color centers - photo conductivity - Electronic transitions in photo conductors - Trap, Capture and recombination centers.
VI	Luminescence - Excitation and emission Decay mechanisms. Thallium activated alkali halides sulfide phosphorous.
VII	Ferro electrics - Ferro electricity - general Properties - dipole theory - Ionic displacements.
VIII	Behaviour of $BaTiO_3$ - Spontaneous polarization of $BaTiO_3$ - Thermodynamics of ferro electric transitions.

LESSON PLAN

HUMAN RIGHTS.

Unit - II :- Indian Constitution and Human Rights.

Meaning - Definition - Features of Indian Constitution - Federalism - Preamble - Fundamental Rights - Directive Principles of state policy - Right to Constitutional Remedies.

Unit - III :- United Nations and Human Rights.

Provisions relating to Human Rights under UN Charter - Role of UN in promotion and protection - Through principal organs UN Charter based institutions - UN specialized Agencies - Human Rights and Domestic Jurisdiction - UN Commission on Human Rights.

Unit - IV : Human Rights - and vulnerable groups.

Violence, The sexual Harassment of Women at Workplace Act 2013, Economic Empowerment of Women, Social Empowerment of Women, Women in difficult circumstances, Violence against Women - Rights of the girl child - Mass Media, operational strategies.

WEEK	PORTIONS TO BE COVERED.
I	Meaning - Definition - Features of Indian Constitution
II	Federalism - Preamble - Fundamental Rights - Directive Principles of state policy.
III	Right to constitutional Remedies. Provisions related to Human rights under UN Charter.
IV	Role of UN in promotion and protection through Principal organs.
V	UN Charter based institutions - UN specified Agencies. Human Rights and Domestic Jurisdiction
VI	UN Commission on Human Rights. Violence - The sexual Harassment of women at workplace Act 2013.
VII	Violence against Women - Rights of the girl child.
VIII	Economic and social empowerment of women, Mass media, Operational strategies.
<p data-bbox="255 1926 446 2105">Rajal</p>	

LESSON PLAN

Week I

Unit: I COMPLEX VARIABLES:

Analytic functions - Cauchy-Reimann conditions - Single and Multivalued functions - Cauchy's integral theorem and formula - Taylor's theorem II and Laurent's theorem - Poles and Residues - Cauchy's residue theorem - Application to evaluation of definite integrals of round unit circle and an infinite semi circle.

Unit: IV PROBABILITY THEORY

Probability densities, and Probability distributions - Binomial, Poisson's and Normal distributions - Moments and Generating functions - Discrete distribution - Casual and Uniform distribution - Cauchy continuous distribution.

Unit: V GROUP THEORY

Definitions of group, subgroups and conjugate classes - Invariant subgroup - Homomorphism and isomorphism between groups - Point groups - Representation of a group - Reducible and irreducible representations.

Books for Study:

1. Mathematical Physics by Satyaprakash
2. Mathematical Physics by B.D. Gupta
3. Mathematical Physics by H.L. Phass.

LESSON PLAN

WEEK	PORTIONS TO BE COVERED.
I Week	Analytic functions, Cauchy Riemann conditions, Problems, Single valued functions.
II Week	Multivalued functions, Problems, Cauchy's integral theorem and formula
III Week	Taylor's theorem and Laurent's theorem, Poles and Residues
IV Week	Cauchy's residue theorem, Solved Problems, Application to evaluation of definite integrals of round unit circle
V Week	Application to evaluation of definite of an infinite semi circle, Probability densities.
VI Week	Probability distribution, Binomial, Poisson's and Normal distribution Solved problems.
VII Week	Moments and generating functions discrete distributions, Problems.
VIII Week	Casual and uniform distribution Solved Examples Problems.
IX Week	Cauchy continuous distribution

LESSON PLAN

WEEK	PORTIONS TO BE COVERED
<u>I</u> WEEK	Definition of groups, subgroups and conjugate classes, Invariant subgroups.
<u>XI</u> WEEK	Homomorphism and isomorphism between groups, problems.
<u>XII</u> WEEK	Point groups, Representation of a group, Reducible and irreducible representations.

