E.M.G. YADAVA WOMEN'S COLLEGE, MADURAI – 625 014.

(*An Autonomous Institution – Affiliated to Madurai Kamaraj University*)

Re-accredited (**3rd Cycle**) with Grade **A+** & **CGPA 3.51** by NAAC

DEPARTMENT OF PHYSICS

CBCS CURRICULUM

MASTER OF SCIENCE

PROGRAMME CODE - PP

COURSE STRUCTURE

(w.e.f. 2017 – 2018 onwards)

Annexure-23

E.M.G YADAVA WOMENS COLLEGE, MADURAI-14

(An Autonomous Institution-Affliliated to Madurai Kamaraj University)
(Re-accrediated (3rd cycle)A+ & CGPA 3.51 Grade by NAAC)

CBCS

DEPARTMENT OF PHYSICS

M.Sc PHYSICS
(w.e.f.2018-2019 onwards)

COURSE STRUCTURE-SEMESTER WISE

Sem	Subject	Subject code	Title of the paper	Teaching hrs(Per week)	Duration of exam (hrs)	Marks alloted			Credits
						C.A	S.E	Total	
I	CORE	18PP11	Mathematical Physics-I	6	3	25	75	100	5
		18PP12	Classical Mechanics	6	3	25	75	100	5
		18PP13	Advanced Electronics	6	3	25	75	100	5
		18PP21P	*Practical – I General Experiments	4	-	-	-	-	
		18PP22P	*Practical – II Electronics	4	-	-	-	-	
	ELECTIVE		Elective -I	4	3	25	75	100	4
II	CORE	18PP21	Mathematical Physics – II	6	3	25	75	100	5
		18PP22	Thermodynamics & Statistical Mechanics	6	3	25	75	100	5
		18PP23	Electromagnetic theory	6	3	25	75	100	5
		18PP21P	Practical – I General Experiments	4	4	40	60	100	4
		18PP22P	Practical – II Electronics	4	4	40	60	100	4
	ELECTIVE		Elective -II	4	3	25	75	100	4
		18PP31	Solid State Physics - I	6	3	25	75	100	5

III	CORE	18PP32	Quantum Mechanics-I	6	3	25	75	100	5
		18PP33	Nuclear Physics	6	3	25	75	100	5
		18PP31P	*Practical – III General Physics	4	-	-	-	-	-
		18PP32P	*Practical – IV Project	2	-	-	-	-	-
	ELECTIVE		Elective-III	6	3	25	75	100	4
IV	CORE	18PP41	Solid State Physics - II	6	3	25	75	100	5
		18PP42	Quantum Mechanics-II	6	3	25	75	100	5
		18PP43	Molecular Spectroscopy	6	3	25	75	100	5
		18PP41P	Practical – III General Physics	4	4	40	60	100	4
		18PPPR4	Project	2	3	20	80	100	2
	ELECTIVE		Elective-IV	6	3	25	75	100	4

* Practical examinations are conducted only in even semesters

Semester	**Subject code**	**Electives**
I	18PPE1A	Numerical Methods
	18PPE1B	Programming in C++
II	18PPE2A	Instrumentation
	18PPE2B	Medical Physics
III	18PPE3A	Nano Physics
	18PPE3B	Solar Energy
IV	18PPE4A	Microprocessor
	18PPE4B	Crystallography

Annexure-23

CREDITS DISTRIBUTION

SUBJECT	NO.OF.PAPERS			CREDITS	MARKS
	THEORY	PRACTICAL	PROJECT		
CORE	12	3	1	74	1600
ELECTIVE	4	-		16	400
TOTAL				90	2000

Annexure-23

E.M.G YADAVA WOMENS COLLEGE, MADURAI-14

(An Autonomous Institution-Affliliated to Madurai Kamaraj University)
(Re-accrediated (3rd cycle)A+ & CGPA 3.51 Grade by NAAC)

CBCS

DEPARTMENT OF PHYSICS

M.Sc PHYSICS
(w.e.f.2018-2019 onwards)

Title of the paper : Mathematical physics I
Semester : I **Contact Hours : 6**
Subject Code : 18PP11 **Credits : 5**

Objectives :

This paper aims to

1. Apply vectors to hydrodynamics
2. Study the significant theorems of matrices
3. learn the special functions
4. Understand the properties of Fourier and Laplace transforms

Unit : I Vectors

Gradient – The Divergence and Gauss's Theorem – The curl of a vector field and Stokes theorem –Orthogonal curvilinear coordinates – Application to Hydrodynamics – Equation of heat flow in solids – The Gravitational Potential – Maxwell's Equation – The Wave Equation.

Unit : II Matrices

Vectors as Matrices – Solution of linear equations – Linear transformations – Orthogonal and Unitary transformations – Similarity transformations – Eigen values, Eigen vectors; Characteristic equation of a matrix – Cayley - Hamilton theorem – Some important theorems of Eigen values and Eigen vectors – Diagnolization of matrices.

Unit : III Special functions I

The Beta function – The Gamma function – Relation between Beta and Gamma function- Legendre's differential equation and Legendre's function – The generating function for $P_n(x)$ – Rodrigue's formula for the Legendre's polynomial - The Legendre's coefficients- n th orthogonality $P_n(x)$ – Recurrence Formulae-Laguerre's Differential

equation and Laguerre polynomial-The generating function for Laguerre polynomial - Rodrigue's formula for the Laguerre's polynomial.

Unit : IV Special functions II

Bessel's differential equation – The Bessel's function of order n of the second kind – Recurrence Formulae –Generating function- Orthonormality of Bessel's Functions: Expansion of an arbitrary function in a Series of Bessel's functions - Modified Bessel's function. Hermite Differential Equation and Hermite Polynomials-Generating function of Hermite Polynomials- Recurrence Formulae for Hermite Polynomials.

Unit : V Fourier Series and transforms

Fourier Series- Half Range Series –Complex Form – Change of Interval Fourier's Transform – Properties of Fourier's Transform – Fourier Transform of a Derivative – Fourier sine and cosine Transforms of Derivatives.

Text Book:

1.Satya Prakash, *Mathematical Physics*,Sultan chand and sons Educational Publishers, New Delhi, First Edition, Reprint 2009.

Unit : I	**Chapter 1**	**1.2 to 1.9,1.19**
Unit : II	**Chapter 2**	**2.27 to 2.35**
Unit : III	**Chapters 4,7**	**4.1 to 4.7,7.11 to7.17,7.38 to 7.40**
Unit : IV	**Chapter 7**	**7.21 to 77.26,7.29,7.30 ,7.33 to 7.35**
Unit : V	**Chapters 8,10**	**8.1 to 8.8,10.1 to 10.5**

Reference Books:

1. Charlie Harper,*Introduction to Mathematical Physics* , Prentice Hall of India Pvt Limited,New Delhi, First Edition ,2005.

2. Gupta.B.D, *Mathematical Physics*, Vikas Publishing House, Pvt Limited, New Delhi, Fourth Edition ,2006.

3. Joshi.A.W,*Matrices and Tensors in Physics*, New age International Publishers, New Delhi, 3rd edition

4. Kakani.S.L,Hemrajani.C,*Mathematical physics*, CBS Publishers & Distributors Pvt.Ltd., New Delhi, Second Edition,2004.

5. Raman.K.V, *Group theory and its applications to chemistry*, Tata Mc Graw Hill Limited, New Delhi, Reprint, Second Edition 2005.

Annexure-23

E.M.G YADAVA WOMENS COLLEGE, MADURAI-14

(An Autonomous Institution-Affliliated to Madurai Kamaraj University)
(Re-accrediated (3rd cycle)A+ & CGPA 3.51 Grade by NAAC)

CBCS

DEPARTMENT OF PHYSICS

M.Sc PHYSICS

(w.e.f.2018-2019 onwards)

Title of the paper : Classical mechanics
Semester : I **Contact Hours : 6**
Subject Code : 18PP12 **Credits : 5**

Objectives :

This paper aims to

1. Understand Lagrangian methods
2. Learn about the central field motion
3. Study the Hamiltonian formulations
4. Analyze the mechanics of small oscillations

Unit : I Lagrangian Methods

System of Particles – Conservation of energy – Work energy theorem – Conservative forces – Examples – Generalized coordinates – Degrees of freedom under constraints – D'Alemberts principles – Lagrangian function – Lagrange's equation – Application of Lagrange's equation.

Unit : II Central field motion

Reduction to the equivalent one-body problem – The equation of motion and first integrals – The equivalent one-dimensional problem, and classification of orbits – The virial theorem – The differential equation for the orbit, and integrable power-law potentials – Conditions for closed orbits (Betrand's theorem) – The Kepler problem: Inverse square law of force – The motion in time in the Kepler problem – The Laplace-Runge-lenz vector – Scattering in a central force field – Transformation of the scattering problem to laboratory coordinates.

Unit : III Hamiltonian methods

Hamiltonian equations of motion – Cyclic coordinates and Routh's procedure – Physical significance of the Hamiltonian – Hamiltonian's equation from variational principle – The principle of least action.

Canonical Transformations: The equation of canonical transformations – Examples of canonical transformation – Lagrangian brackets – Poisson brackets – Equations of motion in Poisson bracket notation.

Unit : IV Small Oscillations

Formulation of the problem – The Eigen Value equation and the principal axis transformation – Frequencies of free vibration and normal coordinates – Free Vibrations of a linear triatomic molecule.

