VIVEKANANDHA

COLLEGE OF ARTS AND SCIENCES FOR WOMEN

(AUTONOMOUS)

An ISO 9001: 2008 Certified Institution

(Approved by AICTE, Affiliated to Periyar University and Re-accredited with A grade by NAAC, Recognized under section 2(f) and 12(B) of UGC Act,1956)

Elayampalayam, Tiruchengode - 637 205



PG AND RESEARCH DEPARTMENT OF PHYSICS

M.Sc., DEGREE - OBE SYLLABUS

2019-2021





Elavampalavam, Tiruchengode-637 205.

WOMEN EMPOWERMENT		Elayampalayam, Ti	rucher	ıgod	e-63	7 205.									
Programme	M.Sc Programme Code PPH Regulations 2018-2019														
Department	Phys		1												
			Per	iods		Credit	Maxim	um Mar	ks						
Course Code	Course	Name	per	We	ek										
			L	Т	P	С	CA	ESE	Total						
	МАТНЕМАТ	TICAL PHYSICS	5	1	0	5	25	75	100						
18P1PH01															
COURSE	1. To acquire knowledge of non-relativistic and relativistic quantum mechanics2. The ability to understand														
OBJECTIVE	concepts and to perform calculations of scattering of particles.3. The ability to critically understand														
S	and evaluate modern research														
POs	PROGRAMME OUTCOME														
PO 1	Capable of den	Capable of demonstrating the basic concept sand comprehensive knowledge from undergraduate													
	programme of study.														
PO 2	Ability to express thoughts and ideas effectively Communicate with others using appropriate media and														
	interpret the idea in clear and concise manner.														
PO 3	To identify the relevant assumptions to formulate the arguments by following scientific approach to														
	knowledge development														
PO 4		Capacity to solve the different kinds of non familiar problem and apply in real life situation.													
PO 5	=	uate the reliability and releva	ance of	evi	denc	e identify log	ical flaws	and hole	es in the						
DO 6	arguments of o														
PO 6	-	uiry and capability for askin	g appro	opria	te qu	iestions, prob	lematising	, synthe	esizing and						
PO 7	articulating.	c effectively and respectfully	, with	divo	eso to	nome									
PO 8	·	yse, interpret and draw conc					and critic	vally ave	aluata idaas						
100	Evidence and e	=	iusions	5 11 01	ıı qu	antitative date	a and critic	ally Cva	iruate rucas,						
PO 9		lity to lived experiences wit	h self-	awai	enes	s and reflexiv	ity of both	self an	d society.						
PO 10		se ICT in a variety of learning					•		•						
		ant information sources.	-6		,		,	,	,						
PO 11	•	independently, identify app	propria	te re	sour	ces required f	or a projec	et and m	nanage a project						
	through to com	apletion.	-			•	1 0								
PO 12	Possess knowle	edge of the values and belief	s of m	ultip	le cı	ıltures and a g	global pers	pective.							
PO 13	Ability to emb	race moral values in conduc	ting on	e‹	Ms 1	ife formulates	a position	about a	an ethical issue						
	from multiple	perspectives.													
PO 14		mapping out the tasks of a te													
PO 15	• •	ire knowledge and skills, pe	rsonal	deve	elopi	nent, meeting	economic	, social	and cultural						
	objectives														

COs	COURSE OUTCOME
CO 1	Understand the complex variables and evaluation of definite integrals
CO 2	To acquire knowledge of vector tensor and matrices. Understand the characteristic equation of matrix and evaluate Hamiltonian theorem
CO 3	To acquire knowledge of Fourier and Laplace transform. Understand the Fourier integrals and Apply Fourier transformation in interferometer
CO 4	Understand the relation between beta and gamma function and evaluate the gamma function
CO 5	To acquire the knowledge of group theory. Understand Reducible and irreducible representation. Evaluate
	C2V and C3V point groups.
Pre-requisites	To gain knowledge

1. Remembering, 2. Understanding, 3. Applying, 4. Analyzing, 5. Evaluating, 6. Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
CO 1		PO 1	1
	2	PO 2	2
		PO 3	2
CO 2		PO 4	3
	1	PO 5	5
		PO 6	1
CO 3		PO 7	6
	1	PO 8	4
		PO 9	5
		PO 10	1
CO 4	5	PO 11	2
		PO 12	2
		PO 13	3
CO 5	5	PO 14	3
		PO 15	6

CO / PO Mapping

COs	Programme Outcome (POs)														
COS	РО	PO	РО	РО	РО	РО	PO7	PO	РО	PO1	PO1	PO1	PO1	PO1	PO1
	1	2	3	4	5	6		8	9	0	1	2	3	4	5
CO1	2	3	3	2	1	2	1	1	1	2	3	3	2	2	1
CO2	3	2	2	1	1	3	1	1	1	3	2	2	1	1	1
CO3	3	2	2	1	1	3	1	1	1	3	2	2	1	1	1
CO4	1	1	1	1	3	1	2	2	3	1	1	1	1	1	2
CO5	1	1	1	1	3	1	2	2	3	1	1	1	1	1	2

Course Assessment Methods	
Direct	
	1. Continuous Assessment Test I, II & Model
	2. Assignment
	3. End Semester Examinations
Indirect	
1. Course End Delivery	

Unit - II Complex Analysis
integral theorem - Cauchy integral formulas-Taylors Series - Residue theorem - Evaluation of definite integrals - Contour integration. Vectors, Tensors and Matrices Periods 12 Linear vector spaces - Subspaces - Linear independents and orthogonality of vectors - Hilberts space - Transformation of coordinates - Summation convention, Contravariant, Covariant and mixed tensors, Rank of tensor, Kronecker delta, Symmetric and Antisymmetric tensors, Contraction of tensor - Characteristic equation of a matrix - Eigen values and Eigen vectors - Cayley - Hamilton theorem- Reduction of a matrixto diagonal form - Jacobi method - Sylvester's Theorem. Fourier Transforms and Laplace Transforms Periods 14 Fourier Transform: Properties of Fourier transform - Fourier transform of derivative - Fourier's sine and cosine transform of derivative - Complex representation of Fourier series - Fourier's integral - Different forms of Fourier integrals - Application of Fourier Transformation in Interferometer.Laplace Transform: Properties of Laplace transform - Laplace transform of derivative function - Laplace transform of integrals - Laplace transform of periodic function - Inverse Laplace transform - Properties of inverse Laplace transform - Applications of Laplace Transform.
Integral theorem - Cauchy integral formulas-Taylors Series - Laurent's Series - Residue theorem - Evaluation of definite integrals - Contour integration. Vectors, Tensors and Matrices
Unit - III Vectors, Tensors and Matrices
Unit - II Linear vector spaces - Subspaces - Linear independents and orthogonality of vectors - Hilberts space - Transformation of coordinates - Summation convention, Contravariant, Covariant and mixed tensors, Rank of tensor, Kronecker delta, Symmetric and Antisymmetric tensors, Contraction of tensor - Characteristic equation of a matrix - Eigen values and Eigen vectors - Cayley - Hamilton theorem- Reduction of a matrixto diagonal form - Jacobi method - Sylvester's Theorem. Fourier Transforms and Laplace Transforms Periods 14 Fourier Transform: Properties of Fourier transform - Fourier transform of derivative - Fourier's sine and cosine transform of derivative - Complex representation of Fourier series - Fourier's integral - Different forms of Fourier integrals - Application of Fourier Transformation in Interferometer.Laplace Transform: Properties of Laplace transform - Laplace transform of derivative function - Laplace transform of integrals - Laplace transform of periodic function - Inverse Laplace transform - Properties of inverse Laplace transform-Laplace transform of some special functions- Evaluation of integral using InverseLaplace Transform - Applications of Laplace Transform.
Unit - II Transformation of coordinates - Summation convention, Contravariant, Covariant and mixed tensors, Rank of tensor, Kronecker delta, Symmetric and Antisymmetric tensors, Contraction of tensor - Characteristic equation of a matrix - Eigen values and Eigen vectors - Cayley - Hamilton theorem-Reduction of a matrixto diagonal form - Jacobi method - Sylvester's Theorem. Fourier Transforms and Laplace Transforms Periods 14 Fourier Transform: Properties of Fourier transform - Fourier transform of derivative - Fourier's sine and cosine transform of derivative - Complex representation of Fourier series - Fourier's integral - Different forms of Fourier integrals - Application of Fourier Transformation in Interferometer.Laplace transform: Properties of Laplace transform of derivative function - Laplace transform of integrals - Laplace transform of periodic function - Inverse Laplace transform - Properties of inverse Laplace transform-Laplace transform of some special functions- Evaluation of integral using InverseLaplace Transform - Applications of Laplace Transform.
Unit - II Rank of tensor, Kronecker delta, Symmetric and Antisymmetric tensors, Contraction of tensor - Characteristic equation of a matrix - Eigen values and Eigen vectors - Cayley - Hamilton theorem- Reduction of a matrixto diagonal form - Jacobi method - Sylvester's Theorem. Fourier Transforms and Laplace Transforms Periods 14 Fourier Transform: Properties of Fourier transform - Fourier transform of derivative - Fourier's sine and cosine transform of derivative - Complex representation of Fourier series - Fourier's integral - Different forms of Fourier integrals - Application of Fourier Transformation in Interferometer.Laplace Transform: Properties of Laplace transform - Laplace transform of derivative function - Laplace transform of integrals - Laplace transform of some special functions- Evaluation of integral using InverseLaplace Transform - Applications of Laplace Transform.
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unit - III and cosine transform of derivative - Complex representation of Fourier series - Fourier's integral - Different forms of Fourier integrals - Application of Fourier Transformation in Interferometer.Laplace Transform: Properties of Laplace transform - Laplace transform of derivative function - Laplace transform of integrals - Laplace transform of periodic function - Inverse Laplace transform - Properties of inverse Laplace transform-Laplace transform of some special functions- Evaluation of integral using InverseLaplace Transform - Applications of Laplace Transform.
Unit - III Different forms of Fourier integrals - Application of Fourier Transformation in Interferometer.Laplace Transform: Properties of Laplace transform - Laplace transform of derivative function - Laplace transform of integrals - Laplace transform of periodic function - Inverse Laplace transform - Properties of inverse Laplace transform-Laplace transform of some special functions- Evaluation of integral using InverseLaplace Transform - Applications of Laplace Transform.
Transform: Properties of Laplace transform - Laplace transform of derivative function - Laplace transform of integrals - Laplace transform of periodic function - Inverse Laplace transform - Properties of inverse Laplace transform-Laplace transform of some special functions- Evaluation of integral using InverseLaplace Transform - Applications of Laplace Transform.
Transform: Properties of Laplace transform - Laplace transform of derivative function - Laplace transform of integrals - Laplace transform of periodic function - Inverse Laplace transform - Properties of inverse Laplace transform-Laplace transform of some special functions- Evaluation of integral using InverseLaplace Transform - Applications of Laplace Transform.
inverse Laplace transform-Laplace transform of some special functions- Evaluation of integral using InverseLaplace Transform - Applications of Laplace Transform.
InverseLaplace Transform - Applications of Laplace Transform.
Special Functions and Differential Equations Periods 14
1
Beta function - Symmetry property of beta function - Evaluation of beta function - Transformation of beta
Unit - IV function - Different forms of beta function - Evaluation of gamma function - Transformation of Gamma
function - Reduction of definite integrals to gamma function - Relation between Beta and Gamma
functions - Dirac delta function. Solution for Bessel, Legendre, Lagure and Hermite differential equation
-Properties - Generating functions, Rodrigues formula, Orthogonal properties, Recurrence relation.
Group Theory Periods 10
Basic Definition - Multiplication Table - Sub groups - Cosets and Classes, Direct Product groups -
Unit - V Point group, Space groups, Rotation groups - Symmetry elements and symmetry operations -
Representation theory - Homomorphism and Isomorphism - Reducible and Irreducible representation -
Schurs Lemma- The great Orthogonality theorem - Character Table - C2V and C3V as examples,
Treatment ofmolecular structure.
Total Periods 60

Text Books	
1	1. Mathematical Physics, B.D. Gupta, Vikas Publishing House, (2004).
2	2. Mathematical Physics, Satyaprakash, Sultan Chand and Sons, (2004).
References	
1	1. Mathematical Physics, P.K. Chattopadhyay, Wiley Eastern India, (1990).
2	2. Chemical applications of group theory, F.A. Cotton, Wiley Eastern India, (2001).
3	3. Elements of group theory for physicist, A.W Joshi, New age international Publishers, (2002).
E-References	
1	1. https://www.khanacademy.org/math/differential-equations/laplace-transform

2	2. https://www.khanacademy.org/math/linear-algebra#vectors-and-spaces
3	3. https://www.khanacademy.org/math/linear-algebra#matrix-transformations

THORNAL AND TORNAL OF THE PROPERTY OF THE PROP	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)												
WOMEN EMPOWERMEN		Elayampalayam, Ti	ruchengode-	637 205.	_								
Programme	M.Sc	Programme Code	PPH		Regulat	ions	2018-2019						
Department	Physics Semester 1												
			Periods	Credit	Maximi	ım Mar	ks						
Course Code	Course	Name	per Week	P C	CA	ESE	Total						
	CLASSICAL	AND STATISTICAL		r C	CA	ESE	Total						
18P1PH02	MECHANICS 6 0 0 5 25 75 100												
COURSE OBJECTIVE S	1. The main goal of the course is to introduce students to classical mechanics and its applications in physics and studied rigorously using advanced mathematical techniques.												
POs	PROGRAMME OUTCOME												
PO 1	Capable of demonstrating the basic concept sand comprehensive knowledge from undergraduate programme of study.												
PO 2	Ability to express thoughts and ideas effectively Communicate with others using appropriate media and interpret the idea in clear and concise manner.												
PO 3	To identify the relevant assumptions to formulate the arguments by following scientific approach to knowledge development.												
PO 4		-	miliar probler	ns and apply to	real life si	tuations	5.						
PO 5	sources then dr	Capacity to solve different kinds of non-familiar problems and apply to real life situations. Ability to evaluate the reliability and relevance of evidence, analyse and synthesise data from a variety of sources then draw valid conclusions and support them with evidence and examples, and addressing opposing viewpoints.											
PO 6	=	lems, formulate hypothese ict cause-and-effect relation		=	_		conclusions e results ofan						
PO 7	•	effectively and respectfull group and act together as a		teams, facilita	te cooperat	ive or c	oordinated effort						
PO 8		vse, interpret and draw conc and experiences from an o				ta and c	ritically evaluate						
PO 9	Critical sensibi	lity to lived experiences, wi	ith self awarer	ess and reflex	ivity of both	n self an	nd society.						
PO 10	= -	se ICT in a variety of learni ant information sources and	_		-		luate, and use a						
PO 11	•	independently, identify ap					nanage a project						
PO 12	·	fectively engage in a multi-	cultural societ	y and interact	respectfully	with di	iverse groups.						
PO 13		nonstrating the ability to ide											
		as fabrication, falsification											
PO 14		napping out the tasks of a t	_		setting dire	ction, fo	ormulating an						
DO 15		i, building a team who can l			0 0000000	for	tioinotino in						
PO 15	-	ire knowledge and skills, in ies throughout life.	ciuding now t	o ieam, mat ar	e necessary	10r par	ucipating in						
	-												