PCPH20 - ELECTROMAGNETIC THEORY

Unit - I : ELECTROSTATICS

Electrostatic potential, - Poisson's equation and Laplace's equation from Gauss's law - Solution of Laplace's equation in spherical co-ordinates - solution to Laplace's equation in cylindrical co-ordinates - solution to Laplace's equation in Cartesian co-ordinates - polar molecules - Clausius-Mossotti relation - Polarization vector - Electric field at external and internal points due to Polarization - Displacement vector - Conducting sphere in a uniform field - Dielectric sphere in a uniform field.

Unit - II : MAXWELL'S EQUATION

Faraday's Laws of Electromagnetic induction. Faraday's law in vector form - Maxwell's displacement vector - Maxwell's equations - Derivations - Electromagnetic potentials A and ϕ (vector and scalar potentials) Maxwell's equation in terms of Electromagnetic Potentials - non uniqueness of Electromagnetic potentials

Gauge invariance - Lorentz gauge and Coulomb gauge
Conservation laws for a system of charges and
electromagnetic fields - Equation of continuity -
(charge) - Momentum in EM fields - Energy in EM
fields (Poynting theorem) - Wave equation in general
Plane wave solution of for free space.

Unit - V WAVE PROPAGATION

Propagation of EM waves in isotropic and
anisotropic dielectrics - Propagation in conducting
Media - Calculation of phase velocity - Refractive
index - Skin depth - linear and circular
Polarization - Reflection and Refraction of a Plane
interface - Propagation of waves in a rectangular
Wave Guide - TE waves - TM waves - cavity
resonator - TE mode - TM mode - Faraday and
Kerr effects.

Books for Study:

1. Electromagnetic theory by Chopra, Agarwal
2. Electromagnetic theory by Satya Prakash
3. Electromagnetic theory by Gupta Kumar Singh.

Lesson Plan

Week	Portions to be covered.
<u>I</u>	Electrostatic potential, Poisson's equation and Laplace's equation from Gauss's law, solution of Laplace's equation in Cartesian coordinate
<u>II</u>	solution to Laplace's equation spherical and cylindrical coordinates, Polar molecules Langevin's equation.
<u>III</u>	Non-polar molecules, Clausius-Mossotti relation Polarization vector, Electric field at external and internal points due to polarization.
<u>IV</u>	Displacement vector, conducting sphere in a uniform field, Dielectric sphere in a uniform field. Faraday's laws of EM induction
<u>V</u>	Faraday's laws in vector form, Maxwell's displacement current, Maxwell's equations, Derivation.
<u>VI</u>	EM potentials A and ϕ (vector and scalar potentials), Maxwell's equation in terms of EM potentials, Non uniqueness of EM potentials, Gauge invariance.
<u>VII</u>	Lorentz Gauge and Coulomb Gauge, Conservation laws for a system of charges & EM fields.
<u>VIII</u>	Equation of continuity (charge), Momentum in EM wave, Energy in EM fields (Poynting theorem), wave equation in general Plane wave solution for free space.
<u>IX</u>	Propagation of EM wave in isotropic and anisotropic dielectrics, Propagation in conducting media.

Weeks	Portions to be covered.
<u>X</u>	calculation of phase velocity, Refractive index - skin depth, linear and circular Polarization
<u>XI</u>	Reflection and Refraction of Plane waves, Propagation of waves in a rectangular wave Guide.
<u>XII</u>	TE waves, TM waves, Cavity resonator, TE ₁₀ mode, TM mode, Faraday and Kerr effects.

II M.Sc., PHYSICS.

PCPHN20 - CONDENSED MATTER PHYSICS

UNIT - II: LATTICE DYNAMICS

Monatomic lattices - lattices with two atoms per primitive cell - First Brillouin zone - Group and Phase velocities - Quantization of lattice vibrations - Phonon model
 In elastic scattering by phonons - Debye's theory of lattice heat capacity - Einstein model and Debye's model of specific heat - Thermal Expansion - Thermal Conductivity - Umklapp Processes.