Unit : V Hamilton – Jacobi Theory

The Hamilton-Jacobi equation for Hamilton's principal function – The Harmonic oscillator problem as an example of the Hamilton-Jacobi method – The Hamilton – Jacobi equation for Hamilton's characteristic function – Separation of variables in the Hamilton – Jacobi equation – Action-angle variables in systems of one degree of freedom – Action-angle variables for completely separable systems – The Kepler problem in action-angle variables.

Text Book:

1. Goldstein.H, *Classical Mechanics*, Narosa Publication House, New Delhi, Twelth Edition ,2001.

Unit : I	**Chapter 1**	**1.1, 1.2, 1.3, 1.4, 1.6**
Unit : II	**Chapter 3**	**3.1 to 3.11**
Unit : III	**Chapters 8,9**	**8.1, 8.2, 8.3, 8.5, 8.6,9.1, 9.2, 9.4, 9.5**
Unit : IV	**Chapter 6**	**6.1, 6.2, 6.3, 6.4**
Unit : V	**Chapter 10**	**10.1 to 10.7**

Reference Books :

1. Aruldhas.G,*Classical Mechanics*,PHI learning private limited,New Delhi,Second Edition,2009.
2. Gupta,Kumar,Sharma,*Classical Mechanics* ,Pragati Prakashan, Meerut,twenty sixth Edition,2013.
3. Panat.P.V,*Classical Mechanics*,Narosa Publication house,New Delhi,Reprint Edition ,2006.
4. Sankar Rao.K.N,*Classical Mechanics*,University press(India) Private Limited,Hyderabad, First Edition,2011.
5. Upadhyaya.J.C,*Classical Mechanics*,Himalaya Publishing house, Second Edition,2005.

Annexure-23

E.M.G YADAVA WOMENS COLLEGE, MADURAI-14

(An Autonomous Institution-Affliliated to Madurai Kamaraj University)
(Re-accrediated (3rd cycle)A+ & CGPA 3.51 Grade by NAAC)

CBCS

DEPARTMENT OF PHYSICS

M.Sc PHYSICS

(w.e.f.2018-2019 onwards)

Title of the paper : Advanced Electronics

Semester : I	**Contact Hours : 6**
Subject Code :18PP13	**Credits 5**

Objectives :

This paper aims to

1. Understand the basis of semiconductor devices
2. Make awareness on Operational amplifier
3. Review IC 555 Timer
4. Develop wide knowledge about Combination and data processing circuit
5. Learn about flip flop and counters

Unit : I Semiconductor diodes & devices

The continuity equation-PN junction diode in equilibrium with no applied voltage-under forward bias condition-Reverse bias condition- MOSFET-Enhancement MOSFET-Depletion MOSFET-Biasing the FET-SCR- SCR half wave rectifier-SCR full wave rectifier-SCR bridge rectifier.

Unit : II Operational amplifier

Evolution of op amp- OP Amp characteristics and parameters-OP Amp comparator-Schmitt trigger- Inverting amplifier-Inverting summing (Adder)- Non inverting amplifier – voltage follower-Non inverting summing amplifier-Difference amplifier-OP Amp Differentiator-OP Amp Integrator.

Unit : III D/A and A/D Converters and IC 555 Timer

Binary weighted Resistors D/A converter-R-2R Resistive ladder D/A converter-Counter type A/D converter –Successive approximation A/D converter- IC 555 Timer-Internal structure-Schmitt trigger-Astable multivibrator- Monostable multivibrator.

Unit : IV Karnaugh map &Combination circuit

karnaugh map- Minterms- relation between K-map and truth table- 2,3and 4 variable K map using minterms- don't care condition-Maxterms –K map using maxterms – Multiplexers- Demultiplexers- decorders- encoders.

Unit : V Flip flops & counters

Introduction - SR flip flop – SR using NOR gates – clocked S-R – Edge triggered: D flip flop – JK flip flop - JK Master slave flip flop- T flip flop- Resister- Shift register- Ring counter- asynchronous counter- Synchronous counter.

Text books

1. Salivahanan.S,Suresh kumar.N,*Electronic Devices and circuits*, Tata McGraw-Hill Education private limited, New Delhi, First Edition, 2011.[unit – I]

2. Vijayendran.V *Introduction to integrated Electronics Digital and Analog*-. Vishwanathan .S (Printers and publishers)Pvt Ltd ,Chennai, First Edition, 2010. [unit – II,III,IV,V]

Unit : I	**Chapters 4,7,8**	**4.10,4.11,7.9 to 7.11,7.16,8.3**
Unit : II	**Chapters 13,14**	**13.2, 13.4, 14.1 to 14.10**
Unit : III	**Chapters 16,17**	**16.1 to 16.4, 17.1 to 17.4**
Unit : IV	**Chapters 6,8**	**6.1 to 6.8,8.1 to 8.4**
Unit : V	**Chapters 9,10**	**9.1,9.3 to 9.6,10.1 to 10.3,10.5,10.6**

Reference Books:

1. Ghosh. B, *Fundamental Principles of Electronics*, Arunabha Sen Books and Allied (p) Ltd, Kolkata, Second Edition ,2011.

2.Jose Robin.G,Ubald raj.A, *Analog electronics and Digital Electronics*, Indra Publications,Marthandam, First Edition2008.

3.Malvino leach, *Digital principles and applications*, Tata McGraw Hill publishing company limited, New Delhi, Fifth Edition, 2002.

4. Rohit Mehtha,V.K.Mehtha, *Principles of electronics*, S.Chand and company Ltd, New Delhi,Eleventh Edition,2012.

5. Santhiram Kal, *Basic Electronics Devices circuits and IT fundamentals*, PHI Learning Private Learning, New Delhi, Tenth Edition,2010.

Annexure-23

E.M.G YADAVA WOMENS COLLEGE, MADURAI-14

(An Autonomous Institution-Affliliated to Madurai Kamaraj University)
(Re-accrediated (3rd cycle)A+ & CGPA 3.51 Grade by NAAC)

CBCS

DEPARTMENT OF PHYSICS

M.Sc PHYSICS
(w.e.f.2018-2019 onwards)
Elective Paper-I

Title of the paper : Numerical methods
Semester : I **Contact Hours : 4**
Subject Code : 18PPE1A **Credits 4**

Objectives :

This paper aims to

1. Recall the curve fitting procedures
2. Analyse different interpolation techniques
3. Rejuvenate the concepts of numerical integration and differentiation
4. Solve partial differential equations

Unit : I Solution of Algebraic and Transcendental Equations:

The Bisection Method–The Method of False position- The Iteration Method –Newton Raphson Method –Ramanujan's Method-The secant Methods .

Unit : II Interpolation

Finite Differences-Forward Differences – Backward differences – Central Differences – Detection of errors by use of difference tables – Differences of a polynomial – Newton's formula for interpolation –Divided difference and their properties-Central difference interpolation formula-Gauss's central difference formulae – Stirling's formula – Bessel's formula-Everett's formula.

Unit : III Least squares and B-splines

Fitting a straight Line-Nonlinear Curve Fitting- Curve Fitting by a sum of Exponentials-Linear Weighted Least squares approximation-Nonlinear Weighted Least squares approximation -Representations of B-splines-computation of B-splines -chebyshev Polynomials -Economization of power series.

Unit : IV Numerical differentiation and integration

Numerical integration – Trapezoidal rule – Simpson's 1/3 rule-Simpson's 3/8 rule – Error Analysis-Numerical solution of ordinary differential equations: Introduction-solution by Taylor's series – Picard's method of successive approximations – Euler's method – Modified Euler's method – Runge kutta method.

Unit : V Simultaneous solutions

Direct Methods – Matrix Inversion Method-Gaussian elimination Method–Iterative Methods – The eigen value problem- Jacobi's Method – Gauss-Seidel Method – Successive over -relaxation.

Text Book:

1.Sastry .S.S, *Introductory methods of Numerical analysis,* Prentice Hall of India private limited ,New Delhi, Fourth Edition , 2005.

Unit : I Chapter 2 2.2 to 2.7

Unit : II Chapter 3 3.3,3.3.1 to 3.3.3,3.4 to 3.7,3.7.1 to 3.7.4,3.10

Unit : III Chapter 4 4.2.1 to 4.2.3,4.3,4.3.1,4.3.2,4.5.1 to 4.5.3, 4.7.1,4.7.2

Unit : IV Chapters 5,7 5.4,5.4.1 to 5.4.3,7.1 to 7.4,7.4.1,7.4.2,7.5

Unit : V Chapters 6,8 6.3,6.3.1,6.3.2,6.4,6.5,8.3.1 to 8.3.3

Reference Books:

1. Arumugam .S, Somasundaram .A, Thangapandian Issac.A, *Numerical methods*,Sci Tech Publications India Pvt Ltd,Chennai,Second Edition,2002.

2. Burden.R.L,&Faires.T.D, *Numerical analysis*,Thomson Asia Pvt Ltd, Seventh Edition, Bangalore, 2002.

3.Kandasamy.P, Thilagavathi.K,Gunavathy.k, *Numerical methods*,S.Chand&company Ltd,New Delhi ,Third Edition, 2005.

4. Sankara Rao.K, *Numerical methods for scientists and engineers*, Prentice hall India, New Delhi ,Second Edition ,2004.