COs	COURSE OUTCOME
CO 1	To understand the fundamental principles of Lagrange formulation. Apply linear harmonic oscillator in
	Lagrange formulation.
CO 2	To acquire knowledge of Hamiltons canonical equations. Understand the harmonic oscillator problem.
CO 3	Understand the angular momentum of a rigid body.
CO 4	Understand the ideas liouvlies theorem. Synthesis phase space.
CO 5	To understand the equations Fermi Dirac statistics .Apply ideal Bose Einstein gas blackbody radiation
Pre-requisites	To Acquire idea about statistics

1. Remembering, 2. Understanding, 3. Applying, 4. Analyzing, 5. Evaluating, 6. Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

(3/2/1 marcutes	the strength of correlation, 5 stre	ong, 2 medium, 1 weak)	
COs	KLs	POs	KLs
CO 1		PO 1	1
	2	PO 2	2
		PO 3	2
		PO 4	3
CO 2	1	PO 5	5
		PO 6	1
		PO 7	6
CO 3	2	PO 8	4
		PO 9	5
		PO 10	1
CO 4	6	PO 11	2
		PO 12	2
		PO 13	3
CO 5	3	PO 14	3
		PO 15	6

CO / PO Mapping

CO				Progra	ımme C	Outcome	e (POs)								
COs	РО	РО	РО	РО	РО	РО	PO7	РО	PO	PO1	PO1	PO1	PO1	PO1	PO1
	1	2	3	4	5	6		8	9	0	1	2	3	4	5
CO1	2	3	3	2	1	2	1	1	1	2	3	3	2	2	1
CO2	3	2	2	1	1	3	1	1	1	3	2	2	1	1	1
CO3	2	3	3	2	1	2	1	1	1	2	3	3	2	2	1
CO4	1	1	1	1	2	1	1	1	2	1	1	1	1	1	3
CO5	1	2	2	3	1	1	1	2	1	1	2	2	3	3	1

Course Assessment Methods	
Direct	
	1. Continuous Assessment Test I, II & Model
	2. Assignment
	3. End Semester Examinations
Indirect	
1. Course End Delivery	

Content of the	Syllabus								
	Fundamental Principles and Lagrangian Formulation	Periods	12						
	Mechanics of a system of particles - Conservation laws - Constraints, Generalized coordinates - D-								
Unit - I	Alemberts principle - Lagranges equation of motion from D-Ale	mberts principle-	Application of						
Onit - 1	Lagranges formulation - Linear Harmonic oscillator - Simple per	ndulum - Hamil	tons principle -						
	Derivation of Lagranges equation of motion from Hamiltons princip	ole - Conservation	on theorems and						
	Symmetry properties.								
	Hamiltons Formulation	Periods	12						
	Hamiltons Canonical equations of motion - Physical Significance of H	- Hamiltons Can	onical equations						
Unit - II	from variation principle - Principle of least action - Canonical tran	sformations - Po	isson brackets -						
	Properties - Hamilton - Jacobi method - Harmonic oscillator problem us	sing Hamiltonian .	Jacobi method -						
	Lagrangs brackets - Properties.								
	Rigid Body Motion	Periods	12						
	Generalized coordinates for Rigid Body Motion - Euler Angles - Eulerian theorem - Angular Velocity								
Unit - III	- Angular Momentum of a rigid body - Motion of symmetrical top - Moments and Products of Inertia								
Omt - m	- Eulers equation of motion Relativistic Approach Lorentz transformation - Kinematic effects of								
	Lorentz transformation - Mass energy equivalence - Lagrangian formulation of Relativistic								
	mechanics -Hamiltonian Formulation of Relativistic mechanics.								
	Classical Statistics	Periods	12						
	Phase Space - Ensemble - Definition of Micro Canonical - Canonical a	and Grand Canoni	cal ensembles -						
Unit - IV	Liouvilles theorem - Microstates and Macro states - Sterlings formula, Entropy in statistical mechanics -								
	Partition function - Doppler broadening of spectral lines - Principle of equipartition of energy -								
	connectionbetween Partition function and thermodynamically quantities	S							
	Quantum Statistics	Periods	12						
	Identical particles and Symmetry requirements - Maxwell - Boltzman Statistics, Bose -Einstein								
Unit - V	Statistics and Fermi - Dirac statistics - Ideal Bose Einstein gas and its application: Black body radiation								
Onit - V	and Planck Radiation Law - Gas degeneracy - Bose - Einstein Condensation - Random walk and								
	Brownian motion -								
	Ideal Fermi Dirac gas: Electron gas - Thermionic emission - Paulis theo	ry of Paramagneti							
	Total Periods		60						

Text Books	
1	Classical Mechanics, Gupta and Kumar, PragatiPrakashnan, Meerut, (2005).
2	Statistical Mechanics, Gupta and Kumar, PragatiPrakashnan, Meerut, (2005).
References	
1	Classical Mechanics, H. Goldstein, Narosa Publishing House, New Delhi, (2005)
2	Classical Mechanics, C.R.Mondal, Prentice - Hall of India, New Delhi, (2008).
E-References	
1	https://www.britannica.com/science/classical-mechanics
2	https://www.chegg.com/homework-help/definitions/classical-Mechanics-II.





WOMEN EMPOWERNEN	Elayampalayam, Tiruchengode-637 205.								
Programme	M.Sc	Programme Code		Pl	PH		Regulat	ions	2018-2019
Department	Phy	sics			Sen	nester			1
			Pe	riods	s	um Mar	ks		
Course Code	Course	Name	pe	r We	eek				
			L	Т	P	С	CA	ESE	Total
18P1PH03	ADVANCED	ELECTRONICS	6	0	0	4	25	75	100
COURSE	1.The aim of t	he course is to introduce the	studei	nts to	o the	advanced con	cepts of ele	ectronic	es.2.Acquire basic
OBJECTIVE	knowledge of	advanced electronics such as	Oper	ation	nal A	mplifier, Men	ory and C	ptoelec	tronic
S	Devices etc.								
POs	PROGRAMM	E OUTCOME							
PO 1	•	monstrating the basic concep	t sand	con	npreh	ensive knowle	edge from	underg	raduate
PO 2	programme of	ress thoughts and ideas effect	ivalv	Con	ımıın	icate with oth	are neina a	nnronr	ista madis and
102		lea in clear and concise man		Con	mun	icate with our	ers using a	ірргорг	iate illedia alid
PO 3		e relevant assumptions to for		e the	argu	ments by follo	owing scie	ntific a	pproach to
	knowledge de	=			Ü	·	C		
PO 4		lve different kinds of non-far	niliar	prol	olems	and apply to	real life si	tuations	S.
PO 5	Ability to evaluate the reliability and relevance of evidence, analyse and synthesise data from a variety of								
	sources then o	draw valid conclusions and s	suppor	rt th	em w	ith evidence	and examp	oles, an	d addressing
	opposing view	•							
PO 6	=	olems, formulate hypotheses				=	_		conclusions
	=	dict cause-and-effect relation	ships	and	abilit	ty to plan, exe	cute and re	eport th	e results ofan
PO 7	experiment	1 66 2 1 1 2 6 11	•.•	1.		C 11.		•	1' 1 66 1
PO 7		k effectively and respectfully			erse te	eams, facilitate	e cooperat	ive or c	oordinated effort
DO 9		a group and act together as a					1:4.4:	ملمسم ما	
PO 8	•	lyse, interpret and draw concile and experiences from an op-			-	-		ia and c	rincany evaluate
PO 9		ility to lived experiences, wi					•	self ar	nd society
PO 10		use ICT in a variety of learning							
1010	= -	vant information sources and	_				-		iraute, arra ase a
PO 11		k independently, identify app							nanage a project
	through to con		P				FJ	-,	8 FJ
PO 12	Capability to effectively engage in a multicultural society and interact respectfully with diverse groups.								
PO 13		monstrating the ability to ide							
	-	h as fabrication, falsification	•						
PO 14		mapping out the tasks of a te					etting dire	ction,fo	rmulating an
	= -	n, building a team who can h			_				-
PO 15	Ability to acqu	uire knowledge and skills, in	cludin	g ho	w to	learn, that are	necessary	for par	ticipating in
	learning activi	ties throughout life.							

COs	COURSE OUTCOME
CO 1	To get knowledge about the basics information's of ideal Op-amp.
CO 2	Apply the sample and hold circuit in simultaneous equations and differential equations
CO 3	Understand the filters, basic DAC and ADC techniques.
CO 4	Synthesis the basic monolithic IC's.
CO 5	To acquire Knowledge the memory devices and apply in opto electronic devices.
Pre-requisites	To Acquire idea about Advanced Electronics

1. Remembering, 2. Understanding, 3. Applying, 4. Analyzing, 5. Evaluating, 6. Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
		PO 1	1
CO 1	1	PO 2	2
		PO 3	2
		PO 4	3
CO 2	3	PO 5	5
		PO 6	1
		PO 7	6
CO 3	2	PO 8	4
		PO 9	5
		PO 10	1
CO 4	6	PO 11	2
		PO 12	2
		PO 13	3
CO 5	1	PO 14	3
		PO 15	6

CO / PO Mapping

COs		Programme Outcome (POs)													
COS	РО	РО	РО	PO	PO	PO	PO7	РО	PO	PO1	PO1	PO1	PO1	PO1	PO1
	1	2	3	4	5	6		8	9	0	1	2	3	4	5
CO1	3	2	2	1	1	3	1	1	1	3	2	2	1	1	1
CO2	1	2	2	3	1	1	1	2	1	1	2	2	3	3	1
CO3	2	3	3	2	1	2	1	1	1	2	3	3	2	2	1
CO4	1	1	1	1	2	1	1	1	2	1	1	1	1	1	3
CO5	3	2	2	1	1	3	1	1	1	3	2	2	1	1	1

Course Assessment Methods	
Direct	
	1. Continuous Assessment Test I, II & Model
	2. Assignment
	3. End Semester Examinations
Indirect	
1. Course End Delivery	

Content of the	e Syllabus								
	Operational Amplifier	Periods	12						
Unit - I	Operational amplifiers: Basic information - Ideal op-amp - Open loop operation - Feedback in ideal op-amp- Inverting and Non-inverting amplifier, Voltage Follower, Differential amplifier, CMRR.DC Characteristics - Input bias current, Input offset current, Input offset voltage, Total output offset voltage, Thermal drift.AC Characteristics - Frequency Response, Stability of an Op-amp, Frequency Compensation, Slew rate - Electrical Parameters.								
	Analog Computation and Waveform Generators	Periods	12						
	Basic Op-amp Applications - Sample and hold circuits, Logarith	mic amplifiers,	Antilogarithmic						
Unit - II	amplifiers. Analog multiplier - Analog divider - Differentiator - Int	egrator - Analog	Computation -						
OIIIt - II	Solving Simultaneous equation and Differential equation - Sine wave os	Solving Simultaneous equation and Differential equation - Sine wave oscillator - RC Phase shift oscillator							
	- Wein - Bridge oscillator, method - Harmonic oscillator problem using	Hamiltonian Com	parator, Schmitt						
	trigger, Astable and Monostablemultivibrators - Triangular wave generator.								
	Filters and Data Converters	Periods	12						
	RC Active filters - First order low pass filter, Second order active filter, Higher order low pass filter,								
Unit - III	High pass active filter, Band pass filters and Band reject filters.Basic DAC techniques - Weighted								
Omt - m	resistor DAC, R-2R Ladder DAC. ADC- Counter type, Successive approximation A/D convertor, Dual -								
	Slope ADC,								
	DAC/ADC Specifications: Resolution, Accuracy, Linearity and Stability								
	IC Fabrication	Periods	12						
	Basic monolithic ICs - Thin film fabrication - Epitaxial growth -	•							
Unit - IV	diffusion, Fabricating monolithic resistors, Diodes, Transistors, Inductor	-							
	Description of the functional diagram, Mono stable multivibrator - A	Astablemultivibra	tor - Bi-Stable						
	multivibrator -Schmitt trigger.								
	Memory and Optoelectronic Devices	Periods	12						
Unit - V	Architecture of ROM - PROM, EPROM, EEPROM, EAROM. RAM - S	Static RAM - Dyn	amic RAM and						
OIIIt - V	Integrated RAM - Compact Disk. Solar cells - LED - Photo diode - Pin	Diode - LCD - LI	OR.						
	Total Periods		60						

Text Books	
1	1. Handbook of Electronics, Gupta and Kumar, PragatiPrakashnan, Meerut, (2003).
2	2. Linear Integrated Circuits, D. Roy choudry, New Age Publications, (2015).
References	
1	1. Electronic Measurement and Instrumentation, WilliamCooper, TMG Hill, (2001).
2	2. Operational Amplifier, Robert F, Pearson Hill, (2015).
E-References	
1	1. www.khanacademy.org/science/physics/electronics/operational amplifier.
2	2. www.khanacademy.org/science/physics/electronics/memory and optoelectronic devices.





WOMEN EMPOWERMENT		Elayampalayam,	Tiruche	ngod	e-63	7 205.			10 31030/840/
Programme	M.Sc.,	Programme Code		PP	Н		Regula	tions	2018-2019
Department	Phys	sics	1						
		Periods Credit Maximum Ma							
Course Code	Course	Name	per	Wee	ek				
			L	T	P	С	CA	ESE	Total
18P1PHE01	NANOSCIEN	ICE .	4	0	0	4	25	75	100
COURSE	1.To provide the	ne basic skills required to	understa	nd, d	evel	op, and desig	gn Nanoma	terials.2	.To enhance the
OBJECTIVE S	research intere	st in Nanotechnology							
POs		PROGRAMME OUT	COME						
PO 1	Capable of der programme of	nonstrating the basic conc study.	ept sand	com	preh	ensive know	ledge from	undergi	raduate
PO 2		ess thoughts and ideas effection ea in clear and concise ma		Com	mun	icate with otl	hers using	appropri	ate media and
PO 3	To identify the	To identify the relevant assumptions to formulate the arguments by following scientific approach to knowledge development							
PO 4		ve different kinds of non-	familiar	prob	lems	and apply to	real life si	tuations	
PO 5	Ability to eval	uate the reliability and rele	evance of	f evic	lenc	e , analyse ar	nd synthesi	se data i	from a variety
	of sources ther	draw valid conclusions a	nd suppo	ort th	em v	with evidence	and exam	ples, and	d addressing
	opposing view	•							
PO 6		lems, formulate hypothe							conclusions
		dict cause-and-effect relati	ionships	and a	ıbilit	ty to plan, ex	ecute and r	eport the	e results of an
PO 7	experiment	CC+:1	11	J:	4.		4		d :
PO /		c effectively and respectfu			se te	eams, facilita	ie cooperai	ive or co	oordinated effor
PO 8		yse, interpret and draw con			n au	antitative/au	alitative da	ta and c	ritically evaluate
100	•	e and experiences from an			-	•		ita ana c	ricically evaluate
PO 9		ility to lived experiences,					_	h self ar	nd society.
PO 10		se ICT in a variety of lear							
	= -	vant information sources a	_				-		
PO 11		c independently, identify a							nanage a project
	through to con	npletion							
PO 12	Capability to e	ffectively engage in a mul	lticultura	l soc	iety	and interact	respectfully	with di	iverse groups.
PO 13	Capable of der	nonstrating the ability to i	dentify e	thica	l iss	ues related to	ones work	k, avoid	unethical
	behaviour such	as fabrication, falsification	on or mis	srepre	esen	tation of data	ι		
PO 14	Capability for	mapping out the tasks of a	team or	an o	rgan	ization, and	setting dire	ction,fo	rmulating an
		n, building a team who car							
PO 15		ire knowledge and skills,	includin	g hov	v to	learn, that ar	e necessary	for par	ticipating in
	learning activi	ties throughout life.							