UNIT - III: THEORY OF METALS AND SEMICONDUCTORS

Free electron gas in three dimensions - Electronic heat capacity - Wiedemann Franz law - Hall effect - Bloch theorem - Kronig Penney model - Band theory of metals and semiconductors - semiconductors - Density of states - Intrinsic and extrinsic carrier concentration - Mobility - Impurity conductivity - Fermi surfaces - construction - De Haas Van Alphen Effect.

Books for study:

1. Solid state physics by S.O. Pillai
2. solid state physics by Gupta Kumar
3. Solid state physics by C.L. Arora.

Lesson Plan

Week	Portions to be covered
I	Monatomic lattices, lattices with two atoms per primitive cell, First Brillouin zone
II	Group and phase velocities, Quantization of lattice vibrations - phonon, momentum
III	Inelastic scattering by phonons, Debye's theory of lattice heat capacity
IV	Einstein model and Debye's model of specific heat
V	Thermal Expansion, Thermal conductivity
VI	Umklapp process, Free electron gas in three dimension
VII	Electronic heat capacity, Wiedemann Franz law
VIII	Hall effect, Bloch theorem
IX	Kronig penny model, Band theory of metals and semiconductors, semiconductors
X	Density of states, intrinsic and extrinsic carrier concentration
XI	Mobility, Impurity conductivity, Fermi surfaces
XII	Fermi surface construction, De Haas Van Alphen Effect.

Unit - II WAVE MECHANICS

Wave mechanics - Dual nature of matter - De Broglie wavelength - problems - Definition of phase and group velocity - relationship between them - Experimental Study of matter waves - Davisson and Germer's Experiment - Heisenberg's uncertainty principle - Applications - Determination of position of an electron with γ -ray microscope - vibration of electron beam through a slit - Proof for non existence of electrons inside the nucleus - wave function - properties of wave function - Basic postulates of wave mechanics - Derivation of time dependent Schrodinger's equation - Time independent Schrodinger's Equation

Unit - V ELECTRONICS

Rectifiers - Half and full wave rectifiers - Full wave Bridge Rectifier - construction and working - mathematical Analysis - Filters - types of filter circuits - Capacitor filter - choke input filter - π section filter - Zener diode - characteristics of zener diode - zener diode as voltage regulator - opto Electronic devices - Photo diode - Principle - characteristic of photo diode - Applications - Alarm circuit - counter circuit - light emitting diode LED - principle - characteristic of LED - Applications - Power Indicator - seven segment display - Solar cell - construction - working, characteristics etc.

Books for study:

1. Modern Physics by R. Nurugesan
2. Principle of Electronics by V.K. Mehta
3. Modern Physics by Arulthan.

Lesson Plan

Week	Portions to be covered.
I	Wave mechanics, Dual nature of matter, De Broglie wavelength, Problems.
II	Definition of phase and group velocities, Relationship between them.
III	Experimental study of matter waves, Davison and Germer's Experiment, Heisenberg's Uncertainty principle
IV	Applications, Determination of position of an electron, with γ -ray microscope, Diffraction of electron beam through a slit
V	Proof for non existence of electrons inside the nucleus, wave function, properties of wave functions.
VI	Basic postulates of wave mechanics, derivation of time dependent and time independent Schrodinger wave equation.
VII	Rectifiers, Half wave and full wave rectifiers, Bridge rectifier, construction and working
VIII	Mathematical Analysis, Filters, types of filter circuits, Capacitor filter.
IX	Choke input and π -section filter, Zener diode characteristics, voltage regulator
X	Opto Electronic devices, Photo diode, principle characteristics of photo diode, Applications, Alarm circuit
XI	Counter circuit, LED characteristics, Applications
XII	Power indicator, 7-segment display, Solar cell construction, working, characteristics, Uses.