5. Veerarajan Ramachandran, *Numerical methods*, Tata Mc Graw Hill Ltd., New Delhi ,Second Edition, 2006.

Annexure-23

E.M.G YADAVA WOMENS COLLEGE, MADURAI-14

(An Autonomous Institution-Affliliated to Madurai Kamaraj University)
(Re-accrediated (3rd cycle)A+ & CGPA 3.51 Grade by NAAC)

CBCS

DEPARTMENT OF PHYSICS

M.Sc PHYSICS
(w.e.f.2018-2019 onwards)
Elective Paper-I (OPTIONAL)

Title of the paper : Programing in C++
Semester : I **Contact Hours : 4**
Subject Code : 18PPE1B **Credits : 4**

Objectives :

This paper aims to

1. Develop skill for developing the different programs
2. Appreciate and apply the programming concepts
3. Know overloading, inheritance concepts
4. Envelop logical thinking

Unit : I Principles of Oop, Tokens, Expressions and Control Structures

Introduction to object Programming – Procedural Vs Object oriented – Basic concepts – benefits – Languages – Applications – structure – Character set Basic data type – Identifier – operators – Control Structure.

Unit : II Functions and Classes

Function – declarations – parameter passing methods – inline functions – Default arguments – functions – Overloading – friend and virtual functions- Structure class – Defining member function in class - arrays within a class.

Unit : III Constructors and Destructors, Operator Overloading

Constructors– constructor overloading -dynamic Constructor–destructors-operator overloading-unary, binary operators-overloading using friend functions-Rules for over loading –type conversion.

Unit : IV Inheritance, Pointers

Inheritance – Various forms of Inheritance – abstract classes – pointers – pointers to objects – this pointer – virtual functions-virtual constructors and destructors.

Unit : V Managing console I/O Operations, Files

I/O stream-stream class-formatted and unformatted I/O manipulators-file of classes-file I/O-updating file, error handling and command line arguments.

Text Book:

1. Balagurusamy.E, *Object Oriented Programming with C++*, Tata Mc Graw Hill Company, New Delhi , Fourth Edition, 2011.

Unit : I Chapters 1-3

Unit : II Chapters 4-5

Unit : III Chapters 6-7

Unit : IV Chapters 8-9

Unit : V Chapters 10-11

Reference books:

1. Herbert Schildt, *The Complete Reference C++*, Tata Mc Graw Hill Company, New Delhi ,Fourth Edition,2009.

2. Mike McGrath, *C++ Programming in easy steps,* Dreamtech Press, New Delhi,Third Edition,2011.

3. Radha Ganesan.P ,*Programming with C ++* , Scitech Publication**,** Chennai**,**First Edition,2002.

4. Ravichandran.D, *Programming with C++,* Tata Mc Graw Hill Company, New Delhi,Second Edition,2002.

5. Robert Laffore, *Object oriented programming using C++*,Sams publishing, carmal Indiana, Fourth Edition,2002.

Annexure-23

E.M.G YADAVA WOMENS COLLEGE, MADURAI-14

(An Autonomous Institution-Affliliated to Madurai Kamaraj University)
(Re-accrediated (3rd cycle)A+ & CGPA 3.51 Grade by NAAC)

CBCS

DEPARTMENT OF PHYSICS

M.Sc PHYSICS

(w.e.f.2018-2019 onwards)

Title of the paper : Mathematics physics-II

Semester : II **Contact Hours : 6**

Subject Code :18PP21 **Credits : 5**

Objectives :

This paper aims to

1. Use the complex variables in solving integrals
2. Study about the Tensors
3. Understand the group theory concepts
4. Study statistical and probability concepts

Unit : I Complex Variables

Introduction – Function of complex variable– Cauchy Riemann equations – Line integral of complex functions– Cauchy integral theorem (simple proof) – Cauchy integral formula –Taylor's and Laurent's series.

Unit : II Residue

Singularities of an analytic function – Residues and their Evaluation – Cauchy Residue theorem – Evaluation of definite integrals – Jordan's Lemma Theorem.

Unit : III Tensors

Qualitative introduction – Coordinate transformation – Scalars, Contravarient vectors and Covariant vectors – Addition, Multiplication and contraction of Tensors – Symmetric and Antisymmetric Tensors – Differentiation of Tensors – Intrinsic and covariant derivatives of tensors of higher order –Simple Applications of tensor.

Unit : IV Group theory

Introduction- Definitions of theorems of group theory – defining properties of a group – some examples of groups – Sub groups – Classes – Classes of symmetry operations – Representation of groups – The great Orthogonality theorem and its consequences – Character table – Representation for cyclic groups.

Unit : V Probability

Definition-Binomial theorem of Probability-Measures of Dispersion-The Binomial Distribution – The Poisson distribution – The normal or Gaussian distribution.

Text Books:

1. Satya Prakash, *Mathematical Physics*, Sultan chand and sons Educational Publishers, New Delhi, Reprint, First Edition, 2009.[Unit I,II,III,V]

2. Albert.F, Cotton, *Chemical Application of Group theory*, John Wiley and sons Private Limited, New Delhi, Third Edition , 2011.[Unit IV]

Unit : I	**Chapter 6**	**6.1. to 6.7,6.10 to 6.12,6.14 to 6.16,6.20,6.21**
Unit : II	**Chapter 6**	**6.22 to 6.25(c)**
Unit : III	**Chapter 3**	**3.1 to 3.4,3.8,3.10,3.11,3.23,3.24,3.30,3.38**
Unit : IV	**Chapters 1,2,3,4**	**1,2.1 to 2.4, 3.13,4.1,4.3 to4.5**
Unit : V	**Chapter 12**	**12.1 to 12.7,12.11,12.20,12.21,12.22**

Reference Books:

1. Charlie Harper, *Introduction to Mathematical Physics* , Prentice Hall of India Pvt. Limited, New Delhi ,First Edition ,2005.

2. Gupta.B.D, *Mathematical Physics*, Vikas Publishing House, PVT Limited, New Delhi, Fourth Edition ,2006.

3. Joshi.A.W,*Matrices and Tensors in Physics*, New age International Publishers,New Delhi, Third Edition.

4. Kakani.S.L,Hemrajani.C,*Mathematical physics*, CBS Publishers & Distributors Pvt.Ltd.,New Delhi,Second Edition,2004.

5. Raman.K.V, *Group theory and its applications to chemistry,* Tata Mc Graw Hill Limited,New Delhi, Reprint, Second Edition 2005.

Annexure-23

E.M.G YADAVA WOMENS COLLEGE, MADURAI-14

(An Autonomous Institution-Affliliated to Madurai Kamaraj University)
(Re-accrediated (3rd cycle)A+ & CGPA 3.51 Grade by NAAC)

CBCS

DEPARTMENT OF PHYSICS

M.Sc PHYSICS

(w.e.f.2018-2019 onwards)

Title of the paper : Thermodynamics and Statistical Mechanics

Semester : II **Contact Hours : 6**

Subject Code : 18PP22 **Credits : 5**

Objectives:

This paper aims to

1. Study the Law of Thermodynamics
2. Apply the Laws of Thermodynamics
3. Understand the Application and concept of Ensembles.

Unit : I Thermodynamics

First law of thermodynamics – The Two specific heats – Second law of thermodynamics and entropy – Latent Heat Equations – Clausius theorem – Entropy; a Point Function – Entropy as a thermodynamic coordinate – T-S indicator diagram – Third law of thermodynamics; Nernst Heat theorem – Calculation of entropy change in different process – Maxwell's Thermodynamical Relations – Thermodynamical potentials – Maxwell's Equation from Thermodynamical potentials – The two Tds equations.

Unit : II Applications of laws of thermodynamics

Application of Tds equation – Clausius Clapeyron's latent heat equation – The Triple point; Thomson's Theorem – Perfect gas equation – Joule-Thomson's theorem –The energy equation – Ratio of two Specific heats – Adiabatic stretching of a wire – Application to Paramagnetic salts; Magneto-Caloric effect – Application to surface Films –Application to Chemical Thermodynamics.

Unit : III Statistical mechanics

Phase Space –ensembles –Micro Canonical ensemble – perfect gas in micro canonical ensemble –Gibbs paradox – partition function and its correlation with thermodynamic quantities-Gibbs canonical ensemble-Thermodynamic functions for canonical ensemble-Grand canonical ensemble-Partition function and thermodynamic functions for Grand canonical ensemble-Perfect gas in Grand canonical ensemble.

Unit : IV Distribution law

Identical particles and symmetry requirement –Bose-Einstein statistics –Fermi-Dirac statistics-Maxwell-Boltzmann statistics-Evaluation of constants α and β-Gas degeneracy – Bose Einstein condensation.

Unit : V Applications of Statistics

Introduction – Specific Heat of Solids – Dulong and Petit's Law – Deduction of Dulong and Petit's law from Classical statistics –Temperature Variation of specific heat – Einstein's theory of specific heat of solids – Debye's theory of specific heat solved examples – Specific heat of gases – Temperature variation of specific heat of Diatomic Gases – Quantization of various contributions to energy of a Diatomic molecule – Specific heat of diatomic gases.

Text Books:

1. Sharma,Sankar,*Thermodynamics and Statistical physics*,Himalaya publishing house Pvt Ltd,Mumbai,First Edition,2011. [Unit I,II,V]

2. Gupta.S.L,Kumar.V ,*Elementary Statistical mechanics*,Pragati Prakashan,Meerut,Twenty third Edition ,2009. [Unit III ,IV]

Unit : I	**Chapters 2,5,6**	**2.7,2.9,5.10 to 5.14,5.20,5.21,6.1 to 6.4**
Unit : II	**Chapter 6**	**6.5 to 6.16**
Unit : III	**Chapters 1,3**	**1.1,1.3(1.3.1,1.3.2),3.0.2,3.0.3,3.1,3.3,3.2(1,2,3)**
Unit : IV	**Chapters 6,7,8**	**6.1,6.2,6.3,6.4,6.5,6.10,7.10,8.1,8.2**
Unit : V	**Chapter 14**	**14.1 to 14.10**

Reference Books:

1. Garg.S.C., Bansal.R.M., Ghosal.C.K., *Thermal Physics,* McGraw Hill Education, New Delhi, Second Edition.

2. Gupta .A.B, Roy. A.B, *Thermal Physics,* Arunabha Sen Books & Allied (P) Ltd, kolkata, First Edition, 2002.

3. Jayaraman .D.Dr, Ilangovan. K. Dr ,*Thermal Physics& Statistical Mechanics*,S.viswanathan (Printers & Publisher) Pvt.Ltd, First Edition, 2009.