COs	COURSE OUTCOME
CO 1	To acquire more knowledge about mechanical, electrical, optical properties of nano particles.
CO 2	Analyze the nano fabrication and nano patterning
CO 3	Understand characterization techniques of nano particles Analyze the SEM and TEM equipments.
CO 4	Acquire knowledge about working principle of photo loumninescene spectroscopy. Understand the workingprinciple of XRD and UV.
CO 5	Apply carbon nano tubes for electronics applications.
Pre-requisites	To Acquire idea about Nano Science

1. Remembering, 2. Understanding, 3. Applying, 4. Analyzing, 5. Evaluating, 6. Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

(3/2/1 marcates	the strength of correlation, 5-stre	ong, 2 medium, 1 weak)	
COs	KLs	POs	KLs
		PO 1	1
CO 1	1	PO 2	2
		PO 3	2
		PO 4	3
CO 2	4	PO 5	5
		PO 6	1
		PO 7	6
CO 3	2	PO 8	4
		PO 9	5
		PO 10	1
CO 4	2	PO 11	2
		PO 12	2
		PO 13	3
CO 5	3	PO 14	3
		PO 15	6

CO / PO Mapping

COs		Programme Outcome (POs)													
COS	РО	РО	РО	РО	РО	РО	PO7	PO	РО	PO1	PO1	PO1	PO1	PO1	PO1
	1	2	3	4	5	6		8	9	0	1	2	3	4	5
CO1	3	2	2	1	1	3	1	1	1	3	2	2	1	1	1
CO2	1	1	1	2	2	1	1	3	2	1	1	1	2	2	1
CO3	2	3	3	2	1	2	1	1	1	2	3	3	2	2	1
CO4	2	3	3	2	1	2	1	1	1	2	3	3	2	2	1
CO5	1	2	2	3	1	1	1	2	1	1	2	2	3	3	1

Course Assessment Methods
Direct
Continuous Assessment Test I, II & Model
Assignment
End Semester Examinations
Indirect
1. Course End Delivery

Content of th	e Syllabus								
	Basic Properties of Nanoparticles	Periods	12						
	Particle Size: Top down and bottom up ideas - particles shape - Size effect and properties of a								
Unit - I	particles; Particle density; Melting point; Surface tension; Wettability; Specific surface area and								
	Composite structure; Crystal structure; Surface characteristics; M	Mechanical prope	rties; Electrical						
	properties; Magnetic								
	properties; Optical properties; Concept of vacuum technology		·						
	Nanofabrication and Nan patterning	Periods	8						
Unit - II	Sol - gel Synthesis - Hydrothermal Synthesis - CVD method - Optical, 2	X-ray, and electron	n beam						
	lithography - Self - assembled organic layers - Microwave techniques		T						
	Characterization Techniques	Periods	11						
	Scanning Electron Microscope (SEM) - Transmission Electron Mic	=							
Unit - III	Microscope (AFM) - Scanning Tunneling Microscope (STM),		•						
	Instrumentation and applications - Photoluminescence (PL) Spectrosco	py - UV Spectros	copy analysis -						
	Elemental								
	dispersive EDAX analysis.	T	Γ .						
	Nano Systems	Periods	8						
Unit - IV	Quantum dot - Quantum wire - Quantum Hall effect - C60- Basics of fu								
	its applications - Tunnel diode - Molecular transistor - Single electron tr	ansistor - Spin po	larized transistor						
	- Thin film self assembly		Γ .						
	Applications of Nanomaterial	Periods	9						
Unit - V	Optoelectronic properties of molecular materials - Nanotechnology devi								
	Bioelectronics and biosensors: Charge Transport - DNA and Protein	functional system	ms, Electronic						
	noses and biosensors		T 40						
	Total Periods		48						

Text Books	
1	. Roland Wiesendanger â€" Scanning Probe Microscopy and Spectroscopy â€" Methods and
	Applications – Cambidge University Press, (1994).
2	Joel I. Gersten, Frederick W. Smith – The Physics and Chemistry of Materials; John Wiley and Sons,
	(2001).
3	John C. Vickerman; Surface Analysis (The principal Techniques); John Wiley and Sons, (2003).
References	
1	D. Briggs, M.P. Seah; Practical Surface Analysis-Auger and X-ray Photoelectron Spectroscopy, Wiley
	Interscience, (1990).
2	Sergei N. Magonov, Myung-Hwan Whangbo; Surface Analysis with STM and AFM: Experimental and
	Theoretical Aspects of Image Analysis, VCH Publishers, (1996).
3	Nanoscale materials in chemistry, Kenneth, John Wiley and Sons, (2003).
E-References	
1	https://www.google.com/search?q=Basic%20Properties%20of%20Nanoparticle+filetype%3Adoc
2	https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=5&cad=rja&uact=8&ved=2ahUKE
	wiO_cDVnvvcAhXJqY8KHTN2D_YQFjAEegQIBhAC&url=http%3A%2F%2Fwww.lehigh.edu%2F~inm
	atpac%2Fsyllabus%2Fs2004mat398.doc&usg=AOvVaw18OmcUT7mNM2qfDrdLTkkG



VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elavampalayam, Tiruchengode-637 205.



WOMEN EMPOWERMENT												
Programme	M.Sc	M.Sc Programme Code pph Regulations										
Department	Phy	2										
			Pe	riods		Credit	Maxim	um Mar	ks			
Course Code	Course	Name	per	r We	ek							
		L T P C CA ESE										
18P2PH05	QUANTUM I	MECHANICS - I	6	0	0	5	25	75	100			
COURSE	1. To acquire knowledge of non-relativistic and relativistic quantum mechanics.2. The ability to unc											
OBJECTIVE S	concepts and t	concepts and to perform calculations of scattering of particles.										
POs		PROGRAMME OUT	COME									
PO 1	Capable of der	nonstrating the basic concestudy.	epts and	com	preh	ensive knowl	edge from	underg	raduate			
PO 2	Ability to expr	ress thoughts and ideas effe	ectively	Com	mun	icate with oth	ners using a	ppropri	iate media .			
PO 3	To identify the	e relevant assumptions to for	ormulate	e the	argu	ments by foll	owing scie	ntific a	pproach to			
	knowledge dev	velopment.										
PO 4	Capacity to sol	lve different kinds of non-f	familiar	prob	lems	and apply to	real life si	tuations	3			
PO 5	Ability to eval sources .	Ability to evaluate the reliability and relevance of evidence, analyse and synthesise data from a variety of										
PO 6	To define prob	olems, formulate hypothes	ses, test	hypo	thes	es, analyse, ir	nterpret and	l draw	conclusions			
PO 7	Ability to worl	k effectively and respectful	lly with	dive	se to	eams, facilitat	te cooperat	ive or c	oordinated effort			
	on the part of a	a group .										
PO 8	Ability to anal	yse, interpret and draw con	clusion	s fro	n qu	antitative/qua	alitative da	ta and c	ritically evaluate			
	ideas, evidence	e and experiences from an	open-m	indec	l and	l reasoned per	rspective.					
PO 9		ility to lived experiences, v										
PO 10	Capability to u	se ICT in a variety of learn	ning situ	atior	ıs, d	emonstrate ab	oility to acc	ess, eva	luate, and use a			
	variety of rele	vant information sources.										
PO 11	•	k independently, identify a	ppropri	ate re	sour	ces required	for a projec	et, and r	nanage a project			
	through to con	•										
PO 12		effectively engage in a mult			_							
PO 13	_	nonstrating the ability to ic	dentify e	ethica	ıl iss	ues related to	ones work	t, avoid	unethical			
		n as fabrication.										
PO 14		mapping out the tasks of a			_		•		•			
		n, building a team who can gage with that vision.	help ac	chiev	e the	e vision, moti	vating and	inspirin	g team			
PO 15		ire knowledge and skills, i	includin	σ ho	w to	learn that are	necessarv	for ner	ticinating in			
1013	• •	ties throughout life, through		_			•	ioi pai	acipumg m			
	rearring activi	acs an oughout me, unoug	, sc11-p	accu	unu	sen uncellu	rammig.					

COs	COURSE OUTCOME
CO 1	To get the knowledge about Ehrenfest theorem . Understand the Expectation values of dynamical quantities
CO 2	Able to understand spin angular momentum. To analyze the eigen values spectrum. Evaluate the properties.
CO 3	Understand the characteristic equation of a matrix. To analyze the Hibert space.
CO 4	Apply the time independent perturbation theory in non degenerate cases. Analyze the fundamental concepts
	Variation method and its uses.
CO 5	Apply the selection rule for dipole radiation. Evaluate adiabatic and sudden approximation.
Pre-requisites	GET KNOWLEDGE

				Knov	wledge	e Lev	els									
1.Remembe	ring, 2	2.Und	lerstaı					nalyz	ing, 5	.Evalu	ating,	6.Syn	thesizi	ng		
				CO / F	PO / KL	. Марр	ing									
(3.	/2/1 ind	licates t	the stre	ngth of	correla	tion, 3	-strong	, 2-med	ium, 1-	weak)						
COs				KLs				P	Os]	KLs			
								PC) 1					1		
CO 1					1) 2					2		
) 3					2		
GO 5					2) 4					3		
CO 2					2				0 5					5 1		
														6		
CO 3					4			PO 7 PO 8				4				
					•			PO 9					5			
									10					1		
CO 4				3 PO 11							2					
								PC	12					2		
									13					3		
CO 5					5				14					3		
				CO	/ DO N	Ionniu :		PC	15					6		
(3	/2/1 ind	licates t	he strei			Iapping		2-med	ium 1.	weak)						
(3.		iraics (110 51101						14111, 1	weak)						
COs	PO	PO	PO	Programme Outcome (POs) PO PO PO PO PO PO PO PO PO PO1 PO1							PO1	PO1	PO1	PO1		
	1	2	3 4 5 6 8 9 0 1							2	3	4	5			
CO1	3	2	2	1	1	3	1	1	1	3	2	2	1	1	1	
CO2	2	3	3	3 2 1 2				1	1	2	3	3	2	2	1	
CO3	1	1	1	2	2	1	1	3	2	1	1	1	2	2	1	
CO4	1	2	2	3	1	1	1	2	1	1	2	2	3	3	1	
	1													+		

2

2

3

CO5

Course Assessment Methods		
Direct		
	1. Continuous Assessment Test I, II & Model	
	2. Assignment	
	3. End Semester Examinations	
Indirect		
1. Course End Delivery		

	General Formalism of Quantum Mechanics	Periods	12						
	Expectation values of dynamical quantities - Probability of current density - Ehrenfest theorem -								
Unit - I	Uncertainty principle - Relations - Simultaneous measurability of observa	ables - Diracs nota	ition,						
	Schrodinger, Heisenberg and Dirac representation (Pictures) - Momentum representation.								
	Angular Momentum	Periods	12						
	Orbital Angular Momentum - Spin Angular Momentum - Total Angular I	Momentum Opera	tors -						
Unit - II	Commutation relations of Total Angular Momentum with Components -	Ladder operators	- Commutatio						
OIII - II	Relation of Jz with J+ and J-, Eigen values spectrum of J2, Jx, Jy and Jz,	Matrix Representa	ation of J2, Jz,						
	J+ and J-, Addition of angular momenta: Clebsch Gordon Coefficients - H	Properties and its l	Evaluation.						
	operators								
Unit - III	Eigen values, Eigen vectors: Characteristic equation of a matrix, Schrodin	nger, Heisenberg	and Interaction						
Onit - m	matrix representation. Diracs Bra and Ket vectors: Dual Space, Hibert Sp	ace, Projection Op	perator, and						
	Matrix Theory of Harmonic Oscillator								
	Approximation Methods	Periods	12						
Unit - IV	Time Independent Perturbation Theory in Non - Degenerate Case, Ground	d State of Helium	Atom,						
OIIIt - I V	Degeneracy - Stark Effect in Hydrogen - Spin - Orbit interaction - Variation	ion Method & its	application to						
	Hydrogen Molecule - WKB Approximation.								
	Time Dependent Perturbation Theory	Periods	12						
	Time Dependent Perturbation Theory - First and Second Order Transition	ns - Transition to	Continuum of						
Unit - V	States: Fermi Golden Rule - Constant and Harmonic Perturbation - Tran	nsition Probabiliti	es - Selection						
	Rules for Dipole Radiation - Adiabatic and Sudden Approximation - Cha	rged Particle in ar	1						
	Electromagnetic Field.								
	Total Periods	<u> </u>	60						





WOMEN EMPOWERNEN		Elayampalayam, T	`irucheı	ngod	e-63	37 205.					
Programme	M.Sc	tions	2018-2019								
Department	Phy	2									
		Periods Credit Maximum Marks					ks				
Course Code	Course										
		Total									
18P2PH06	SPECTROSC	100									
COURSE	To know the B	asic ideas about different t	ypes of	spec	trosc	copic theories	and to kno	ow the p	rinciple and		
OBJECTIVE S	functions of sp	ectroscopic instrumentation	ns.								
POs		PROGRAMME OUT	COME								
PO 1	=	nonstrating the basic conce	pts and	com	preh	ensive know	ledge from	underg	raduate		
-	programme of	•									
PO 2	• •	ress thoughts and ideas effe	•								
PO 3		relevant assumptions to fo	rmulate	the	argu	ments by foll	owing scie	ntific a _l	pproach to		
70.1	knowledge dev	-									
PO 4		lve different kinds of non-f				11 7					
PO 5	Ability to eval sources .	uate the reliability and rele	vance of	f evid	denc	e , analyse ar	id synthesis	se data i	from a variety of		
PO 6	To define prob from data.	lems, formulate hypothes	es, test l	hypo	thes	es, analyse, ii	nterpret and	d draw	conclusions		
PO 7	Ability to worl	k effectively and respectful	ly with	dive	se te	eams, facilita	te cooperat	ive or c	oordinated effort		
	on the part of a	a group .									
PO 8	· ·	yse, interpret and draw con			-	-		ta and c	ritically evaluate		
		e and experiences from an o									
PO 9		ility to lived experiences, w					•		•		
PO 10		se ICT in a variety of learn	ing situ	atior	ıs, de	emonstrate al	oility to acc	ess, eva	luate, and use a		
	•	vant information sources.									
PO 11		k independently, identify ap	propria	ite re	sour	ces required	for a projec	et, and n	nanage a project		
	through to con	*									
PO 12		ffectively engage in a mult									
PO 13	_	nonstrating the ability to id	entify e	thica	ıl iss	ues related to	ones work	, avoid	unethical		
		as fabrication.									
PO 14		mapping out the tasks of a			_		•		•		
		n, building a team who can	help ac	hiev	e the	vision, moti	vating and	inspirin	g team		
		gage with that vision.									
PO 15		ire knowledge and skills, i		_			_	for par	ticipating in		
	learning activi	ties throughout life, through	earning activities throughout life, through self-paced and self-directed learning.								