Work Plan

class	Topics covered	References
<p>II M.Sc Condensed Matter</p>	<p>04-01-2021 - 08-01-2021 Free electron gas in three dimension, Electronic heat capacity</p> <p>11-01-2021 - 16.01.2021 Wiedemann Franz law, Hall effect</p> <p>18-01.2021 - 22.01.2021. Hall angle, Hall coefficient, Applications.</p> <p>25-01-2021 - 29-01.2021. Bloch theorem, Kronig Penny model, Band theory of metals and semi-conductors.</p> <p>Analytic functions Introduction.</p>	<p>I</p> <p>II</p> <p>III</p> <p>Solid state Physics by S.O. Pillai & C.L. Anra.</p> <p>IV</p> <p>V</p> <p>Mathematical Physics by Santya Prakash.</p>
<p>PN 1/2/2021/M.Sc M.P. II</p> <p>II M.Sc Chem. Math. Phys.</p> <p>I M.Sc M.P. II</p> <p>I M.Sc EMT</p>	<p>01-02-21 - 05-02-21. Semi-conductors, Problems, Density of states.</p> <p>Cauchy Riemann conditions, Problems, single valued functions.</p> <p>Electrostatic Potential, Poisson's equation, Laplace's equation Gauss's law</p>	<p>Solid state Physics by S.O Pillai</p> <p>VI Mathematical Physics by Santya Prakash</p> <p>VII EMT by Santya Prakash</p>

Class	Topics covered	References
I M.Sc EMT	Laplace equations in spherical, cylindrical & cartesian coordinates.	EMT by Satya Prakash
I B.Sc Applied physics	Wave mechanics, Dual nature of matter, De Broglie wavelength, problems.	Applied physics by R. Mungesan.

08/2/2021

II M.Sc.	08-02-21 - 12-02-21. Derivation of Bloch theorem, Explanation of Kronig-Penny model.	Solid state physics by S.O. Pillai and C.L. Arora.
I M.Sc M.P-II	Cauchy's Integral theorem problems, Taylor's theorem	Mathematical physics by H.K. Dhas.
I M.Sc EMT	Laplace equations in cylindrical coordinates, problems.	Electromagnetic theory by Satya Prakash
I B.Sc (A.P) Maths	Wave mechanics, Dual nature of matter, De Broglie wavelength, problems, Phase velocity and group velocity	Modern Physics by Mungesan R.

PN
12/2/2021

Work Plan

class	Topics covered	References
<p><u>II</u> M.Sc., Condensed Matter</p>	<p>15-02-21 to 20-02-21 Density of states, semiconductors.</p>	<p>Solid State Physics by C.L. Arora</p>
<p><u>I</u> M.Sc., Physics EMT.</p>	<p>Polar molecules & Non-polar molecules, Lorentz equation, Clausius Mossotti relation, Displacement vector</p>	<p>EMT by Chopra & Sathya Prakash</p>
<p><u>I</u> M.Sc. II M.P. = <u>II</u></p>	<p>Cauchy's Integral theorem problem, sequences, infinite series.</p>	<p>Mathematical Physics by H.K. Dhar.</p>
<p><u>I</u> B.Sc (Applied Phys) <u>II</u></p>	<p>Davison and Croemer's Experiment, Heisenberg's Uncertainty principle.</p>	<p>Modern Physics by R. Murugesan</p>
22-02-21 to 29-02-21		
<p><u>II</u> M.Sc, Condensed Matter.</p>	<p>Intrinsic Semiconductor, concentration of electrons in an n-type semiconductor</p>	<p>Solid state Physics by C.L. Arora</p>
<p><u>I</u> M.Sc. Physics EMT</p>	<p>Polarization vector, Displacement- current.</p>	<p>EMT by Chopra.</p>
<p><u>I</u> M.Sc M.P. - <u>II</u></p>	<p>Taylor's theorem & Problems.</p>	<p>Mathematical Physics by Sathya Prakash</p>
<p><u>I</u> B.Sc Applied physics <u>II</u></p>	<p>Heisenberg's Uncertainty principle Applications.</p>	<p>Modern Physics by R. Murugesan</p>