4. Panat.P.V, *Thermodynamics and Statistical mechanics, Na*rosa publishing house, New Delhi, First Edition, 2011.

5. Saxena.A.K, *An Introduction* to *Thermodynamics and Statistical mechanics, Na*rosa Publishing house, New Delhi, First Edition, 2011.

Annexure-23

E.M.G YADAVA WOMENS COLLEGE, MADURAI-14

(An Autonomous Institution-Affliliated to Madurai Kamaraj University)
(Re-accrediated (3rd cycle)A+ & CGPA 3.51 Grade by NAAC)

CBCS

DEPARTMENT OF PHYSICS

M.Sc PHYSICS

(w.e.f.2018-2019 onwards)

Title of the paper : Electromagnetic theory

Semester : II **Contact Hours : 6**

Subject Code : 18PP23 **Credits 5**

Objectives :

This paper aims to

1. Understand the concepts of electrostatic fields
2. Review the Maxwell's equations
3. Analyze electromagnetic wave propagation
4. Induce the knowledge about wave guides

Unit : I Divergence and curl of electric fields

Field lines and Gauss law –The divergence of **E** – Applications of Gauss law - The curl of E. Electric potential: Introduction to potential – Comments on potential – Poisson's equations and Laplace equations – The potential of a localized charge distribution – Electrostatic boundary conditions.. **Multipole expansion**: Approximate potentials at large distances – The monopole and dipole terms – Origin of coordinates in multipole expansions – The electric field of a dipole. Polarization. Gauss law in the presence of dielectrics – Boundary Conditions. **Linear dielectrics:** Susceptibility – Permittivity – Dielectric constant.

Unit : II The divergence and curl of B

Straight line currents – The divergence and curl of **B** – Applications of Ampere's law – Comparison of magneto statics and electrostatics – Magnetic vector potential – Magnetostatic boundary conditions – Multipole expansion of two vector potentials – The auxiliary magnetic field **H** – Ampere's law in magnetized materials – Comparison between **B** and **H** – Faraday's law – Electromagnetic induction – Inductance – Energy in magnetic fields.

Unit : III Maxwell's equations

Maxwell's equations and magnetic charge - Maxwell's equations inside matter – Boundary conditions. Potential formulations of electrodynamics**:** Scalar and vector potentials - Gauge transformations – Coulomb Gauge and Lorentz Gauge – Lorentz force law in

potential form. Energy and momentum in electrodynamics: Newton's third law in electrodynamics – Poynting's theorem.

Unit : IV Electromagnetic waves

The wave equation in one-dimension – Sinusoidal waves – Polarization – Boundary conditions. Electromagnetic waves in non-conducting media Monochromatic plane waves in vacuum – Energy and momentum of EM waves – Propagation through linear media – Reflection and transmission at (1)normal incidence and (2) oblique incidence. Electromagnetic waves in conducting- The modified wave equation – Monochromatic plane waves in conducting media.

Unit : V Electromagnetic radiation:

Dipole radiation – Retarded potentials – Electric dipole radiation – Magnetic dipole radiation – Radiation from arbitrary distribution of currents and charges. Radiation from a point charge: Lienard-Wiechert potentials – The fields of a point charge in motion – Power radiated by a point charge – Magnetism as a relativistic phenomenon – The transformation of fields.

Text book

1.David.J.Griffiths, *Introduction to electrodynamics*, PHI Learning private Limited, New Delhi, Third Edition,2011.

Unit : I Chapters 2(2.2.1 to 2.24,2.31 to 2.3.5) , 3(3.41 to 3.44), 4(4.1.4, 4.3.1 ,4.3.3 ,4.4.1)

Unit : II Chapters 5(5.3.1 to 5.3.4,5.4.1 to 5.4.3), 6(6.3.1,6.3.3), 7(7.21 to 7.2.4)

Unit : III Chapters 7(7.3.3 to 7.3.6), 10(10.1.1 to 10.1.3), 8(8.1.2)

Unit : IV Chapters9(9.1.1 to 9.1.4,9.2.1 to 9.23, 9.31.to 9.3.3,9.4.1 to 9.4.2)

Unit : V Chapters 11(11.1.1 to 11.1.4,11.2.1), 12(12.3.1 to 12.3.2)

Reference Books:

1. Nishit Mathur, *Text Book of Magnetism,* Green Leaf Publications, Varanasi, First Edition,2013.

2. Rai choudhary.S, Shobhit Mahajan, *Electricity ,Magnetism and Electromagnetic Theory,* Tata McGraw Hill Education Private Limited, New Delhi, First Edition,2012.

3.Tayal.D.C, *Electricity and Magnetism,* Himalaya Publishing House, Mumbai, Fourth Edition,2007.

4. Laud.B.B. *Electromagnetics*,New Age International, Third Edition

5.Vasudeva.N,*Fundamentals of Magnetism and Electricity,* S.Chand & Company Pvt Ltd, New Delhi, First Edition, 2008.

Annexure-23

E.M.G YADAVA WOMENS COLLEGE, MADURAI-14

(An Autonomous Institution-Affliliated to Madurai Kamaraj University)
(Re-accrediated (3rd cycle)A+ & CGPA 3.51 Grade by NAAC)

CBCS

DEPARTMENT OF PHYSICS

M.Sc PHYSICS

(w.e.f.2018-2019 onwards)

Title of the paper : Practical-I General Experiments

Semester : I **Contact Hours : 4**

Subject Code : 18PP22P **Credits 4**

(Any twelve)

Name of the Experiments

1. Cauchy's constant
2. Hyperbolic fringes
3. Maxwell's Bridge
4. Hartman's Interpolation formula.
5. Wien's Bridge Network
6. Resolving power of a prism
7. Numerical Methods I (Simpson's 1/3 rule & Trapezoidal rule)
8. Numerical Methods II (Bisection and Newton Raphson method)
9. Numerical Methods III (Runge Kutta Method)
10. Elliptical Fringes
11. Hollow Prism-To find the Refractive index of the liquids
12. Four probe method- To find the band gap of the given material
13. Edser Butler Fringes
14. Anderson Bridge
15. Refractive Index of Liquids using Laser

Annexure-23

E.M.G YADAVA WOMENS COLLEGE, MADURAI-14

(An Autonomous Institution-Affliliated to Madurai Kamaraj University)
(Re-accrediated (3rd cycle)A+ & CGPA 3.51 Grade by NAAC)

CBCS

DEPARTMENT OF PHYSICS

M.Sc PHYSICS

(w.e.f.2018-2019 onwards)

Title of the paper : Practical-II Electronics

Semester : I	**Contact Hours : 4**
Subject Code : 18PP21P	**Credits 4**

Name of the Experiments (Any twelve)

1. Zener diode-Regulated power supply(5 V)
2. Wave shaping (diodes)
3. IC Regulated power supply
4. OP amp as an Integrator and Differentiator
5. OP amp Characteristics(Inverting, Non Inverting, Input Impedence,Output Impedence)
6. OP amp waveform generator
7. Two stage RC coupled amplifier
8. Karnaugh map
9. Astable multivibrator using IC 555 and Transistor
10. Monostable multivibrator using IC 555 and Transistor
11. Hartley oscillator using Transistor
12. Colpitts oscillator using Transistor
13. Relaxation oscillator using UJT
14. Construction of dual regulated power supply.
15. Phase shift oscillator using Transistor
16. Emitter follower in CC Mode
17. Bistable multivibrator using IC 555
18. Three bit D/A convertor.

Annexure-23

E.M.G YADAVA WOMENS COLLEGE, MADURAI-14

(An Autonomous Institution-Affliliated to Madurai Kamaraj University)
(Re-accrediated (3rd cycle)A+ & CGPA 3.51 Grade by NAAC)

CBCS

DEPARTMENT OF PHYSICS

M.Sc PHYSICS
(w.e.f.2018-2019 onwards)
Elective Paper-II

Title of the paper : Instrumentation
Semester : II **Contact Hours : 4**
Subject Code : 18PPE2A **Credits 4**

Objectives :

This paper aims to

1. Know about the Oscilloscope.
2. Understand the Signal generators.
3. Gain knowledge about Measuring instruments.
4. Study the type of Recorders
5. Learn about the Transducers

Unit : I Oscilloscope

Introduction-Block Diagram of Oscilloscope – Simple CRO – Vertical Amplifier – Horizontal Deflecting System – Triggered Sweep CRO – Trigger Pulse Circuit – Delay Line in Triggered Sweep – Typical CRT Connections – High Frequency CRT – Dual Beam CRO - Measurement of Frequency by Lissajous Method.

Unit : II Signal Generators

Introduction – Variable AF Oscillator – Basic Standard Signal Generator-Modern Laboratory Signal Generator – AF Sine and Square Wave Generator – Function Generator – Square and Pulse Generator – Random Noise Generator - Video Pattern Generator – Color Bar Generator.

Unit : III Measuring instruments

Introduction – Output Power Meters – Field Strength Meter – Stroboscope – Phase Meter –Q Meter: factors errors- - impedance measurement – Susceptance method- RX Meters –Analog pH Meter.