COs	COURSE OUTCOME
CO 1	Understand the techniques of rotation of molecules and their spectra. Analyze the microwave spectrometer.
CO 2	Analyze IR and Raman spectroscopy. Evaluate the Born Oppenheimer approximation.
CO 3	Understand the instrumentation of UV Photo electron spectroscopy. Analyze the frank Condon principle.
CO 4	Understand the Quantum Mechanical and Classical Description. Apply NMR spectroscopy for determining
	the content and purity of samples.
CO 5	Understand the principles of ESR spectrometer and analyze the experimental techniques in hyperfine
	interaction.
Pre-requisites	GET KNOWLEDGE ABOUT SPECTROSCOPY

1. Remembering, 2. Understanding, 3. Applying, 4. Analyzing, 5. Evaluating, 6. Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

(e, =, 1 mereaces	the strength of confedencia, a str	9118, 2 11100101111, 1 1100111)	
COs	KLs	POs	KLs
		PO 1	1
CO 1	2	PO 2	2
		PO 3	2
		PO 4	3
CO 2	4	PO 5	5
		PO 6	1
		PO 7	6
CO 3	2	PO 8	4
		PO 9	5
		PO 10	1
CO 4	3	PO 11	2
		PO 12	2
		PO 13	3
CO 5	4	PO 14	3
		PO 15	6

CO / PO Mapping

COs		Programme Outcome (POs)													
COS	РО	РО	РО	PO	РО	РО	PO7		РО	PO1	PO1	PO1	PO1	PO1	PO1
	1	2	3	4	5	6		8	9	0	1	2	3	4	5
CO1	2	3	3	2	1	2	1	1	1	2	3	3	2	2	1
CO2	1	1	1	2	2	1	1	3	2	1	1	1	2	2	1
CO3	2	3	3	2	1	2	1	1	1	2	3	3	2	2	1
CO4	1	2	2	3	1	1	1	2	1	1	2	2	3	3	1
CO5	1	1	1	2	2	1	1	3	2	1	1	1	2	2	1

Course Assessment Methods	
Direct	
	1. Continuous Assessment Test I, II & Model
	2. Assignment
	3. End Semester Examinations
Indirect	
1. Course End Delivery	

Content of th	e Syllabus										
	Microwave Spectroscopy	Periods	12								
	Rotation of molecules and their Spectra - Diatomic molecules, Inten	Rotation of molecules and their Spectra - Diatomic molecules, Intensity of line spectra - The effect of									
Unit - I	isotropic substitution - Non - rigid rotator and their spectra - Polyatomi	c molecules (Line	ar and Symmetric								
	top molecules)- Classical theory of Raman Effect - Pure Rotational Rar	nan Spectra (Linea	ar and Symmetric								
	top molecules) - Stark effect - Microwave Spectrometer.										
	IR and Raman Spectroscopy	Periods	12								
	Vibrational energy of diatomic molecules - Simple Harmonic Oscillato	r- Anharmonic osc	cillator - Diatomic								
	vibrating rotator - Vibration - Rotation spectrum of carbon monoxide,	Breakdown of Bo	rn - Oppenheimer								
Unit - II	Approximation, Influence of rotation on the spectra of polyatomic me	olecules (Linear ar	nd Symmetric top								
	Molecules). Raman Effect - Quantum Theory of Raman Effect - Selection Rules - Degree ofdepolarization										
	- Rotational Raman Spectrum - Vibrational Raman Spectrum, Structure determination using IR and Raman										
	spectroscopy - Principles and Working of Raman Spectrometer.										
	Electronic Spectroscopy	Periods	12								
	Born - Oppenheimer Approximation, Vibrational Coarse and their progressions - Franck-Condon Principle										
Unit - III	- Dissociation energy and their products - Rotational fine structure of electronic - Vibration Transition -										
Omt - m	Molecular Orbital theory - Spectrum of molecular hydrogen -Change	of shape on excit	tation - Chemical								
	analysis by electronic spectroscopy - Re-emission of energy by excited	molecule- Instrum	nentation of UV								
	Photoelectron Spectroscopy - Zeeman Effect.										
	NMR & NQR Spectroscopy	Periods	12								
	NMR Spectroscopy: Quantum Mechanical and Classical Description - Bloch Equations - Relaxation										
Unit - IV	Processes - Principle and Working of High Resolution - NMR	Spectrometer -0	Chemical Shift -								
Omt 1v	Applications of NMR Spectroscopy.NQR Spectroscopy: Fundamental requirements - General Principle -										
	Experimental										
	detection of NQR frequencies - Interpretation and Chemical explanation										
	ESR &Mossbauer Spectroscopy	Periods	12								
	ESR Spectroscopy: Basic Principles, ESR Spectrometer - Reflection Cavity and Microwave bridge - ESR										
Unit - V	Spectrum - Hyperfine Structure.Mossbauer Spectroscopy: Mossbauer										
	absorption- Mossbauer Spectrum: Experimental techniques - Hyperfi										
	Shift- Doppler velocity shift - Magnetic hyperfine interaction - electric	quadrupole interac									
	Total Periods		60								

Text Books	
1	Vibrational Spectroscopy, Sathyanarayana, New Age International Publications, (2004).
2	Fundamentals of Molecular Spectroscopy, Banwell, TMG Hill, (2009).
References	
1	Spectroscopy II, Straughan and Walkar, Chapman and Hall, (2003).
2	Modern Molecular Spectroscopy, Randhava, Macmillan India, (2003).
E-References	
1	www.khanacademy.org/science/physics/spectroscopy/microwave spectroscopy.
2	www.khanacademy.org/science/physics/spectroscopy/IR/raman spectroscopy.





Elavampalavam, Tiruchengode-637 205.

WOMEN EMPOWERMENT		Elayampalayam,	Tiruche	ngod	le-63	37 205.						
Programme	M.Sc., Programme Code PPH Regulations											
Department	Physics Semester											
	Periods Credit Maximum Mark											
Course Code	Course	Name	per	We	ek							
			L	T	P	С	CA	ESE	Total			
18P2PHE02	BIO PHYSIC	CS	4	0	0	4	25	75	100			
COURSE	To learn abou	t the basic biophysics and	to know	abo	at the	e principle a	nd working	of bio i	nstrumentations			
OBJECTIVES	and its applications.											
POs		PROGRAMME OU	TCOME									
PO 1	_	monstrating the basic con	cepts and	l con	nprel	hensive know	vledge from	n under	graduate			
	programme of											
PO 2		ress thoughts and ideas ef										
PO 3	-	e relevant assumptions to	formulat	e the	argi	uments by fo	llowing sci	ientific a	approach to			
70.4	knowledge de	*	2				1.110					
PO 4		olve different kinds of non										
PO 5		luate the reliability and re	elevance o	of ev	iden	ce, analyse a	and synthes	ise data	from a variety			
DO 6	sources .	11 6 1 1 1		1	-1		• , ,	1.1	1 .			
PO 6	_	blems, formulate hypoth	eses, test	nyp	otnes	ses, anaiyse,	interpret ai	ia araw	conclusion			
PO 7	from data.	k effectively and respects	Siller resith	div	reo f	come feailit	eta aconore	otivo or	acardinated offe			
10 /	on the part of	• •	uiiy witii	uive	150 (eams, facim	ate coopera	ilive or	coordinated erro			
PO 8	*	lyse, interpret and draw co	onclusion	s fro	m a	uantitative/a	ualitative d	ata and	critically evalua			
100	•	the and experiences from a			-	-			critically evalua			
PO 9	<u> </u>	pility to lived experiences,							and society			
PO 10		use ICT in a variety of lea							<u> </u>			
	•	evant information sources.	•		,		J	,	,			
PO 11		k independently, identify		ate r	esou	rces required	l for a proje	ect, and	manage a projec			
	through to cor					•	1 3		0 1 0			
PO 12	Capability to	effectively engage in a mi	ulticultura	al so	ciety	and interact	respectful	ly with o	liverse groups			
PO 13	Capable of de	monstrating the ability to	identify	ethic	al is	sues related t	to ones wor	k, avoic	l unethical			
	behaviour suc	h as fabrication.										
PO 14	Capability for	mapping out the tasks of	a team o	r an	orga	nization, and	setting dir	ection, 1	formulating an			
	inspiring visio	on, building a team who ca	an help a	chiev	e th	e vision, mo	tivating and	l inspiri	ng team			
	membersto en	gage with that vision.										
PO 15	Ability to acq	uire knowledge and skills	, includir	ng ho	w to	learn, that a	re necessar	y for pa	rticipating in			
	learning activities throughout life, through self-paced and self-directed learning.											

COs	COURSE OUTCOME
CO 1	To acquire the knowledge about strong and weak bonds.
CO 2	Acquire knowledge about radioactivity. Apply GM counter for the detection of ionizing radiation.
CO 3	Acquire the knowledge about Biomolecules and biological energy. Analyze the DNA and RNA conformation. Synthesis the ATP.
CO 4	To acquire the knowledge about the movement of organisms. To understand the Nerve impulse and nervous system.
CO 5	To get the knowledge about Ballistic control in a simplified visual system. To understand the mental processing.
Pre-requisites	GET KNOWLEDGE ABOUT biophysics

Pre-requisites	GET	KNO	WLEDO	JE AD	JO1 01	орпуя	CS								
				Knov	wledg	e Lev	els								
1.Remembe	ering, Z	2.Und	lerstai	nding	, 3.Ap	plyin	g, 4.A	nalyz	ing, 5	.Evalu	ating,	6.Syn	thesizi	ing	
(3	/2/1 ind	icates t	ha etra	CO / F			_	2 mad	ium 1	week)					
COs	/ 2/ 1 IIIG	il cates t		KLs	COTTCIA	tion, 5	suong,		Os	weak)]	KLs		
) 1					1	
CO 1					1) 2					2	
								PC) 3					2	
) 4					3	
CO 2					3) 5					5	
) 6					1	
GO 2					4	PO 7					6				
CO 3					4			PO 8 PO 9				5			
									10					1	
CO 4					2) 11					2	
					_				12					2	
								PC	13					3	
CO 5					2			PC	14					3	
								PC	15					6	
					/ PO M										
(3	/2/1 ind	icates t	the stre						ium, 1-	weak)					
COs							e (POs)						1		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PO1 3	PO1 4	PO1
CO1	3	2	2	1	<u>3</u> 1	3	1	1	1	3	2	2	1	1	5 1
CO2	1	2	2	3	1	1	1	2	1	1	2	2	3	3	1
CO3	1	1	1	2	2	1	1	3	2	1	1	1	2	2	1
CO4	2	3	3	2	1	2	1	1	1	2	3	3	2	2	1
CO5	2	3	3	2	1	2	1	1	1	2	3	3	2	2	1

Course Assessment Methods	
Direct	
	1. Continuous Assessment Test I, II & Model
	2. Assignment
	3. End Semester Examinations
Indirect	
1. Course End Delivery	

Content of th	e Syllabus								
	Bonds	Periods	8						
	Ionization energy electron affinity - chemical bonding - electronegativit	y - strong bond	ls secondary						
Unit - I	bonds. Energies-forces-bonds: Interatomic potentials for strong and we	ak bonds -bond e	nergies. Rates						
	of reaction: reaction kinetics- water, acids, bases and aqueous reactions.	Transport process	: Diffusion -						
	viscosity-thermal conduction								
	Radioactivity	Periods	8						
Unit - II	Radiation Biology: Radio activity- Natural radiation (Cosmic rays) - Ar	tificial (or) Induce	ed radioactivity -						
Onit - II	Radioactive disintegration - Geiger-muller counter - Crystal cou	unter: Method o	f detection of						
	disintegration frequency - Biological effects of radiation.								
	Biological structure	Periods	8						
	Biomolecules and biological energy Biological polymers: Nucleic acids-DNA-RNA-conformation-								
Unit - III	proteins protein folding. Biological Membranes: Historical background-membrane chemistry and								
	structure-membrane physics. Biological energy: Energy consumption respiration-photosynthesis-ATP								
	synthesis.								
	Nature of organisms	Periods	8						
	Movement of organisms Bacterial motion-chemical memory in primitive organisms-muscular								
Unit - IV	movement-human performance, nerve signals and memory Excitable n	nembranes: Diffus	ion and mobility						
	of Ions-resting potential Nerve signals: Passive response-Nerve imp	ulses (action pot	entials)- nervous						
	system.	T	1						
	Instrumentation	Periods	12						
	Control of movement Primary of movement-Ballistic control in a sin	-							
Unit - V	more sophisticated-mode of control-structure of muscle fibres-centr	al pattern genera	ntors-						
	conditioned								
	reflexes-volition-and Free will-consciousness Passive verses active in m	nental processing.	T						
	Total Periods		40						

Text Books	
1	RodyneyM.J.Cotterill, Biophysics: An introduction, John Wiley and sons Publications, (2014).
2	Roland Glacer, Biophysics, Springer Publications, (2006).
References	
1	P.K.Srivastava, Elementary Biophysics An introduction, Narosa Publishing House, (2005).
2	M.V.Volkenshtein, Biophysics, Mir Publications, Moscow, (2010).
E-References	
1	https://www.google.com/search?q=httt%2Fwww.biophysics&ie=utf-8&oe=utf-8&client=firefox-b-ab
2	https://www.google.com/search?q=http%2F+radiation+physics&ie=utf-8&oe=utf-8&client=firefox-b-ab





WOMEN EMPOWERMENT	Elayampalayam, Tiruchengode-637 205.												
Programme	M.Sc	Programme Code		P	PH	ions	2018-2019						
Department	Phy	2											
		·ks											
Course Code	Course												
		L T P C CA ESE											
18P2PHE04	ELECTRO	100											
COURSE	To provide the basic skills required to understand, develop, and design Electromagnetic materials and To												
OBJECTIVES	enhance the	enhance the research interest in electricity and magnetism.											
POs		PROGRAMME OUTCOME											
PO 1	Capable of d	emonstrating the basic conc	ept sa	nd c	compr	ehensive know	wledge from	n under	rgraduate				
	programme o	•											
PO 2		press thoughts and ideas effo		ly C	omm	unicate with o	others using	g approj	priate media and				
DO 6		idea in clear and concise ma				1.0							
PO 3		he relevant assumptions to f	ormul	ate	the ar	guments by to	ollowing sc	1entific	approach to				
PO 4	knowledge d	evelopment solve different kinds of non-	fomili	ior n	roblas	ne and annly	to real life	aituatio	an a				
PO 5		aluate the reliability and rele											
103	•	en draw valid conclusions a				•	•		•				
		pposing viewpoints.	na sa _l	ppor	t tireii	i with eviden	ce una exui	пртов, с	ina .				
PO 6		oblems, formulate hypothe	ses, te	st h	ypoth	eses, analyse,	interpret a	nd drav	v conclusions				
	•	redict cause-and-effect relati				•	•						
	experiment												
PO 7	Ability to wo	ork effectively and respectfu	lly wi	th d	iverse	teams, facili	tate cooper	ative or	coordinated				
		f a group and act together as			_								
PO 8	evaluate	alyse, interpret and draw con						lata and	l critically				
PO 9		ice and experiences from an ibility to lived experiences,						oth self	and society				
PO 10		use ICT in a variety of lear											
1010		evant information sources a	_				•						
PO 11	Ability to wo	ork independently, identify and to completion											
PO 12	Capability to	effectively engage in a mul	ticultı	ural	societ	y and interac	t respectful	ly with	diverse groups.				
PO 13		emonstrating the ability to i											
	behavior suc	h as fabrication.											
PO 14	Capability fo	or mapping out the tasks of a	team	or a	an org	anization, and	d setting di	rection,	formulating an				
	inspiring visi												
PO 15		quire knowledge and skills,	includ	ling	how	o learn, that a	are necessar	ry for p	articipating in				
	learning activ	vities throughout life.											