class	TOPICS COVERED	References.	methodology
	01-03-2021 to 6-3-2021. I CA Exam Begins.		
II M.Sc.,	08-03-2021 to 12-3-2021 Practical classes. (General & microprocessor).		M.Sc., Physic lab.
I B.Sc., Allyed Physic-II	2-ray microscope, Diffraction of electron beam through a slit, Basic postulates of wave mechanics.	Modern Physics by R. Mungesan	Black Board.
II M.Sc Condensed Matter Physic.	15-03-2021 to 19-3-2021. Extrinsic semiconductor, density of electrons and density of holes in an n-type and P-type semiconductor, Fermi level of Extrinsic semiconductor.	Solid state Physics by Uupta Kumar.	PPT and Black Board.
I M.Sc., EMT.	Polarization of Polar molecules Langevin's equation, Debye's relation.	EMT by Chopra and Sathya Prakash	PPT and Black Board.
I M.Sc Mathematical Physic.	Partial functions, Taylor's theorem Problems.	Mathematical Physics by Sathya Prakash and H.K. Dhass.	PPT and Black Board and Chalk method.

Class	Topics Covered	References
<p>II M.Sc Physics</p> <p>I M.Sc. Physics</p> <p>I B.Sc Maths</p>	<p>22.03.2021 to 31.03.2021</p> <p>Model Practicals and semester practicals for PG Students.</p> <p>Semester Practicals for Allied physics.</p>	
<p>II M.Sc Physics</p> <p>I M.Sc, Physics Emt.</p>	<p>07-04-2021 to 10-4-2021.</p> <p>Mobility, conductivity, De-Haas-van Alphen effect, Monoatomic lattices One-dimensional and two dimensional, Group velocity, phase velocity, Brillouin Zone.</p> <p>Electric field inside and outside Polarized sphere, Faraday's laws of EM induction, Maxwell's equation, Gauge invariance, Lorentz gauge, Coulomb gauge, Non uniqueness of EM potential.</p>	<p>Solid State Physics by C.L. Arora and Gupta Kumar.</p> <p>Electromagnetic theory by Jitendra Prakash & Chopra</p>
<p>Mathematical Physics II</p>	<p>Laurant's theorem and problems, Residue theorem and problems, methods of finding residues, Applications of Residue theorem.</p>	<p>Mathematical Physics by H.K. Dhas.</p>

class	Topics to be covered	References.
	12-04-2021 to 17-04-2021	
II M.Sc., (MP)	Quantization of lattice vibration, Phonon momentum, Inelastic Scattering of phonon, Debye's theory of lattice heat and Einstein's theory of lattice heat capacity	Solid State Physics by C.L. Arora, Gupta Kumar.
I M.Sc., EMT	Conservation laws for a system of charges and EM fields, Equation of continuity, Poynting theorem, Poynting vector, momentum and Energy in an EM fields.	EMT by Satyaprakash, Chopra.
I M.Sc MP-II	Definition of groups, subgroups, conjugate classes, Invariant Sub group, Homomorphism and Isomorphism.	Mathematical Physics by H.K. Dhall.
I B.Sc A-P-II Pw 19/4/2021	Time dependent and Independent Schrodinger wave equation, Properties of wave function, Fibre Optics, construction, Light Propagation in fibres, fibre optic communication system, Acceptance angle, Numerical Aperture Problems.	Optics and Spectroscopy by Bijal Subramanian Engineering physics by Vijayakumari.

class	Topics Covered	References
	19-04-2021 to 20-04-2021	Li.
I MISC EMT	Propagation of EM waves, conducting media, phase velocity, refractive index, skin depth, linear and circular polarisation.	EMT by Chopra.
I MISC M.P II	Point group, representation of point group, reducible and irreducible representation.	M.P by Satyapratim
II MISC CMP	Thermal Expansion, thermal conductivity.	Solid State Physics by S.L. Arora.
I BSC AP-II	Types of fibres, step-index and graded index fibre, multimode fibre.	Engineering Physics by vijaykumari
	26-04-2021 to 30-04-2021.	
I MISC EMT	TE mode, TM mode, Faraday effect, Kerr effect.	EMT by Chopra.
MP-III	Revision for III Unit.	
II MISC CMP.	Revision for II Unit.	
I BSC AP-II	Revision for fibre optics.	

class	TOPICS covered	References
	03-05-2021 - 05-05-2021.	
I M.Sc, EMT	Syllabus completed.	
Mathematical Physics	Syllabus completed.	
II M.Sc Condensed matter physics	Syllabus completed	
I B.Sc Maths	Syllabus completed.	

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