Unit : IV Recorders

Introduction – Strip Chart Recorder – Galvanometer Type Recorder – Null Type Recorder – Circular Chart Recorder – X-Y Recorder – Magnetic Recorders – Frequency Modulation Recording – Digital Data Recording.

Unit : V Transducers

Introduction – Electrical Transducer – Selecting a Transducer – Resistive Transducer – Resistive Position Transducer – Resistive Thermometer – Thermistor –Piezo Electrical Transducer – Photo Electric Transducer.

Text Book:

1.Kalsi.H.S, *Electronic Instrumentation*, Tata MC Graw Hill Publishing Company Limited, New Delhi,Third Edition, 2003.

Unit : I	**Chapter 7**	**7.1, 7.4 to7.10, 7.12 to 7.15, 7.20**
Unit : II	**Chapter 8**	**8.1, 8.3, 8.4, 8.6 to 8.10, 8.16**
Unit : III	**Chapter 10**	**10.1 to 10.5.10.7, 10.9**
Unit : IV	**Chapter 12**	**12.1 to 12.9**
Unit : V	**Chapter 13**	**13.1 to 13.5, 13.7,13.8, 13.15,13.16**

Reference Books :

1.Albert.D,Helfrick,William.D,Cooper, *Modern Electronics Intrumentation and Measurement techniques*, PHI Learning Private Limited, New Delhi, 2011, First Edition

2.Basudev Ghosh, *Fundamental Principles of Electronics*, Books and Allied (p) Ltd, Kolkata, Second Edition,2011.

3.Jose Robin.G, Ubald Raj .A , *Basic Electronics and Applied Electronics*, Indira Publication, Marthandam, Second Edition, 2004.

4. Rangan.C.S, Sarma.G.R,Mani.VSV, *Instrumentation Devices& systems* , Tata McGraw Hill Education Private Limited, New Delhi, Second Edition,2012.

5.Salivahanan.S,Sureshkumar.N, A.Vallavaraj, *Electronic devices &circuits*, Tata MC Graw Hill Publishing Company Limited, New Delhi, First Edition, 2011.

Annexure-23

E.M.G YADAVA WOMENS COLLEGE, MADURAI-14

(An Autonomous Institution-Affliliated to Madurai Kamaraj University)
(Re-accrediated (3rd cycle)A+ & CGPA 3.51 Grade by NAAC)

CBCS

DEPARTMENT OF PHYSICS

M.Sc PHYSICS
(w.e.f.2018-2019 onwards)
Elective Paper-II (OPTIONAL)

Title of the paper : Medical Physics
Semester : II **Contact Hours : 4**
Subject Code : 18PPE2B **Credits 4**

Objectives ::

This paper aims to

1. Use of Physics in medical instruments
2. Know the physics of diagnostic X-rays
3. Understand the concepts of Radio isotopes and Radiography
4. Review the concepts of Medical Physics

Unit : I Human physiological systems

Cells and their structures-nature of cancer cells-Transport of ion through the cell membrane-Resting and action potential-Bioelectric potential-Nerve tissues and organs-Different system of human body.

Unit : II Bio Potential Recorders

Characteristics of the recording system- Electrocardiography(ECG)-Electroencephalography(EEG)-Electromyography(EMG)-Electroretinography(ERG) &Electrooculography(EOG)-Recorders with high accuracy- Recorders for off line analysis. Physiological Assist Devices: Pacemakers-Pacemaker batteries.

Unit : III Operation Theatre Equipments

Surgical diathermy-Shortwave diathermy –Microwave diathermy-Ultrasonic diathermy- Therapeutic effect of heat-Ventilators-Anesthesia machine-Blood flowmeters-Cardiac output Measurements-Pulmonary function analysers-Gas analysers-Blood gas analysers -Oxymeters-Elements of intensive care monitoring. Bio-Telemetry:Elements ofbio-telemetry system-Design of a bio-telemetry system-Radiotelemetry Systems-Problems in implant telemetry-Uses of bio-telemetry.

Unit : IV Specialised Medical Equipment

Blood cell Counter-Electron Microscope-Radiation detectors-Photometers an Colorimeters-Digital thermometer-Audiometers-X-ray tube-X-ray machine-Radiography and fluoroscopy-Image Identifiers-Angiography-Application of X-ray examination.

Unit : V Advances in Biomedical Instrumentation

Computers in Medicine-Lasers in Medicine-Endoscopes-Cryogenic Surgery-Nuclear Imaging techniques-Computer tomography-Thermography-Ultrasonic Imaging Systems-Magnetic resonance imaging-Positron emission tomography-Digital substraction angiography-Biofeedback instrumentation.

Text book:

1.Arumugam.M,*Biomedical Intrumentation*,Anuradha Publications,Kumbokonam, Second Edition,2007.

Unit : I Chapter 1

Unit : II Chapter 4 4.2-4.8,5.2-5.8

Unit : III Chapter 6,8 6.2-6.6,6.8-6.16, 8.2-8.6

Unit : IV Chapter 7 7.2-7.13

Unit : V Chapters 10 10.2-10.14

Reference books :

1. Anadanatarajan, *Biomedical instrumentation and Measurements*,PHI Learning private Limited,New Delhi,First Edition ,2007.

2. Arora.M.P, *Biophysics*,Himalaya publishing House,Mumbai, First Edition,2011.

3.Cromwell.L,Pfeiffer.E.A,Weibell.F.J, *Biomedical Instrumentation and Measurements*,Prentice Hall of India Pvt Ltd,2006, New Delhi,Second Edition.

Some useful websites

1.https://www.medphysics.wisc.edu/graduate/documents/handbook_june_2014.pdf

2.http://www.almhnds.com/7/Medical_Physics/1.pdf

Annexure-17

E.M.G. YADAVA WOMEN'S COLLEGE, MADURAI – 625014

(An Autonomous Institution – Affiliated to Madurai Kamaraj University)
(Re-accredited (3rd Cycle) with Grade A+ and CGPA 3.51 by NAAC)

CBCS
DEPARTMENT OF PHYSICS-PG
(w.e.f.2018-2019 Batch onwards)

Title of the paper : Solid State Physics-I
Semester : III **Contact Hours : 6**
Subject Code : 18PP31 **Credits 4**

Objectives :

To be able to

1. Understand the different crystal structures
2. Know about the physical properties of different metals
3. Appreciate the different physical phenomena

Unit : I Crystal Structure

Periodic Array of atoms- Primitive lattice cell - Fundamental types of lattice – Two and Three dimensional lattice types - Index system for crystal planes-Simple crystal structures – Direct imaging of atomic structure- Crystal structure data.

Wave diffraction and Reciprocal lattice

Diffraction of waves by crystals– Scattered wave amplitude – Brillouin Zones-Reciprocal lattices to sc, bcc and fcc lattices- Fourier Analysis of the basis.

Unit : II Crystal binding and elastic constants

Crystals of Inert gas– Vander Waals – Londaon Interaction - Ionic crystals – Electrostatic or Madelung Energy - Covalent crystals – Metallic crystals – Hydrogen bonds – Atomic radii – Analysis of elastic strains – Elastic compliance and stiffness constants – Elastic waves in cubic crystals.

Unit : III Phonons I –Crystal vibrations

Vibrations of crystals with monoatomic basis – First brillouin zone – Group velocity - Two atoms per primitive basis– Quantization of elastic waves – Phonon momentum- Inelastic scattering by phonons.

Phonons II-Thermal Properties

Phonon heat capacity - Plack distribution - Debye model for density of states - Anharmonicity crystal interaction- Thermal expansion - Thermal conductivity – Umklapp process.

Unit : IV Free electron Fermi gas

Energy levels in one dimension-Effect of temperature on the Fermi- Dirac distribution -Free electron gas in three dimensions-Heat capacity of the electron gas-Electrical conductivity and Ohm's law – Motion in magnetic fields – Thermal conductivity of metals.

Energy bands

Nearly free electron model -Bloch functions- Kronig Penny model- Wave equation of electron in a periodic potential-Number of orbitals in a band.

Unit : V Semiconductor crystals

Band gap in semiconductors- Equations of motion- Holes – Effective mass - Effective mass in semiconductors - Intrinsic carrier concentration-Impurity conductivity-Thermoelectric effects-Semimetals-Super lattices.

Fermi surfaces and metals

Construction of Fermi surfaces- Nearly free electrons - Electron orbits, hole orbits, and open orbits-Calculation of energy bands-Experimental methods in Fermi surface studies-Quantization of orbits in a magnetic field.

Text Book

1.Charles kittel, *Introduction to solid state physics*, Join &Wiley sons Publication, New Delhi, Eighth Edition, 2018.

Annexure-17

Unit I	**Chapter 1**	**Page No:(1 to 22)**
	Chapter 2	**Page No :(23 to 43)**
Unit: II	**Chapter 3**	**Page No:(47 to 85)**
Unit: III	**Chapter 4**	**Page No:(89 to 102)**
	Chapter 5	**Page No :(105 to 126)**
Unit: IV	**Chapter 6**	**Page No:(131 to 157)**
	Chapter 7	**Page No :(161 to 182)**
Unit: V	**Chapter 8**	**Page No :(185 to 217)**
	Chapter 9	**Page No :(221to 252)**

Reference Books:

1.Ilogavan.K, *Solid state physics*, S.Vishwanathan Private Limited, First Edition, 2007.

2.Nandita dasgupta and Amitava das gupta, *Semiconductor devices modeling and technology*, PHI Learning Private Limited,New Delhi, 2011.