COs	COURSE OUTCOME
CO 1	To understand the concept of electrostatics. Acquire conceptual knowledge molecular polarisability.
	Analyze the Laplace equation.
CO 2	Understand the techniques biot-savarts and amperes circuital law.
CO 3	Understand the faraday laws of induction and evaluate the Maxwells equation.
CO 4	Understand the propagation of waves in rectangular wave guides. Apply the concept of wave guides in
	homogeneous wave equation.
CO 5	Acquire the knowledge about Plasma physics. Apply the Plasma or welding techniques.
Pre-requisites	To Acquire idea about Electrodynamics

1. Remembering, 2. Understanding, 3. Applying, 4. Analyzing, 5. Evaluating, 6. Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

(6.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2								
COs	KLs	POs	KLs					
		PO 1	1					
CO 1	1	PO 2	2					
		PO 3	2					
		PO 4	3					
CO 2	2	PO 5	5					
		PO 6	1					
		PO 7	6					
CO 3	2	PO 8	4					
		PO 9	5					
		PO 10	1					
CO 4	3	PO 11	2					
		PO 12	2					
		PO 13	3					
CO 5	3	PO 14	3					
		PO 15	6					

CO / PO Mapping

COs		Programme Outcome (POs)													
COs	PO	РО	РО	PO	PO	PO	PO7	РО	PO	PO1	PO1	PO1	PO1	PO1	PO1
	1	2	3	4	5	6		8	9	0	1	2	3	4	5
CO1	3	2	2	1	1	3	1	1	1	3	2	2	1	1	1
CO2	2	3	3	2	1	2	1	1	1	2	3	3	2	2	1
CO3	2	3	3	2	1	2	1	1	1	2	3	3	2	2	1
CO4	1	2	2	3	1	1	1	2	1	1	2	2	3	3	1
CO5	1	2	2	3	1	1	1	2	1	1	2	2	3	3	1

Course Assessment Methods	
Direct	
	1. Continuous Assessment Test I, II & Model
	2. Assignment
	3. End Semester Examinations
Indirect	
1. Course End Delivery	

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Content of th	e Syllabus							
	Electrostatics	Periods	14					
	Coulombs law - Field due to point and continuous charges - Gauss Law	and its application	on - Laplace and					
III	Poissons equations - Solution of Laplace equation in spherical Coordi	inates - Point cha	arge infront of a					
Unit - I	conducting sphere - Multipole expansion - Electrostatic energy -	Dielectrics - I	Polarization and					
	Displacement vectors, Boundary conditions - Dielectric sphere in	n a uniform fie	ld - Molecular					
	polarizabilityand Electrical susceptibility - Electrostatic energy in diele	ectric medium - 0	Clausis-Mossotti					
	equation.							
	Magnetostatics	Periods	10					
	Biot-Savarts law - Divergence and curl of magnetic induction - Magneti	c vector potential	- Amperes					
Unit - II	circuital law - Magnetic field of a localized current distribution - Magne	tic moment and for	orce on a					
Cilit - II	current distribution in an electric field - Magneto static energy - Magnet	ic induction and I	Magnetic field					
	in a macroscopic media - Concept of magnetic dipole - Boundary condit	tions - Uniformly	magnetized					
	sphere -Magnetic Scalar & Vector Potential - Characteristics.							
	Electromagnetics	Periods	10					
	Faradays law of induction - Maxwells equation in free space and isotropic media - Maxwells							
Unit - III	displacements current - Vector and Scalar potential - Boundary conditions on the field at interfaces -							
	Relation between field theory and circuit theory - Gauge transformation	, Lorentz Gauge -	Coulomb gauge					
	- Conservationlaws for a system of charges - Poynting theorem.							
	Wave Propagation	Periods	14					
	Propagation of an electromagnetic wave in free space - Conducting and	•						
Unit - IV	Skin depth, Reflection and Transmission at dielectric boundaries - Polar							
	Interference, Coherence and Diffraction - Guided waves - Wave guides							
	rectangular wave guide, Inhomogeneous wave Equation and Retarded potentials, Field and Radiation							
	due to an oscillating							
	electric dipole.	· · ·	10					
	Plasma Physics	Periods	12					
	Plasma - Debye length - Plasma oscillations - Plasma behaviour in a ma	_	-					
Unit - V - Magnetohydrodynamic equations - Electron plasma oscillations - Debye shielding problem -								
	confinement in a magnetic field - Pinch effect - Magneto hydrodynamic							
	Dynamics of charged particle in uniform electromagnetic fields - Plasma	arc welding tech						
	Total Periods		60					

Text Books	
1	1. Introduction to Electrodynamics, Griffith, Prentice Hall of India, (2015).
2	2. Electromagnetic Waves and Fields, Paul Corson and Dale, CBS Publishers, (2005).
References	
1	1. Basic Electromagnetics with Application, N. Narayana, Prentice Hall of India, (2001).
2	2. Electromagnetic Theory and Applications, Umesh Sinha, Tech India Publications, (2005).
E-References	
1	https://www.google.com/search?q=http%2F+electromagnetic+theory&ie=utf-8&oe=utf-8&client=firefox-b
	-ab
2	.https://www.google.com/search?q=hppt%2F+magnetostatics&ie=utf-8&oe=utf-8&client=firefox-b-ab





Elavampalavam, Tiruchengode-637 205.

WOMEN EMPOWERMENT	Elayampalayam, Tiruchengode-637 205.											
Programme	M.Sc	Programme Code	PPH		Regulati	ions	2018-2019					
Department	Phy	Physics Semester 3										
			Periods	Credit	Maximu	ım Mar	ks					
Course Code	Course Name per Week											
		L T P C CA ESE										
18P3PH07	CONDENSE	D MATTER PHYSICS	5 0 0	5	25	75	100					
COURSE	1.This subject	provides an advanced introd	duction to conde	ensed matter p	hysics. 2.T	o challe	enge the students					
OBJECTIVE S	provide a four	dation for further advanced	studies.									
POs		PROGRAMME OUTC	COME									
PO 1	Capable of dea	nonstrating the basic concep	ots and compreh	ensive knowl	edge from	undergi	raduate					
	programme of											
PO 2	• •	ress thoughts and ideas effec	•	icate with oth	ners using a	ppropri	ate media and					
DO 2	•	lea in clear and concise man		. 1 . C 11			1 .					
PO 3		e relevant assumptions to for	mulate the argu	ments by foll	owing sciei	itific ap	oproach to					
PO 4	knowledge de	veropment. Ive different kinds of non-fa	miliar problems	and apply to	real life sit	nations	,					
PO 5		uate the reliability and relev	•									
103	=	raw valid conclusions	ance of evidence	e,anaryse and	i synthesise	data ir	om a variety of					
PO 6		olems, formulate hypotheses,	test hypotheses	analyse, inte	rpret and di	aw con	iclusions from					
	-	use-and-effect relationships	• •	-	-							
	experiment.				_							
PO 7	Ability to wor	k effectively and respectfull	y with diverse t	eams,facilitat	e cooperati	ve or co	ordinated effort					
	=	a group and act together as a ly as a member of a team.	group or a tear	n in the intere	ests of a con	nmon c	ause and					
PO 8	Ability to anal	yse, interpret and draw conc	clusions from qu	ıantitative/qua	alitative dat	a and c	ritically evaluate					
	ideas, evidenc	e and experiences from an o	pen-minded and	d reasoned per	rspective.							
PO 9	Critical sensib	ility to lived experiences, wi	ith self awarene	ss and reflexi	vity of both	self an	nd society.					
PO 10		ise ICT in a variety of learni	•		•		luate, and use a					
		vant information sources and										
PO 11		k independently, identify ap	propriate resour	ces required	for a projec	t, and n	nanage a project					
DO 12	through to con		11	1.	(C 11							
PO 12		effectively engage in a multi										
PO 13	•	monstrating the ability to identification as fabrication, falsification	•									
		n as fabrication, faisification intellectual property rights.	-	tation of data	or committ	ıng pıa	giafisili,					
PO 14		mapping out the tasks of a t		nization and a	entting direc	etion fo	ormulating on					
	= -	n, building a team who can l	=		_		=					
		gage with that vision.	noip acine ve tile	v 151011, 1110t1	vaung and i	пэриш	5 Cam					
PO 15		uire knowledge and skills, in	cluding how to	learn that are	e necessary	for par	ticinating in					
		ties throughout life.		unut all	. 110005541 y	IOI Pul						

COs	COURSE OUTCOME
CO 1	Acquire the knowledge about the energy bands. To understand the Kronig penny model
CO 2	To Understand Drudes Lorentz Free electron theory. Analyze Thermionic Emission
CO 3	To Understand the Langevin classical theory of diamagnetism. Apply the Guoys method in diamagnetism.
CO 4	Understand the concept of London equation. Apply the super conductors for commercial applications.
CO 5	To Understand and Apply the qualitative ideas of MEMs spintronics.
Pre-requisites	To Acquire idea about materials science

1. Remembering, 2. Understanding, 3. Applying, 4. Analyzing, 5. Evaluating, 6. Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

(2) = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 =	the surengui of confedencia, e sure		
COs	KLs	POs	KLs
		PO 1	1
CO 1	1	PO 2	2
		PO 3	2
		PO 4	3
CO 2	2	PO 5	5
		PO 6	1
		PO 7	6
CO 3	2	PO 8	4
		PO 9	5
		PO 10	1
CO 4	3	PO 11	2
		PO 12	2
		PO 13	3
CO 5	5	PO 14	3
		PO 15	6

CO / PO Mapping

COs	Programme Outcome (POs)														
COS	РО	РО	РО	РО	РО	PO	PO7	РО	РО	PO1	PO1	PO1	PO1	PO1	PO1
	1	2	3	4	5	6		8	9	0	1	2	3	4	5
CO1	3	2	2	1	1	3	1	1	1	3	2	2	1	1	1
CO2	2	3	3	2	1	2	1	1	1	2	3	3	2	2	1
CO3	2	3	3	2	1	2	1	1	1	2	3	3	2	2	1
CO4	1	2	2	3	1	1	1	2	1	1	2	2	3	3	1
CO5	1	1	1	1	3	1	2	2	3	1	1	1	1	1	2

Course Assessment Methods	
Direct	
	1. Continuous Assessment Test I, II & Model
	2. Assignment
	3. End Semester Examinations
Indirect	
1. Course End Delivery	

Content of the	e Syllabus							
	Electron Energy Bands	Periods	14					
	Basic concepts of energy bands - Fermi surface - Density of states - The	BlochsTheorm -	Kronig Penney					
Unit - I	model - Zone schemes for energy bands - Brillouin zones - Energy bands	ls in a general peri	iodic potential -					
	Motion of an electron in one dimensional lattice - Effective mass of an e	electron - Effective	e band gap and					
	band overlapping - Anomalous skin effect - De Hass van Alphen effect.							
	Free Electron Theory of Metals	Periods	12					
Unit - II	Free electron in metals - Drude Lorentz free electron theory - Electrical conductivity- Weidemann Franz law - Sommerfield free electron theory emission - Relaxation time - Collision time - Mean free path -Quantum electrons from metal - Potential energy of an electron outside the metal.	- Mattiessens Rul theory of free elec	le - Thermionic					
	Diamagnetism, Paramagnetism and Ferromagnetism	Periods	12					
	Diamagnetism -Langevin classical theory of Diamagnetism -Paramagnetism - Weiss theory of							
Unit - III	paramagnetism -Quantum theory of Paramagnetism - Demagnetization of a paramagnetyic salt -							
Cint - III	Determination of susceptibility of para and diamagnetism using Guoys method - Ferromagnetism -							
	Spontaneous magnetization in ferromagnetic materials - Quantum theory of ferromagnetism - Curie -							
	Weisslaw - Weiss molecular field - Ferromagnetic domains - Antiferror	nagnetism - Ferrir	nagnetism					
	Superconductivity	Periods	12					
	Superconductivity and its historical perspective - Critical Temperature - Persistent current - Energy gap							
Unit - IV	and its Temperature dependence - Type I and Type II superconductors - BCS theory - Flux quantization -							
	London equation - Josephson tunneling effect - DC and AC Josephson effect Power Applications of							
superconductors - High temperature Superconductors - High temperature Ceramic Supercondu								
	Semiconductor Devices	Periods	10					
Unit - V		Hall effect in semi conductors - Vacuum level and Work function of metals - Solar cells, Qualitative ideas						
,	of MEMs, Spintronics, Quantum Dots (QDs) & Molecular Electronics -	LED and Photodi						
	Total Periods		60					

Text Books	
1	Solid State Physics - S.O. Pillai, New Age Publication, 2nd Edition, 2002.
2	Solid State Physics – Gupta &Saxeena, PragattiPraashan, 9th Edition, 2004
References	
1	Introduction to Solid State Physics - C.Kittel (John Wiley and Sons), 7th Edition, 2005
2	Superconductivity Fundamentals and Applications – Werner Buckel, Reinhold Kleiner -VCH
	Publications, 2nd revised and enlarged edition 2004.
E-References	
1	https://physics.ku.edu/research/condensed-matter-physics
2	https://physics.uiowa.edu/research/condensed-matter-and-materials-physics