3. Pillai.S.O, *Solid state physics*, New Age international Private Limited, New Delhi, Sixth Edition, 2012.

4. Puri.R.K Babbar.V.K, *Solid state physics*, S.Chand publications, New Delhi, First Edition, 2010.

5. Srivastava.J.P, *Elements of solid state physics*, PHI Learning private limited, New Delhi, Third Edition, 2011.

6. Wahab.M.A, *Solid state physics structure and properties of materials*, Narosa Publishing house, New Delhi, Second Edition, 2007.

Annexure-17

E.M.G. YADAVA WOMEN'S COLLEGE, MADURAI – 625014

(An Autonomous Institution – Affiliated to Madurai Kamaraj University)
(Re-accredited (3rd Cycle) with Grade A+ and CGPA 3.51 by NAAC)

CBCS
DEPARTMENT OF PHYSICS-PG
(w.e.f.2018-2019 Batch onwards)

Title of the paper : Quantum Mechanics-I
Semester : III **Contact Hours : 6**
Subject Code : 18PP32 **Credits : 4**

Objectives :

To be able to

1. appreciate the development of wave mechanics for the description of particle
2. apply wave mechanism to simple systems
3. understand formulation of quantum mechanics

Unit : I The Schrodinger Wave Equation

Experimental Background – The Old Quantum Theory –Uncertainty and Complementarity –Motion of a free Wave Packet in One Dimension. Development of the Wave equation –Interpretation of the Wave Function –One-dimensional square well. Potential.

Unit : II EigenFunctions and Eigenvalues

Interpretative Postulates and Energy Functions-Dynamical variables as operators - Expansion in eigenfunctions-The total-energy operator-Normalization in a box-Orthonormality of energy eigen functions-Reality of the energy eigenvalues-Expansion in energy eigen functions-The closure property-Probability function and expectation value-General solution of the Schrodinger equation- Box Normalization.

Annexure-17

Unit : III Matrix Formulation of Quantum Mechanics

Matrix Algebra-Types of matrices-Hermitian and unitary matrices-Hilbert space-Dirac's bra and Ket notation-Physical meaning of matrix elements- Equation of Motion-Schrodinger picture, Heisenberg picture, Interaction picture- Classical lagrangian and Hamiltonian equations of motion-Poisson brackets and Commutator brackets.

Unit : IV Discrete Eigenvalues : Bound States

Linear Harmonic Oscillator-Asymptotic behavior-Energy levels-zero-point energy-Hermite polynomials-Harmonic-Oscillator wave functions-The Hydrogen Atom-Reduced mass-Asymptotic behavior-Energy levels-Laguerre Polynomials-Hydrogen – atom wave function-Degeneracy.

Unit : V Symmetry in Quantum mechanics and Angular Momentum states

Space and Time Displacements-Unitary displacement operator-Equation of motion-Symmetry and degeneracy-Time displacement-Commutation Relation for the Generators-Choice of a Representation- Angular Momentum and unitary groups-Combination of Angular momentum states-Eigen values of the total angular momentum-Clebsch-Gordan Coefficients .

Text Book

1.Leonard I Schiff, *Quantum Mechanics*, McGraw Hill Education (India) Private Limited, New Delhi, Fourth Edition, 2014.

Unit : I	**Chapters 1,2,3**	**Page No:2-8,12-15,20-23,45-50,81-85**
Unit : II	**Chapter 2**	**Page No:51-59**
Unit : III	**Chapter 2,3**	**Page No: Page No:25-28,38-42,63-71.**
Unit : IV	**Chapter 3,6**	**Page No: 90-95,162-169.**
Unit : V	**Chapter 4,5**	**Page No:105-108,109-111,115-117,129,130,138-140**

Reference Books

1. Ajoy Ghatak, Lokanathan.S, *Quantum mechanics theory and applications* **,** Macmillan publishers India Limited,New Delhi, Fifth Edition, 2012.

2.Gupta, kumar, Sharma, *Quantum mechanics*, Jai Prakash Nath Publications, Meerut, Thirteenth Edition, 2011.

3. Mathews.P.M and Venkatesan. K,*A text book of Quantum Mechanics*, Tata Mc Graw Hill Publication ,New Delhi, Second Edition, 2011.

4.Sathya prakash, Quantum Mechanics, Pragati Prakashan Educational Publisher, Meerut, Seventh Edition,2013.

5.Thankappan.V.K,*Quantum Mechanics*,New Age international publishers, New Delhi,Second Edition,2010.

Annexure-17

E.M.G. YADAVA WOMEN'S COLLEGE, MADURAI – 625014

(An Autonomous Institution – Affiliated to Madurai Kamaraj University)
(Re-accredited (3rd Cycle) with Grade A+ and CGPA 3.51 by NAAC)

CBCS
DEPARTMENT OF PHYSICS-PG
(w.e.f.2018-2019 Batch onwards)

Title of the paper : Nuclear Physics
Semester : III **Contact Hours : 6**
Subject Code : 18PP33 **Credits 4**

Objectives :

To be able to

1. Gain knowledge about the properties of Nucleus.
2. Understand the principle of working of Nuclear reactors.
3. Get in-depth knowledge about the phenomena of Radioactivity

Unit : I Nucleus

Introduction-Rutherford scattering and Estimation of the nuclear size-Measurement of nuclear radius – Nuclear spin-Moment and statistics.

The Q Equation

Introduction-Types of nuclear reactions-The balance of Mass and Energy in nuclear reaction –The Q equation-Solution of the Q equation-Centre of mass frame in nuclear physics.

Unit : II Radioactivity

Alpha rays

Range of α-particles-Disintegration energy of spontaneous α-Decay- Alpha decay paradox-Barrier penetration.

Beta rays

Introduction to continuous β-ray spectrum-Difficulities encountered to understand it -Pauli's Neutrino hypothesis-Fermi's theory of β decay-The detection of Neutrino.

Introduction to Gamma emission

Introducion –γ ray emission –Selection rules-Internal conversion.

Unit : III Nuclear models

Binding energy-Semi empirical mass formula-liquid drop model-Nuclear cross section – partial wave analysis of nuclear cross section – Nuclear transmutation - compound nucleus theory – Breit Wigner single level formula-Deuteron problem.

Unit : IV Nuclear Fission and Fusion

Types of fission – Distribution of fission products – Neutron emission in fission – fissile and fertile materials, spontaneous fission – Deformation of liquid drop: Bohr and Wheelers theory – Quantum effects- Nuclear fusion and Thermo nuclear Reaction – Controlled Thermo nuclear reactions (Hydrogen bomb, Different methods for the production of fusion reactions).

Nuclear fission reactors

Nuclear chain reaction (Four Factor Formula) – The Critical size of a Reactor (Reactor buckling, on leakage factors, Effect of Reflectors).

Unit : V Elementary particles

Introduction-Classification of Elementary particles-Fundamental interactions-conservation laws-Hypernuclei-Quarks.

Text books :

1. Patel.S.B, *Nuclear Physics*, New Age International publishers, First Edition, 2005. [UNITS I,II]

2. Dayal D.C, *Nuclear Physics*, Himalaya publishing house., Mumbai., Fifth revised Edition,2013. [UNITS III,IV,V]

Annexure-17

Unit : I	**Chapters 3,4**	**3.1-3.6,4.I.1-3,4.I.5**
Unit : II	**Chapter 4**	**4.II.1-4.II.3,4.III.1-4.III.5,4.IV.1-4.IV.3**
Unit : III	**Chapter 1,9,10**	**1.6,1.7,9.3,10.7-10.9,10.15,10.20**
Unit : IV	**Chapter 13,15**	**13.1-13.3,15.2,15.3**
Unit : V	**Chapter 18**	**18.1-18.4,18.16,18.19**

Reference books:

1. Basu.C.R, *Atomic and nuclear physics*, New Central Book Agency Private Limited, Calcutta, First Edition,2005.
2. Chandra.S,Sharma.M,*Nuclear particle physics*, Narosa Publishing House Private Limited, New Delhi, Second Edition, 2012.
3. Devanathan.V, *Nuclear Physics*, Narosa Publishing House Private Limited, New Delhi, Second Edition,2011.
4. Ghosal.S.N, *Nuclear Physics* , S.Chand& company Private Limited,New Delhi, Revised Enlarged Edition, 2014.
5. Murugeshan .R , *Atomic and nuclear Physics* , Madurai, First Edition, 2005.

Annexure-17

E.M.G. YADAVA WOMEN'S COLLEGE, MADURAI – 625014

(An Autonomous Institution – Affiliated to Madurai Kamaraj University)
(Re-accredited (3rd Cycle) with Grade A+ and CGPA 3.51 by NAAC)

CBCS
DEPARTMENT OF PHYSICS-PG
(w.e.f.2018-2019 Batch onwards)
Elective Paper-III

Title of the pape : Nano Physics
Semester : III **Contact Hours : 6**
Subject Code : 18PPE3A **Credits 5**

Objectives:

To be able to

1. Gain some basic ideas in Nano scale
2. Grasp structure and properties of CNTS.
3. Rejuvenate various methods of synthesizing Nano crystalline powder

Unit : I Nano particles and methods of measuring

Particle size determination – Transmission Electron Microscopy- Infrared and Raman Spectroscopy –Magic Numbers-Semiconducting Nanoparticles: Optical Propertices- Photofragmentation- Coulombic Explosion- Methods of synthesis: RF plasma- chemical methods- Thermolysis- Pulsed Laser methods.

Unit : II Nano Structures

Carbon clusters-Small Carbon Clusters-Discovery of C_{60}- Carbon nanotubes - Fabrication-Electrical Properties-Vibrational Properties – Mechanical Properties- Porous silicon- Photonic crystals- Dynamics of Nanomagnets- Gaint and colossal Magnetoresistance.

Annexure-17

Unit : III Quantum Wells, Wires and Dots

Introduction -Preparation of quantum Nanostructure- Size and dimensionality effects-Size Effect- Excitons- Single Electron Tunneling- Applications-Infrared Detectors-Quantum Dot Lasers.

Unit : IV Polymers and Biological Nanostructure

Introduction – Forming and characterizing polymers -Polymers- Polymerization-Sizes of Polymers- Conductive Polymers- Block Copolymers-Supramolecular structures-Transition-metal-Mediated types – Micelles- Biological building blocks- Sizes of Building Blocks and Nano structures-Polypeptide Nanowire and protein Nanoparticles-Biological nano structrures- Examples of Proteins- Multilayer Films.

Unit : V Nanomachines and nanodevices

Microelectromechnical Systems (MEMSs)-Nanoelectromechanical Systems (NEMSs)-Fabrication-Nanodevices and Nanomachines- Molecular and supramolecular switches.

Text Book:

1.Charles.P, Poole Jr, Frank.J,Owens, *Introduction to Nanotechnology*, Wiley Students Edition , New Delhi, 2011.

Unit I	**Chapters 3,4**	**3.2.3,3.3.1,3.4.1,4.2.1,4.3,4.3.1,4.3.2,4.3.3,4.5, 4.5.1-4.5.4**
Unit : II	**Chapters 5,6,7**	**5.3,5.3.1,5.3.2,5.4,5.4.1,5.4.3,5.4.4,5.4.5,6.1.8,6.2.6, 7.3,7.6**
Unit : III	**Chapters 9**	**9.1,9.2,9.3,9.3.1,9.4,9.5,9.6.1,9.6.2**
Unit : IV	**Chapters 11,12**	**11.1,11.2,11.2.1,11.2.2,11.4(11.4.1,11.4.2),11.5 (11.5.1,11.5.4),12.2,12.2.1,12.2.2,12.4 (12.4.1,12.4.3)**
Unit : V	**Chapter 13**	**13.1,13.2,13.2.1,13.2.2,13.3**

Reference books:

1. Chattopadhya K.K, Banerjee A.N, *Introduction To Nano Science And Nano Technology*, PHI learning Private Limited, New Delhi, Fourth Edition, 2012.
2. Foster E. Lynn, *Nano Technology*, Dorling Kindersley Private Limited, New Delhi, Fifth Edition, 2011.
3. Mark Ratner, Daniel Ratner , *Nano technology*, Dorling Kindersley Private Limited, New Delhi,First Edition, 2003.
4. Murty B.S, Shankar.P,Baldev Raj, Rath B.B, James Murday, *Text book of Nanoscience and Nanotechnology*, Universities Press Private Limited,India,First Edition, 2012.
5. Shah M.A,Tokeer Ahamad,*Principles of Nano science and Nano technology*, Narosa Publishing House Private Limited,New Delhi,First Edition, 2011.

Annexure-17

E.M.G. YADAVA WOMEN'S COLLEGE, MADURAI – 625014

(An Autonomous Institution – Affiliated to Madurai Kamaraj University)
(Re-accredited (3rd Cycle) with Grade A+ and CGPA 3.51 by NAAC)

CBCS
DEPARTMENT OF PHYSICS-PG
(w.e.f.2018-2019 Batch onwards)
Elective Paper-III

Title of the paper : Solar Energy
Semester : III **Contact Hours : 6**
Subject Code :18PPE3B **Credits : 5**

Objectives :

To be able to

1. Understand the basis of energy science
2. Learn about Solar radiation
3. Knowledge about solar thermal system

Unit : I Energy science and solar energy

Introduction- energy sectors- classification of energy resources – Primary energy sources- non conventional energy sources- energy chain-common forms of energy- Advantage and disadvantage of conventional energy sources-environmetntal aspects of energy- solar energy-the sun- the earth- sun and earth radiation spectrums-solar time- sun& earth angle- solar day length.

Unit : II Solar radiation: Measurement data & Estimation

Solar radiation data – Estimation of average,daily total radiation on horizontal surface- Estimation of average,daily diffused radiation on horizontal surface – Monthly average, daily global radiation on tilted surface-Solar energy measuring equipments – pyrheliometers - Pyranometers- sun shine recorder.

Annexure-17

Unit : III Solar thermal system

Introduction- solar collectors-flat plate collectors- modified flat plate –linear Fresnel lens collector- solar water heater- solar industrial heating system- solar cooker- box type- parabolaidal dish- cimunity solar cooker- solar furnace- solar green house- solar desalination- solar thermo-mechanical systems-Solar thermal water pumb- solar vapour compression refrigeration.

Unit : IV Performance testing of solar collectors

Introduction - Governing performance equations- measuring instruments and measurements methods- methods of testing- general testing procedures – testing of liquid flat plate solar collector – testing of solar air heaters – thermal performance testing- cylindrical parabolic concentrator- performance of solar heating panels.

Unit : V Indirect sources of solar energy

Wind energy- power from the wind- wind mills type – performance of wind mills – bioconversion- biomass- photosynthesis- biogas generation- digesters – material for biogas and biomass- advantage and disadvantages of biological conversion of solar energy- application of biogas - ocean thermal conversion(OTEC) - method and working principles of ocean thermal electric power generation plants.

Text books :

1. Khan.B.H, *Non – conventional Energy resources*, Tata McGraw-Hill Publishing Company Limited, New Delhi,2006.[Unit I,II,III]

2. Rai.G.D, *Solar Energy Utilization*, Khanna publishers, New Delhi, Fifth Edition, 2006.[Unit IV,V]

Annexure-17

Chapters:

Unit : I	**Chapters 1,4**	**1.1, 1.2, 1.4 to 1.9, 1.11, 4.1 to 4.4, 4.7 to 4.9, 4.11**
Unit : II	**Chapter 4**	**4.12 to 4.16**
Unit : III	**Chapter 5**	**5.1,5.2,5,2,1,5.2.2,5.2.6,5.3,5.5, 5.7to 5.11, 5.11.1,5.11.2**
Unit : IV	**Chapter 8**	**8.1 to 8.9**
Unit : V	**Chapter 18**	**18.1 to 18.3**

Reference Books:

1. Garg.H.P,Prakash.J, *Solar Energy*, Tata McGraw Hill Education Private Limited,New Delhi, 2010.
2. Kothari .D.P, *Renewable Energy Source And Emerging Technologies* , Tata McGraw Hill Education Private Limited ,New Delhi, Fourth Edition,2011.
3. Rai. G.D, *Non Conventional Energy Sources*, Khanna Publishers, New Delhi Fourth Edition, 2008.
4. Sukhatme.S.P, Nayak .J.K, *Solar Energy*, Tata McGraw Hill Education Private Limited,New Delhi, , 2010.
5. Tiwari. G.N, *Solar Energy Fundamentals, Design Modeling And Applications*, Narosa Publishing House, New Delhi, 2013.

Annexure-17

E.M.G. YADAVA WOMEN'S COLLEGE, MADURAI – 625014

(An Autonomous Institution – Affiliated to Madurai Kamaraj University)
(Re-accredited (3rd Cycle) with Grade A+ and CGPA 3.51 by NAAC)

CBCS
DEPARTMENT OF PHYSICS-PG
(w.e.f.2018-2019 Batch onwards)

Title of the paper : Solid State Physics-II
Semester : IV **Contact Hours: 6**
Subject Code : 18PP41 **Credits : 4**

Objectives :

To be able to

1. Understand the occurrence of superconductivity
2. Know about the consequences of dislocation and point defects
3. Compare the behavior of electrons in gases

Unit : I Superconductivity

Experimental survey– Occurrence and Destruction of Superconductivity - Meissner effect – Heat capacity-energy gap – Micro wave and infrared properties and isotope effect- Theoretical survey- London equation –BCS theory of superconductivity – Type II superconductors-High temperature superconducting (HTC) materials.

Unit : II Diamagnetism, Para magnetism

Langevin diamagnetism equation – Quantum theory of diamagnetism of mononuclear systems –Paramagnetism-Quantum theory of paramagnetism – Hund Rules-Spectroscopic splitting factor- Van Vleck temperature-independent paramagnetism - Cooling by isentropic demagnetization-Paramagnetism susceptibility of conduction electrons.

Annexure-17

Unit : III Ferro and Anti Ferro magnetism

Ferromagnetic order–Curie point and the exchange integral - Magnons-Quantization of spin waves - Neutron magnetic scattering-Ferrimagnetic order- Curie temperature and susceptility - Antiferromagnetic order- Susceptibility below the Neel temperature - Ferromagnetic Domains-Single domain particles.

Unit : IV Plasmons, Polaritons and Polarons

Dielectric function of the electron gas –Plasmons-Electrostatic screening – Polaritons - Electron – Electron interaction - Electron – phonon interaction – Polarons – Peierls instability of linear- Metals.

Optical processes and Excitons

Optical reflectance - Kramers-Kronig relations - Exciton– Weakly bound excitons - Raman effect in crystals- Electron spectroscopy with X-rays – Energy loss of fast particles in a solid.

Unit : V Point defects

Lattice vacancies – Schottky defects – Frenkel defects – Diffusion - metals – Color centers –F centers –Other centers in alkali halides.

Dislocations

Shear strength of single crystals – Slip- Dislocations - Burgers vectors- Stress field of dislocations - Low-angle grain boundaries – dislocation densities - Strength of alloys- Dislocation and crystal growth- Hardness of materials.