WOMEN EMPOWERNEH	Elayampalayam, Tiruchengode-637 205.							
Programme	M.Sc.,	Programme Code		PPH		Regulat	ions	2018-2019
Department	Phys	sics		Sen	nester	- 1		3
			Perio	ods	Credit	Maxim	um Mar	ks
Course Code	Course							
			L	T P	С	CA	ESE	Total
18P3PH08	QUANTUM N	MECHANICS - II	6	0 0	5	25	75	100
COURSE	1.To acquire k	nowledge of non-relativist	ic and rela	tivistic	quantum me	echanics.2.7	The abil	ity to understand
OBJECTIVE S	concepts and to	perform calculations of s	cattering	of parti	cles.			
POs		PROGRAMME OUT	COME					
PO 1	_	nonstrating the basic conc	epts and co	omprel	nensive know	ledge from	underg	raduate
_	programme of	•						
PO 2		ess thoughts and ideas effe		ommur	icate with of	hers using a	appropri	ate media and
DO 4	•	ea in clear and concise ma			. 1 6 1		. • •	• •
PO 3	=	relevant assumptions to fe	ormulate t	he argu	iments by fol	lowing scie	ntific aj	oproach to
PO 4	knowledge dev	ve different kinds of non-	fomiliar n	oblom	and apply to	rool life ei	tuotion	,
PO 5		uate the reliability and rele						
FO 3	=	caw valid conclusions	vance of e	videnc	e,anaryse and	a symmesise	uata 11	oni a variety of
PO 6		lems,formulate hypothese	s. test hype	otheses	Lanalyse, inte	erpret and d	raw cor	clusions from
	=	use-and-effect relationship			=	_		
	experiment.	1		, ,	,	1		
PO 7		effectively and respectful	lly with di	verse t	eams,facilitat	e cooperati	ve or co	oordinated effort
	on the part of a	group and act together as	a group o	r a tear	n in the inter	ests of a con	mmon c	ause and
	work efficientl	y as a member of a team.						
PO 8	Ability to anal	yse, interpret and draw cor	nclusions f	rom qu	ıantitative/qu	alitative da	ta and c	ritically evaluate
		e and experiences from an	_			_		
PO 9		llity to lived experiences, v						
PO 10	•	se ICT in a variety of learn	_			•		lluate, and use a
DO 11		vant information sources a						• .
PO 11	=	independently, identify a	ppropriate	resoui	ces required	for a projec	et, and n	nanage a project
DO 12	through to completion. Capability to effectively engage in a multicultural society and interact respectfully with diverse groups.							
PO 12 PO 13		frectively engage in a mul nonstrating the ability to it		•				
FO 13	-	nonstrating the ability to 10 as fabrication, falsification	•					
	not	i as iautication, taismicand	ni Oi IIIISI't	presen	iauon oi uali	i or committe	ung pia	g1a115111,
		ellectual property rights.						
PO 14		mapping out the tasks of a	team or a	n organ	nization, and	setting dire	ction, fo	ormulating an
		n, building a team who car		_		_		=
		gage with that vision.			,	J	•	-
PO 15		ire knowledge and skills,	including l	how to	learn, that ar	e necessary	for par	ticipating in
		ties throughout life.	_			_	-	-

COs	COURSE OUTCOME
CO 1	To acquire the knowledge of emission and absorption of radiation.
CO 2	Analyse partial wave analyses, Evaluate scattering amplitude through scattering cross section.
CO 3	To acquire the knowledge of Symmetrical and anti-symmetrical wave function
CO 4	Apply Klein-Gordon equation to find relativistic wave equation.
CO 5	To acquire the knowledge of quantization of the wave field.
Pre-requisites	To Acquire idea about materials science

1. Remembering, 2. Understanding, 3. Applying, 4. Analyzing, 5. Evaluating, 6. Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
		PO 1	1
CO 1	1	PO 2	2
		PO 3	2
		PO 4	3
CO 2	4	PO 5	5
		PO 6	1
		PO 7	6
CO 3	3	PO 8	4
		PO 9	5
		PO 10	1
CO 4	5	PO 11	2
		PO 12	2
CO 5		PO 13	3
	4	PO 14	3
		PO 15	6

CO / PO Mapping

COs				Progra	ımme C	Outcom	e (POs)								
COS	РО	РО	РО	РО	РО	РО	PO7	РО	РО	PO1	PO1	PO1	PO1	PO1	PO1
	1	2	3	4	5	6		8	9	0	1	2	3	4	5
CO1	3	2	2	1	1	3	1	1	1	3	2	2	1	1	1
CO2	1	1	1	2	2	1	1	3	2	1	1	1	2	2	1
CO3	1	2	2	3	1	1	1	2	1	1	2	2	3	3	1
CO4	1	1	1	1	3	1	2	2	3	1	1	1	1	1	2
CO5	1	1	1	2	2	1	1	3	2	1	1	1	2	2	1

Course Assessment Methods	
Direct	
	1. Continuous Assessment Test I, II & Model
	2. Assignment
	3. End Semester Examinations
Indirect	
1. Course End Delivery	

Content of the	Syllabus							
	Semi classical Theory of Radiation	Periods	12					
	Emission & Absorption of radiation - Electric dipole approximation -Ei	nstein's Transition	probabilities					
Unit - I	and A & B Coefficients - Selection rules -Quantization of radiation field	d - Interaction with	n matter -					
Onit - 1	Spontaneous & Stimulated emissionsQuantum theory of Valence Bond's	VB method - Hitle	er - London					
	theory of Hydrogenmolecule in VB method - Refinements of Simple M	O and VB approx	imations.					
	Scattering Theory	Periods	12					
	Scattering cross section-Scattering amplitude - Greens function - Partial	wave analysis - F	hase shifts - The					
Unit - II	scattering amplitude in terms of phase shift -Scattering by Coulomb pot	ential - Low energ	gy					
	scattering: Scattering length and effective range - Scattering by a perfec	tly rigid sphere						
	Many Electron Atoms	Periods	12					
	Indistinguishable particles - Symmetrical and Anti symmetrical wave fu							
Unit - III	principle- Inclusion of spin - Spin functions for two electrons - Spin functions - Central field approximation - Thomas Fermi model of the atom - Equation							
	Relativistic Wave Equation	Periods	12					
Unit - IV	Klein - Gordan Equation - Diracs equation for a free particle - Dirac Ma	atrics - Covariant f	form of dirac					
Ollit - IV	equation - Probability density and current density - Plane wave solution - Negative energy states - Hydrogen atom							
	Quantum Field Theory	Periods	12					
	Quantization of the wave fields - Classical Lagrangian equation - Classical Hamiltonian							
Unit - V	equation - Field Quantization of the non relativistic Schrodinger equation - Creation, Destruction							
	and Number Operators - Anti Commutation Relations - Quantization of	Electromagnetic	Field					
	Total Periods		60					

Text Books	
1	1. Quantum Mechanics – GAruldhas - Prentice Hall of India, (2006).
2	2. Quantum Mechanics â€" Satyaprakash - Sultan Chand Publishers, (2013).
3	3. Quantum Mechanics â€" Gupta Kumar Sharma - JaiprakashNath Publications, Meerut, (2013).
References	
1	A text Book of Quantum Mechanics â€" P. M.Mathews&K. Venkatesanâ€"Tata Mc Graw Hill, (2004).
2	Introduction to Quantum Mechanics â€" David J.Griffths â€" Pearson Prentice Hall, 2nd edition,
	(2009).
3	Quantum Mechanics – L. I. Schiff - Tata Mc Graw Hill, (2010).
E-References	
1	https://nptel.ac.in/syllabus/115104045/
2	https://www.ntnu.edu/studies/courses/TFY4205/
3	https://www.ntnu.edu/studies/courses/TFY4205/





HOMEN EMPOWERNEN									
Programme	M.Sc	Programme Code		PPH		Regula	tions	2018-2019	
Department	Physics			Sen	nester			3	
			Peri	ods	Credit	Maxim	um Mar	ks	
Course Code	Course	Name	per '	Week					
			L	T P	С	CA	ESE	Total	
18P3PH09	MICROPRO	CESSORS AND		1 1		•	1		
101 31 1107	MICROCON	TROLLERS	5	0 0	5	25	75	100	
COURSE	1.The Basic k	nowledge and buildings blo	cks of co	ompute	rs and its proc	cessors.2.T	o operat	te the processors	
OBJECTIVES	and controller	s with basic idea.							
POs		PROGRAMME OUTC	COME						
PO 1	-	monstrating the basic conce	pts and	compre	hensive know	ledge fron	n underg	graduate	
	programme of								
PO 2	•	ress thoughts and ideas effec	•	Commu	nicate with ot	hers using	appropi	riate media and	
DO 2	•	lea in clearandconcise mann			1 01				
PO 3	-	e relevant assumptions to fo	rmulate	the arg	uments by fol	lowing sci	ientific a	pproach to	
PO 4	·	knowledge development. Capacity to solve different kinds of non-familiar problems and apply to real life situations.							
PO 5		uate the reliability and relev							
103	=	raw valid conclusions	vance of	CVIGCII	cc,anaryse an	a synthesi	ze data 1	Tom a variety of	
PO 6		olems, formulate hypotheses	s, test hy	pothese	es,analyse, in	terpret and	draw co	onclusions from	
	_	ause-and-effect relationship	-	•	, ,	1			
PO 7	Ability to wor	k effectively and respectfull	ly with o	liverse	teams,facilita	te coopera	tive or c	oordinated effort	
	on the part of	a group							
PO 8	Ability to anal	lyse, interpret and draw con-	clusions	from q	uantitative/qu	ıalitative d	ata and	critically evaluate	
	ideas, evidenc	e and experiences from an o	pen-mi	nded an	d reasoned pe	erspective.			
PO 9	Critical sensib	ility to lived experiences, w	ith self-	awaren	ess and reflex	civity of bo	oth self a	and society.	
PO 10		ise ICT in a variety of learn	•			•			
	variety of relevant information sources and use appropriate software for analysis of data.								
PO 11	•	k independently, identify ap	propria	te resou	rces required	for a proje	ect, and	manage a project	
70.15	through to completion.								
PO 12		Capability to effectively engage in a multicultural society and interact respectfully with diverse groups.							
PO 13	_	monstrating the ability to id	entity et	nical is	sues related to	o ones woi	rk, avoid	unetnical	
DO 14	behavior as fa		toom o=	on c===	nization or 1	anttina din	eastion 1	Commulatina an	
PO 14	inspiring vision	mapping out the tasks of a	team or	an orga	mzauon, and	setting dir	ection, I	ormulating an	
PO 15		uire knowledge and skills, ir	ncluding	how to	learn that a	e necessar	v for pa	rticinating in	
1013	• •	ties throughout life.	uuiiig	, 110 00 10	, iouri, mai ai	. C mecessar	у гог ра	aciputing in	
	rearring activi	anoughout me.							

COs	COURSE OUTCOME
CO 1	To acquire the knowledge of evolution of microprocessor. Understand the hardware and software interrupts.
CO 2	To get the knowledge about Assembly language. Understand the instruction set of 8085. Apply the 8bit addition in 8085.
CO 3	To acquire the knowledge of INTEL 8257. Apply the direct memory access in Data transfer.
CO 4	To get the knowledge about architecture of 8051. Understand the counters and timers.
CO 5	To get the knowledge about instruction set of 8051. Apply the ascending and descending order program in
	8085.
Pre-requisites	To Acquire idea about microprocessor programming

1. Remembering, 2. Understanding, 3. Applying, 4. Analyzing, 5. Evaluating, 6. Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

`	,	<i>U</i> , , ,	
COs	KLs	POs	KLs
		PO 1	1
CO 1	1	PO 2	2
		PO 3	2
		PO 4	3
CO 2	5	PO 5	5
		PO 6	1
	1	PO 7	6
CO 3		PO 8	4
		PO 9	5
		PO 10	1
CO 4	3	PO 11	2
		PO 12	2
		PO 13	3
CO 5	2	PO 14	3
		PO 15	6

CO / PO Mapping

COs		Programme Outcome (POs)														
COS	PO	РО	PO	РО	PO	PO	PO7	РО	PO	PO1	PO1	PO1	PO1	PO1	PO1	
	1	2	3	4	5	6		8	9	0	1	2	3	4	5	
CO1	3	2	2	1	1	3	1	1	1	3	2	2	1	1	1	
CO2	1	1	1	1	3	1	2	2	3	1	1	1	1	1	2	
CO3	3	2	2	1	1	3	1	1	1	3	2	2	1	1	1	
CO4	1	2	2	3	1	1	1	2	1	1	2	2	3	3	1	
CO5	2	3	3	2	1	2	1	1	1	2	3	3	2	2	1	

Course Assessment Methods	
Direct	
	1. Continuous Assessment Test I, II & Model
	2. Assignment
	3. End Semester Examinations
Indirect	
1. Course End Delivery	

Content of the	Syllabus										
	EVOLUTION AND ARCHITECTURE OF Periods 1 MICROPROCESSORS8085										
	Evolution of Microprocessors - INTEL 8085 microprocessor Pin config	uration - Pins and	their functions -								
Unit - I	Bus system - Control and status signals - Externally initiated signals in	cluding interrupts	s - Architecture -								
	ALU - Flags - Registers. Timing and Sequencing: Insertion cycle, Machine cycle -Halt st										
	state.										
	Interrupts: Types of interrupts - Hardware and Software interrupts-mask	ting and unmaskir	g interrupts.								
-	CROPROCESSORS 8085 INSTRUCTION SETS & PROGRAMMING	Periods	12								
	Assembly language - Instruction sets of 8085 - Stacks - Counters - Subroutines - MACRO - De										
Unit - II	Subroutine - Examples of Assembly language Programming - 8bit a										
	Addition - 16 bit Subtraction - 16 bit Multiplication - 16 bit Division - The Largest and Smallest number in										
	a data array - Sorting - Sum of a series - Factorial of a given number										
	APPLICATIONS OF MICROPROCESSORS	Periods	12								
	Address space - Partitioning - interfacing - Memory and I/O interfacing -I/O ports: Non programmable										
Unit - III	I/O port INTEL 8212 - Programmable Peripheral Interface (PPI) INTEL 8255 - Programmable Interval										
	(Counter) Timer (PIT) INTEL 8253. Data Transfers: Types of parallel and serial data transfer schemes -										
	Direct Memory Access (DMA) controller INTEL 8257. 8085A interrupt system: Software & hardware										
	interrupts - interfacing - Working and Programming of PIC 8259 with 8		12								
	ARCHITECTURE OF MICROCONTROLLER 8051	Periods	12								
11 137	Introduction - Comparison between microcontroller and microprocessors - Architecture of 8051 - Key										
Unit - IV	features of 8051- Memory organization Data memory and program memory - Internal RAM organization - Special function registers - Control registers - I/O ports - Counters and Timers - Interrupt structure.										
	PROGRAMMING THE MICROCONTROLLER 8051	Periods	12								
	Instruction set of 8051 - Arithmetic, Logical, Data move jump and call										
Unit - V	- Immediate, register, direct and indirect addressing modes - Assembly		•								
Onit - v	programs to illustrate arithmetic and logical operations (Sum of num		-								
	array, Ascending and descending order program in an array) - Software to		sindicot in an								
	Total Periods		60								
i .											

Text Books	
1	Microprocessor Architecture, Programming and Applications with 8085, Ramesh S. Gaonkar, Penram
	International Publishing, (1997).
2	Fundamentals of Microprocessor and Microcomputers, B. Ram, V Edition, Dhanpat Rai Publications (P)
	Ltd. New Delhi, (2003).
References	
1	M.Gilmore, Microprocessor Principles and Application, TMH, 2nd edition, (1995).
2	Aditya P.Mathur, Introduction to Microprocessors, Tata McGraw Hill Company, III edition, (2006).
E-References	
1	https://onlinecourses.nptel.ac.in/noc18_ec03
2	https://www.elprocus.com/microprocessor-and-microcontroller/





Elavampalavam, Tiruchengode-637 205.

WOMEN EMPOWERNEN		_											
Programme	M.Sc	Programme Code	2018-2019										
Department	Phys	sics			3								
			Pei	riods		Credit	Maxim	um Mar	ks				
Course Code	Course	Name	per	Wee	ek								
			L	Т	P	С	CA ESE		Total				
	EDC : SOLA	R ENERGY	4	0	0	4	25	75	100				
18P3PHED1	220,002.1			Ů		<u> </u>		1 .0	100				
COURSE	1. Energy resources around us. 2. Threatening to our energy resources. 3. How to conserve energy.												
OBJECTIVE	PROGRAMME OUTCOME												
S POs		PROGRAMME OUT	COME										
PO 1	Capable of der	nonstrating the basic conce	pts and	com	preh	ensive knowl	edge from	underg	raduate				
	programme of	study.											
PO 2		ess thoughts and ideas effe	•										
PO 3	To identify the	relevant assumptions to fo	rmulate	the	argu	ments by follo	owing scie	ntific ap	oproach to				
	knowledge dev	•											
PO 4		ve different kinds of non-f											
PO 5	Ability to eval	uate the reliability and rele	vance o	f evi	lenc	e , analyse an	d synthesis	ze data	from a variety of				
	sources .												
PO 6	_	lems, formulate hypothese	s, test h	ypotł	ieses	s, analyse, int	erpret and	draw co	onclusions from				
20.5	data.	00 1 1 1 1 0 1				0 111			11 1 66				
PO 7	•	c effectively and respectful	ly with	divei	se te	eams, facilitat	e cooperat	ive or c	oordinated effort				
DO 9	on the part of a	• •	.1	. C			1:4.4:	ماسم مه					
PO 8	•	yse, interpret and draw con			-	-		ta and c	ritically evaluate				
PO 9		e and experiences from an or allity to lived experiences, w						h salf ar	ad society				
PO 10		se ICT in a variety of learn											
10 10		vant information sources.	iiig situ	ation	15, U	monstrate ao	inty to acc	css, cva	iruate, and use a				
PO 11		k independently, identify a	nronria	ite re	sour	ces required f	or a projec	et and n	nanage a project				
1011	through to con		pproprie	uc re	sour	ces required i	or a projec	t, and n	nanage a project				
PO 12		ffectively engage in a mult	icultura	1 soc	ietv	and interact r	espectfully	with d	iverse groups				
PO 13	1 ,	nonstrating the ability to id			•		1 0		<u> </u>				
	_	as fabrication.	, .					,					
PO 14		mapping out the tasks of a	team or	an o	rgan	ization, and s	etting dire	ction, fo	ormulating an				
		n, building a team who can			-		_		_				
		gage with that vision.	•				_	-	-				
PO 15		ire knowledge and skills, i	ncludin	g hov	v to	learn, that are	necessary	for par	ticipating in				
	learning activi	ties throughout life, through	h self-pa	aced	and	self-directed	learning.						

COs	COURSE OUTCOME
CO 1	Acquire the knowledge of energy sources. Understand the concept of Geothermal and wind energy.
CO 2	Acquire the knowledge of renewable energy sources. Apply solar thermal energy in solar cooker and solar
	pond.
CO 3	To get the knowledge of photovoltaic effect and synthesis the solar cells.
CO 4	To get knowledge of bio mass energy .Understand the biomass conversion technology.
CO 5	To acquire the knowledge of energy storage mechanism and understand the storage devices.
Pre-requisites	GET KNOWLEDGE ABOUT various energy

1. Remembering, 2. Understanding, 3. Applying, 4. Analyzing, 5. Evaluating, 6. Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

`	,	0, ,	
COs	KLs	POs	KLs
		PO 1	1
CO 1	1	PO 2	2
		PO 3	2
		PO 4	3
CO 2	3	PO 5	5
		PO 6	1
		PO 7	6
CO 3	6	PO 8	4
		PO 9	5
		PO 10	1
CO 4	2	PO 11	2
		PO 12	2
		PO 13	3
CO 5	2	PO 14	3
		PO 15	6

CO / PO Mapping

COs		Programme Outcome (POs)														
COS	РО	РО	РО	РО	РО	РО	PO7	РО	РО	PO1	PO1	PO1	PO1	PO1	PO1	
	1	2	3	4	5	6		8	9	0	1	2	3	4	5	
CO1	3	2	2	1	1	3	1	1	1	3	2	2	1	1	1	
CO2	1	2	2	3	1	1	1	2	1	1	2	2	3	3	1	
CO3	1	1	1	1	2	1	1	1	2	1	1	1	1	1	3	
CO4	2	3	3	2	1	2	1	1	1	2	3	3	2	2	1	
CO5	2	3	3	2	1	2	1	1	1	2	3	3	2	2	1	

Course Assessment Methods	
Direct	
	1. Continuous Assessment Test I, II & Model
	2. Assignment
	3. End Semester Examinations
Indirect	
1. Course End Delivery	

Content of the	Syllabus									
	Introduction to Energy Sources	Periods	9							
Unit - I	Classification of Energy sources - Worlds reserve of commercial energy	gy sources and th	eir availability -							
Onit - 1	Geothermal energy - wind energy - Ocean thermal energy conversion	n - Energy from	waves and tides							
	(basicideas) - Merits and Demerits.									
	Solar Thermal Energy	Periods	9							
Unit - II	Renewable energy sources - Solar energy - Solar water heater - Solar space heating and cooling - Solar									
Onit - II	thermal technologies - Solar cooker - Solar Pond - Merits and Demerits of solar energy									
	Solar Cell Periods 9									
Unit - III	Photo voltaic effect - Performance of solar cell - Choice of materials for solar cell - Basic requirements for									
Ollit - III	obtaining an effective solar cell - Power generation by using solar cell.									
	Biomass Energy Fundamentals	Periods	9							
Unit - IV	Biomass energy - Classification - Photosynthesis - Biomass conversion technology -Advantages and									
Onit - 1 v	Disadvantages of biomass energy.									
	Energy Storge	Periods	9							
Unit - V	Introduction - Liquid media storage - Solid media storage - Ground colle	ector - Chemical s	storage.							
	Total Periods		45							

Text Books	
1	G.D. Rai, Non Conventional Energy Sources, 4th, 5th Edition, (2011).
2	G.D. Rai, Solar Energy Utilization, 5th Edition, (2011).
3	S.P. Sukhatme, Solar Energy, Tata McGraw Hill Publishing Company, 3rd Edition, (2005).
References	
1	1. D.S. Chauhan, S.K. Srivastava, Non Conventional Energy Sources, Ed.V, first edition, (2004).
2	2. Solar Energy, Fundamentals, Design, Modelling and Applications, G.N.Tiwari, Narosa Publications,
	(2004).
E-References	
1	https://www.renewableenergyworld.com/solar-energy/tech.html
2	https://en.wikipedia.org/wiki/Solar_power

Signature of BOS Chairman





Elavampalavam, Tiruchengode-637 205.

WOMEN EMPOWERNEN												
Programme	M.Sc	Programme Code	me Code PPH Regulations									
Department	Phys	4										
		ks										
Course Code	Course											
			L	ТР	С	CA	ESE	Total				
18P4PH10	NUCLEAR A	ND PARTICLE PHYSICS	6	0 0	5	25	75	100				
COURSE	1.Explain central concepts, laws and models in nuclear and particle physics.2.Use basic laws and relation											
OBJECTIVE S	to solve simple problems											
POs	PROGRAMME OUTCOME											
PO 1	Capable of der programme of	nonstrating the basic concep	ts and co	mprel	nensive knowl	edge from	underg	raduate				
PO 2		ress thoughts and ideas effect	tively Co	mmur	nicate with oth	ers using a	appropr	iate media and				
	• •	lea in clearandconcise manne	•			C	11 1					
PO 3	To identify the	e relevant assumptions to for	mulate tl	ne argu	ments by foll	owing scie	ntific a	pproach to				
	knowledge dev	velopment.										
PO 4	Capacity to solve different kinds of non-familiar problems and apply to real life situations.											
PO 5	=	uate the reliability and releva	ance of e	videno	e, analyses ar	nd synthesi	ze data	from a variety of				
DO 6		raw valid conclusions						1				
PO 6	=	olems, formulate hypotheses,		otheses	s,analyse, inte	rpret and d	raw cor	iclusions from				
PO 7		ause-and-effect relationships k effectively and respectfully		vorce t	game facilitate	a cooperati	ve or co	pordinated affort				
107	on the part of a	• • •	with th	verse i	cams,raciman	cooperan	ve or ec	ordinated errort				
PO 8		yse, interpret and draw conc	lusions f	rom aı	ıantitative/qua	alitative da	ta and c	ritically evaluate				
	•	e and experiences from an or		•	-			, ,				
PO 9	Critical sensib	ility to lived experiences, wi	th self av	varene	ss and reflexi	vity of both	h self ar	nd society.				
PO 10	Capability to u	se ICT in a variety of learning	ng situat	ons, d	emonstrate ab	ility to acc	ess, eva	aluate, and use a				
		vant information sources and		_								
PO 11	=	k independently, identify app	propriate	resour	ces required f	for a projec	et, and r	nanage a project				
	through to con	•										
PO 12		effectively engage in a multion										
PO 13	Capable of der behaviour as fa	nonstrating the ability to ide abrication.	ntity eth	ical iss	sues related to	ones work	x, avoid	unethical				
PO 14	Capability for inspiring vision	Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an										
PO 15		ire knowledge and skills, in	cluding l	ow to	learn, that are	necessarv	for par	ticipating in				
-	• •	ties throughout life.	8-		,		r	1 0				
		<u>~</u>										

COs	COURSE OUTCOME
CO 1	To acquire the knowledge of nuclear models. Analyze the collective models bhor and Mottelson.
CO 2	Understand the nuclear reaction and nuclear mechanism and analyze the partial wave of nuclear reaction.
CO 3	To acquire knowledge of nature of nuclear forces. Understand the np scattering .Evaluate Yukawa potential.
CO 4	Understand the Gamows theory of alpha decay. Analyze the comparative half-lives.
CO 5	Acquire the knowledge of elementary particles and understand the weak and strong interactions.
Pre-requisites	To Acquire idea about nuclear and particle physics

1. Remembering, 2. Understanding, 3. Applying, 4. Analyzing, 5. Evaluating, 6. Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
		PO 1	1
CO 1	1	PO 2	2
		PO 3	2
		PO 4	3
CO 2	2	PO 5	5
		PO 6	1
		PO 7	6
CO 3	1	PO 8	4
		PO 9	5
		PO 10	1
CO 4	5	PO 11	2
		PO 12	2
		PO 13	3
CO 5	4	PO 14	3
		PO 15	6

CO / PO Mapping

COs				Progra	mme C	Outcom	e (POs)								
COS	PO	РО	РО	РО	РО	PO	PO7	РО	РО	PO1	PO1	PO1	PO1	PO1	PO1
	1	2	3	4	5	6		8	9	0	1	2	3	4	5
CO1	3	2	2	1	1	3	1	1	1	3	2	2	1	1	1
CO2	2	3	3	2	1	2	1	1	1	2	3	3	2	2	1
CO3	3	2	2	1	1	3	1	1	1	3	2	2	1	1	1
CO4	1	1	1	1	3	1	2	2	3	1	1	1	1	1	2
CO5	1	1	1	2	2	1	1	3	2	1	1	1	2	2	1

Course Assessment Methods	
Direct	
	1. Continuous Assessment Test I, II & Model
	2. Assignment
	3. End Semester Examinations
Indirect	
1. Course End Delivery	

Content of the	Syllabus									
	NUCLEAR MODELS	Periods	12							
	Basic nuclear properties: Size, shape and charge distribution-spin and parity-determination of									
Unit - I	nuclear mass-binding energy-semi emprical mass formula-nuclear st	ability-Liquid dre	op model-							
	Shell Model-Prediction of Magic numbers and energy levels by sh	ell model-Optica	l Model -							
	Collective model of Bohrand Mottelson.									
	NUCLEAR REACTIONS	Periods	12							
	Nucler reactions and reaction mechanism, Types of reactions and conservation laws - Energetics of									
Unit - II nuclear reactions-Q-value equation-Scattering and reaction cross sections- Compound nucleus reaction										
	Direct reactions Stripping, Pick up reactions-Partial Wave analysis of	of nuclear reaction	n cross-section-							
	Breit-Wignerone level formula- continuum theory of nuclear reaction.									
	NUCLEAR INTERACTIONS	Periods	12							
Unit - III	Nature of Nuclear forces-Exchange forces-Two body problem-ground state of deuteron- Magnetic									
	moment-Quardrapole moment-Tensor forces-Nucleon-nucleon interaction-NP scattering, PP scattering									
	at low energy, non- central-Meson theory of nuclear forces -Yukawa potential-Nucleon-Nucleon									
	scattering- form of nucleon-Nucleon potential-Effective range theory-Spin dependence of nuclear									
	forces-Chargeindependence and charge symmetry of nuclear forces - Isospin formalism.									
	NUCLEAR DECAY	Periods	12							
Gamows theory of alpha decay &Fermis theory of beta dacay -Total decay rate-Mass of the										
Unit - IV	neutrino-Angular momentum and parity selection rules-Allowed and forbidden decays –									
	Comparativehalf-lives-Neutrino physics Neutrino Hypothesis-Helicity-Non-conservation of parity-									
	Multipole transitions in nuclei-Angular momentum and parity selection rules-Internal conversion-									
	Nuclear isomerism	T	T 10							
	ELEMENTARY PARTICLE PHYSICS	Periods	12							
11:4 37	Types of interaction between elementary particles -Hadrons-leptons-mesons-Baryons-hyperons-pions- Symmetries and conservation laws-Elementary ideas of CP and CPT invariance- Gellman-nishijima									
Unit - V	formula-SU(2) and SU(3) multiplets-Gell-Mann-Okubo mass formula for octet and decuplet-Quark model-									
	color flavor- weak and strong interactions- Basic concepts of relative ki		-							
Total Periods 60										

Text Books	
1	D. Griffiths, Introduction to Elementary Particle Physics, Harper & Row, New York, (2006).
2	R. R. Roy and B.P. Nigam, Nuclear Physics, New age Intl. New Delhi, (2005).
References	
1	H. A. Enge, Introduction to Nuclear Physics, Addison-Wesley, Tokyo, (2006).
2	Y. R. Waghmare, Introductory Nuclear, Physics, Oxford-IBH, New Delhi, (2006).
E-References	
1	https://onlinecourses.nptel.ac.in/noc18_ph02/course
2	https://en.wikipedia.org/wiki/Particle_physics





Elayampalayam, Tiruchengode-637 205.

Department Physics Semester 4
Course Code Course Name Periods Credit Maximum Marks per Week L T P C CA ESE Total 18P4PH11 COURSE 1. The working principles of communication systems. 2. How to handle the communication elements. OBJECTIVE S PROGRAMME OUTCOME Probability to express thoughts and ideas effectively Communicate with others using appropriate media . PO 2 Ability to express thoughts and ideas effectively Communicate with others using appropriate media . PO 3 To identify the relevant assumptions to formulate the arguments by following scientific approach to knowledge development. PO 4 Capacity to solve different kinds of non-familiar problems and apply to real life situations PO 5 Ability to evaluate the reliability and relevance of evidence , analyses and synthesize data from a variety of sources . PO 6 To define problems, formulate hypotheses, test hypotheses, analyses, interpret and draw conclusions from data. PO 7 Ability to work effectively and respectfully with diverse teams, facilitate cooperative or coordinated effort on the part of a group . PO 8 Ability to analyses, interpret and draw conclusions from quantitative/qualitative data and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective. PO 9 Critical sensibility to lived experiences, with self-awareness and reflexivity of both self and society PO 10 Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources.
Course Code Course Name per Week
COMMUNICATION SYSTEMS
COURSE 1. The working principles of communication systems. 2. How to handle the communication elements. PROGRAMME OUTCOME PO 1 Capable of demonstrating the basic concepts and comprehensive knowledge from undergraduate programme of study. PO 2 Ability to express thoughts and ideas effectively Communicate with others using appropriate media . PO 3 To identify the relevant assumptions to formulate the arguments by following scientific approach to knowledge development. PO 4 Capacity to solve different kinds of non-familiar problems and apply to real life situations PO 5 Ability to evaluate the reliability and relevance of evidence , analyses and synthesize data from a variety of sources . PO 6 To define problems, formulate hypotheses, test hypotheses, analyses, interpret and draw conclusions from data. PO 7 Ability to work effectively and respectfully with diverse teams, facilitate cooperative or coordinated effort on the part of a group . PO 8 Ability to analyses, interpret and draw conclusions from quantitative/qualitative data and critically evaluating ideas, evidence and experiences from an open-minded and reasoned perspective. PO 9 Critical sensibility to lived experiences, with self-awareness and reflexivity of both self and society Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources.
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through to completion.
PO 12 Capability to effectively engage in a multicultural society and interact respectfully with diverse groups
PO 13 Capable of demonstrating the ability to identify ethical issues related to ones work, avoid unethical
behaviour such as fabrication.
PO 14 Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an
inspiring vision, building a team who can help achieve the vision, motivating and inspiring team
members to engage with that vision.
PO 15 Ability to acquire knowledge and skills, including how to learn, that are necessary for participating in
learning activities throughout life, through self-paced and self-directed learning.

COs	COURSE OUTCOME
CO 1	Understand the frequency modulation and apply modulation system in BPSK and QPSK
CO 2	Acquire the knowledge of single mode and multi-mode communication. Understand splicing and
	connectors.
CO 3	Analyze the reflex klystron and applying microwave system.
CO 4	Apply satellite communication system in RADAR.
CO 5	Apply mobile communication in digital cellular radios.
Pre-requisites	GET KNOWLEDGE ABOUT Communication Systems

1. Remembering, 2. Understanding, 3. Applying, 4. Analyzing, 5. Evaluating, 6. Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

(3/2/1 indicates	the strength of correlation, 5-stre	ong, 2 mearain, 1 weak)	
COs	KLs	POs	KLs
		PO 1	1
CO 1	2	PO 2	2
		PO 3	2
		PO 4	3
CO 2	1	PO 5	5
		PO 6	1
		PO 7	6
CO 3	4	PO 8	4
		PO 9	5
		PO 10	1
CO 4	3	PO 11	2
		PO 12	2
		PO 13	3
CO 5	3	PO 14	3
		PO 15	6

CO / PO Mapping

COs				Progra	ımme C	Outcom	e (POs)								
COS	РО	РО	РО	РО	РО	РО	PO7	PO	РО	PO1	PO1	PO1	PO1	PO1	PO1
	1	2	3	4	5	6		8	9	0	1	2	3	4	5
CO1	2	3	3	2	1	2	1	1	1	2	3	3	2	2	1
CO2	3	2	2	1	1	3	1	1	1	3	2	2	1	1	1
CO3	1	1	1	2	2	1	1	3	2	1	1	1	2	2	1
CO4	1	2	2	3	1	1	1	2	1	1	2	2	3	3	1
CO5	1	2	2	3	1	1	1	2	1	1	2	2	3	3	1

Course Assessment Methods	
Direct	
	1. Continuous Assessment Test I, II & Model
	2. Assignment
	3. End Semester Examinations
Indirect	
1. Course End Delivery	

Content of th	e Syllabus								
	MODULATION SYSTEMS	Periods	12						
	Theory of Amplitude modulation - Theory of frequency modulation-Theory of phase modulation-pulse								
Unit - I	code modulation-pulse width modulation-Sampling theorem-low pa	ss and band pas	s signals, PAM,						
Onit - 1	Channel BW for a PAM signal, Natural Sampling, Flat top Sampling	, Signal recovery	through holding,						
	Quantization of signals, Differential PCM delta modulation-Delta modu	ılation-Adaptive I	Delta modulation-						
	BPSK, QPSK.								
FIBER OPTICS COMMUNICATION Periods 12									
Basics of Fiber Optics-Classification-Single mode and multimode, Step index and Graded index.									
Unit - II	Acceptance angle, Numerical Aperture, Fiber Losses-Attenuation, Abs	orption, Leaky m	odes, Bending						
	losses, Transmission losses, and Core and cladding losses. Chromatic and modal dispersion. Splicing								
	andconnectors.								
	MICROWAVE COMMUNICATION SYSTEM	Periods	12						
Unit - III	Microwave Generation - Multicavity Klystron - Reflex Klystron - Magnetron - Travelling Wave Tubes								
	(TWT) - Propagation modes, Microwave communication system. Analog Microwave Communication-								
	LOS microwave system-OTH microwave system-Digital Hierarchies, Digital Microwave Systems,								
	Bandwidth efficiency								
SATELLITE COMMUNICATIONS Periods 12									
Orbital Satellites, Geostationary Satellites, Orbital Patterns, Look angles, Orbital Classification									
Unit - IV	Spacing and frequency allocation, Radiation Pattern, foot prints, satellite system link models, satellite								
	system link equation. Non-ideal system parameters. INSAT communications satellites. Multiple								
	Accessing FrequencyHopping, Channel Capacity. RADAR								
	MOBILE COMMUNICATION	Periods	12						
Unit - V	Evaluation and fundamentals-cellular structure and planning-frequency allocations- propagation								
ÇIIIV ,	problems-Base station antennas and mobile antennas-type of mobile	e system- access	method -						
	TDMA, FDMA and CDMA- DIGITAL Cellular Radio.								
Total Periods 60									

Text Books	
1	1. Electronic Communication Systems –George Kennedy& Davis, Tata McGraw Hill, 4th Edition,
	(2006).
2	2. John M. Senior, Optical Fiber Communications, Second Edition, PHI, 6th Edition, (2009).
3	Wireless Communication Principles & Practice â€" Theodore S. Rappaport, 2nd Edition, (2002).
References	
1	Taub and Schiling, Principles of Communication Systems, Second edition, Tata Mc Graw Hill, 3rd
	Edition,
	(2010).
2	Simon Haykin, Communication system, Third edition John Wiley & Sons, Inc. 4th Edition, (2007).
3	Wayne, Electronic Communication Systems, 6th Edition, (2004).
E-References	
1	https://en.wikibooks.org/wiki/Communication_Systems
2	https://www.elprocus.com/what-is-a-communication-system-and-its-basic-elements/





WOMEN EMPOWERMENT	Elayampalayam, Tiruchengode-637 205.						
Programme	M.Sc	Programme Code	PPH	PPH Regulation			2018-2019
Department	Physics Semester						4
			Periods	Credit	Maximun	n Marl	XS .
Course Code	Course	Name	per Week				
			L T P	С	CA	ESE	Total
18P4PHE03	THIN FILM T	ECHNOLOGY	4 0 0	4	25	75	100
COURSE	To examine the	e electrical properties in me	etallic thin films	To explore the	ne transport p	propert	ties of semi
OBJECTIVE	•	l insulating film. To know l	how the optical	properties of t	hin film is u	tilized	in solar
S	cell application	is.					
POs		PROGRAMME OUT	COME				
PO 1		nonstrating the basic conce	pts and comprel	nensive knowl	edge from u	ndergr	aduate
70.4	programme of						
PO 2	• •	ess thoughts and ideas effective in the second	•	nicate with oth	ers using ap	propri	ate media and
PO 3		ea in clear and concise mar relevant assumptions to fo		monte by foll	owing scient	tific on	proach to
FO 3	knowledge dev	-	imurate the argu	illients by folio	owing scient	инс ар	proach to
PO 4		ve different kinds of non-fa	amiliar problem	s and apply to	real life situ	ations	
PO 5		uate the reliability and relev					om a variety of
	sources then draw valid conclusions and support them with evidence and examples, and addressing						
	opposing viewpoints.						
PO 6	•	lems, formulate hypotheses	* *	•	-		
	from data, predict cause and effect relationships and ability to plan, execute and report the results of an						
DO 7	experiments Ability to work effectively and respectfully with diverse teams, facilitate cooperative or coordinated						
PO 7	•	•	•				
	effort on the part of a group and act together as a group or a team in the interests of a common cause and workefficiently as a member of a team						
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data and critically evaluat						ritically evaluate
	ideas, evidence	e and experiences from an o	open-minded and	d reasoned per	spective		
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society						
PO 10	Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a						luate, and use a
DO 11	variety of relevant information sources and use appropriate software for analysis of data.						
PO 11	Ability to work independently, identify appropriate resources required for a project, and manage a project						anage a project
PO 12	through to completion. Capability to effectively engage in a multicultural society and interact respectfully with diverse groups.						
PO 13	Capable of demonstrating the ability to identify ethical issues related to ones work, avoid unethical						
2	behavior such as fabrication, falsification or misrepresentation of data or committing plagiarism,						
	notadhering to intellectual property rights						
PO 14		mapping out the tasks of a		nization, and s	etting directi	ion, fo	rmulating an
	inspiring vision, building a team who can help achieve the vision, motivating and inspiring team						
		gage with that vision.					
PO 15	• •	ire knowledge and skills, in	•		•	-	
	•	ies throughout life, through	n self-paced and	self-directed	learning aim	ed at p	ersonal
	development, meeting economic, social.						

COs	COURSE OUTCOME
CO 1	Acquire the knowledge of preparation of thin film. Understand the construction and uses of vapour sources.
CO 2	Apply the deposition monitoring and control in micro balance.
CO 3	Analyse electrical conduction in thin metallic films.
CO 4	Understand DC conduction mechanism and analyze structure and optical properties of UV
	Spectrophotometer.
CO 5	Synthesis thin films for Solar cell application
Pre-requisites	To get knowledge

1. Remembering, 2. Understanding, 3. Applying, 4. Analyzing, 5. Evaluating, 6. Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

(- <i>O</i> ,,	
COs	KLs	POs	KLs
		PO 1	1
CO 1	1	PO 2	2
		PO 3	2
		PO 4	3
CO 2	3	PO 5	5
		PO 6	1
		PO 7	6
CO 3	4	PO 8	1
		PO 9	1
		PO 10	1
CO 4	2	PO 11	1
		PO 12	1
	6	PO 13	1
CO 5		PO 14	1
		PO 15	1

CO / PO Mapping

COs	Programme Outcome (POs)														
COS	PO	РО	РО	PO	РО	PO	PO7	РО	PO	PO1	PO1	PO1	PO1	PO1	PO1
	1	2	3	4	5	6		8	9	0	1	2	3	4	5
CO1	3	2	2	1	1	3	1	3	3	3	3	3	3	3	3
CO2	1	2	2	3	1	1	1	1	1	1	1	1	1	1	1
CO3	1	1	1	2	2	1	1	1	1	1	1	1	1	1	1
CO4	2	3	3	2	1	2	1	2	2	2	2	2	2	2	2
CO5	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1

Course Assessment Methods	
Direct	
	1. Continuous Assessment Test I, II & Model
	2. Assignment
	3. End Semester Examinations
Indirect	
1. Course End Delivery	

Content of the	Syllabus								
	Preparation of Thin Films	Periods	12						
	Study of thin film vacuum coating unit-Construction and uses of vapour sources-wire, sublimation,								
	crucible and electron bombardment heated sources. Physical vapour	deposition- There	mal evaporation-						
Unit - I	electron beam evaporation-Sputtering-Study of glow Discharge- Experimental set up for DC and RF								
Omt - 1	magnetron sputtering, Pulsed laser deposition and Ion beam assis	ted deposition. C	Chemical vapour						
	deposition-CVD, MOCVD and PECVD processes. Chemical methods:	Qualitative study	of preparation of						
	thin films by Electroplating, vapour phase growth and anodization-Nuc	cleation and grow	th of thin films -						
	four stages of film growth.								
	Deposition Monitoring and Control	Periods	8						
Unit - II	Micro balance, Crystal oscillator thickness monitor, optical monitor, Re	sistance Monitor.	Thickness						
Omt - II	measurement: Multiple Beam Interferometer, FizeauTolansky technique-Fringes of equal chromatic								
	order FECO method-Ellipsometry qualitative only.								
	Electrical properties	Periods	8						
Unit - III	Sheet resistance-size effect-Electrical conduction in thin metallic films- Calculation of mobility- Effect of								
Omt In	ageing and annealing - Oxidation - Agglomeration								
	Dielectric Properties Periods								
	DC conduction mechanism-Low field and high field conduction. Breakdown mechanism in								
Unit - IV	dielectric films-AC conduction mechanism. Temperature dependence of conductivity. Structure and								
	Optical Properties: Study of structure of thin films using x-ray diffraction method-Calculation of								
	particlesize-Optical constants of thin films - UV spectrophotometer- Transmittance, absorption,								
	determination ofband gap								
	Application of Thin Films	Periods	9						
	Thin film resistors: Materials and Design of thin film resistors Choice of resistor and shape and								
Unit - V	area-Trimming of thin film resistors-sheet resistance control - Individual resistor trimming. Thin film								
	capacitors: Materials-Capacitor structures-Capacitor yield and capacitor stability. Thin film field effect								
	transistors: Fabrication and characteristics-Thin film solar cells - anti re								
	Total Periods		48						

Text Books	
1	Hand book of Thin films Technology: L I Maissel and R Clang, New York: McGraw-Hill, 1970.
2	Thin film Phenomena: K.L. Chopra, NewYork: Mc Graw-Hill, 1969.
3	Thin films processes – J.L.Vilsan,1993.
References	
1	Physics of thin films, Vol. 12, First Edition Georg Hass Maurice H. Francombe John L. Vossen.
2	Thin films solar cells –K.L. Chopra and S. R. Das, 1983.
3	Vacuum deposition of thin films – L.Holland , 1956.
E-References	
1	https://www.tno.nl/en/focus-areas/industry/expertise-groups/thin-film- technology/