Text Book:

1.Charles kittel, *Introduction to Solid State Physics*, Wiley Publication, New Delhi, Eighth Edition,2018.

Annexure-17

Unit : I	**Chapter:10**	**Page No:(257 to 294)**
Unit : II	**Chapter: 11**	**Page No:(297 to 317)**
Unit : III	**Chapter: 12**	**Page No:(321 to 356)**
Unit : IV	**Chapter:14**	**Page No:(393 to 424)**
	Chapter:15	**Page No:(427 to 449)**
Unit : V	**Chapter: 20**	**Page No:(583 to 593)**
	Chapter: 21	**Page No:(597 to 617)**

Reference Books:

1.Ilogavan.K , *Solid state physics*, S.Vishwanathan Private Limited,First Edition, 2007.

2.Nandita dasgupta and Amitava das gupta, *Semiconductor devices modeling and technology*, PHI Learning Private Limited,New Delhi, 2011.

3. Pillai.S.O, *Solid state physics*, New Age international Private Limited, New Delhi, Sixth Edition, 2012.

4. Puri.R.K, Babbar.V.K, *Solid state physics*, S.Chand publications, New Delhi, First Edition, 2010.

5. Srivastava.J.P, *Elements of solid state physics*, PHI Learning Private Limited, New Delhi, Third Edition, 2011.

6. Wahab.M.A, *Solid state physics structure and properties of materials*, Narosa Publishing house, New Delhi, Second Edition, 2007.

Annexure-17

E.M.G. YADAVA WOMEN'S COLLEGE, MADURAI – 625014

(An Autonomous Institution – Affiliated to Madurai Kamaraj University)
(Re-accredited (3rd Cycle) with Grade A+ and CGPA 3.51 by NAAC)

CBCS
DEPARTMENT OF PHYSICS-PG
(w.e.f.2018-2019 Batch onwards)

Title of the paper : Quantum Mechanics-II
Semester : IV **Contact Hours: 6**
Subject Code : 18PP42 **Credits 4**

Objectives :

To be able to

1. understand the concept of Time dependent Quantum, Scattering cross section
2. acquire knowledge about Symmetry in Quantum mechanics
3. study the consequence of Relativistic wave equations

Unit : I Time independent approximation:

Variation method- Expectation value of the energy- Application to excited states-Ground state of helium-Stationary perturbation theory-Non degenerate case-First order perturbation – second order perturbation –Perturbation of an oscillator-Zeeman effect without electron spin-First order stark effect in hydrogen.

Unit : II Time dependent approximation:

Time-Dependent perturbation theory-First order perturbation-Harmonic perturbation-transition probability-second order perturbation-Adiabatic approximation-Sudden approximation.

Unit : III Quantum theory of Scattering

Born approximation- validity of Born approximation-Scattering from two potential- Distorted wave born approximation-Partial wave analysis of the DWBA-Scattering Amplitude and cross section .

Unit : IV Identical Particles and spin

Physical meaning of identity-Symmetric and Antisymmetric wave functions-Construction from unsymmetrized functions- The symmetric group-Distinguishability of identical particles-The exclusion principle-Connection with statistical mechanics – Connection between spin and statistics- Spin matrices and eigen functions-Collision of identical particles- Electron spin functions.

Unit : V Relativistic Wave Equations

Schrodinger's Relativistic Equation-Free particle-Electromagnetic potentials-Separation of the equation –Energy levels in a coulomb field-Dirac's relativistic equation-Matrices-Free particle solutions-charge and current densities- Dirac's `equation for a central field-Spin angular momentum - Spin orbit energy-Negative energy states.

Text Book

Leonard I Schiff,*Quantum Mechanics*,McGraw Hill Education Private Limited, New Delhi, Fourth Edition ,2014.

Unit: I	**Chapter 7**	**Page No: 198-200,205-209,212-214**
Unit : II	**Chapter 8**	**Page No: 222-227,230-231,234-235**
Unit : III	**Chapter 9**	**Page No: 325-329,340-342**
Unit : IV	**Chapter 10**	**Page No: 361-372**
Unit :V	**Chapter 13**	**Page No: 431-441,443-446,451**

Reference Books

1. Ajoy Ghatak, Lokanathan.S, *Quantum mechanics theory and applications* **,** Macmillan publishers India Limited,New Delhi,Fifth Edition, 2012.

2.Gupta, kumar, Sharma,*Quantum mechanics*,Jai Prakash Nath Publications,Meerut, Thirteenth Edition, 2011.

3. Mathews.P.M and Venkatesan. K, *A text book of Quantum Mechanics*, Tata Mc Graw Hill Publication ,New Delhi, Second Edition, 2011.

4.Sathya prakash, Quantum Mechanics, Pragati Prakashan Educational Publisher, Meerut, Seventh edition, 2013.

5.Thankappan.V.K, *Quantum Mechanics*,New Age international publishers, New Delhi,Second Edition, 2010.

Annexure-17

E.M.G. YADAVA WOMEN'S COLLEGE, MADURAI – 625014

(An Autonomous Institution – Affiliated to Madurai Kamaraj University)
(Re-accredited (3rd Cycle) with Grade A+ and CGPA 3.51 by NAAC)

CBCS
DEPARTMENT OF PHYSICS-PG
(w.e.f.2018-2019 Batch onwards)

Title of the paper : Molecular Spectroscopy
Semester : IV **Contact Hours : 6**
Subject Code :18PP43 **Credits : 4**

Objectives :

To be able to

1. Understand the principles of the spectroscopy
2. Have a detailed knowledge of the different regions of the electromagnetic spectrum
3. Understand the elements of molecular modeling

Unit : I Microwave Spectroscopy

The Rotation of Molecules-Rotational Spectra – Diatomic Molecules – Polyatomic molecules – Techniques and Instrumentation – Chemical Analysis by Microwave Spectroscopy.

Unit : II Infrared Spectroscopy

The vibrating Diatomic molecule – The Diatomic vibrating Rotator- The vibration-Rotation spectrum of Carbon monoxide- Breakdown of the Born-Oppenheimer Approximation: The Interaction of Rotations and vibrations- The vibration of Polyatomic molecules- The Influence of Rotation on the spectra of Polyatomic molecules- Analysis by Infrared Techniques- Techniques and Instrumentation.

Annexure-17

Unit : III Raman Spectroscopy

Introduction – Pure Rotational Raman Spectra-Vibrational Raman spectra – Polarization of light and the Raman Effect – Structure Determination from Raman and infrared Spectroscopy-Techniques and Instrumentation – near Infrared FT Raman Spectroscopy.

Unit : IV Electronic Spectroscopy of Molecules

Electronic Spectra of Diatomic molecules: The Born Oppenheimer Approximation – Vibrational coarse structure: Progressions-Intensity of Vibrational-Electronic Spectra; the Franck Condon Principle-Dissociation Energy and dissociation products – Rotational fine structure of electronic vibration transitions – the Fortrat diagram – Pre dissociation.

Unit : V Spin resonance Spectroscopy

Spin and an applied field – Nuclear magnetic resonance spectroscopy: Hydrogen nuclei - Nuclear magnetic resonance spectroscopy: other than Hydrogen nuclei Techniques and instrumentation.

Text Book :

1.Banwell.C.N,McCash.E.M, *Fundamentals of molecular Spectroscopy*, Tata Mc Graw Hill , New Delhi, First Edition,2011.

Unit : I	**Chapter 2**	**2.1 to 2.6**
Unit : II	**Chapter 3**	**3.1 to 3.8**
Unit : III	**Chapter 4**	**4.1 to 4.7**
Unit : IV	**Chapter 6**	**6.1.1 – 6.1.7**
Unit : V	**Chapter 7**	**7.1-7.4**

Annexure-17

Reference Books:

1. Aruldhas. G., *Molecular Structure and Spectroscopy* , PHI learning Private Limited,Second Edition, 2011.
2. Gupta.S.L, kumar.V, Sharma.R.C ,*Elements of Spectroscopy*,Pragati Prakashan Publication,Meerut,Twenty, First Edition, 2009.
3. Thakur.S.N,Rai.D.K, Atom,Laser and spectroscopy, PHI learning Private Limited, NewDelhi, First Edition, 2010.
4. Rajappan Nair. K. P, *Atomic Spectroscopy*, MJP Publishers, Chennai,First Edition, 2012.
5. Wilfred Sugumar.R, *Molecular and Atomic Spectroscopy*, MJP Publishers, Chennai, First Edition, 2008.

Annexure-17

E.M.G. YADAVA WOMEN'S COLLEGE, MADURAI – 625014

(An Autonomous Institution – Affiliated to Madurai Kamaraj University)
(Re-accredited (3rd Cycle) with Grade A+ and CGPA 3.51 by NAAC)

CBCS
DEPARTMENT OF PHYSICS-PG
(w.e.f.2018-2019 Batch onwards)

Title of the paper : Practical-III General Physics

Semester	**: IV**	**Contact Hours**	**: 4**
Subject Code	**: 18PP41P**	**Credits**	**6**

Any Twelve

Name of the Experiments

1. Transistor characteristics(CC,CE mode)
2. Active Filters using IC 741-High pass, Low pass filter
3. Half adder and Full adder.
4. Quinke's method - Susceptibility of Paramagnetic liquid
5. Hall Effect –To find the No.of.charge carriers & Hall co-efficient
6. UP and DOWN Counters
7. Schmitt Trigger using IC 555
8. Universal BH Curve Tracer –To find energy loss
9. Microprocessor Programming I (Addition, Subtraction)
10. Microprocessor Programming II (Multiplication, Fibonacci Series)
11. Microprocessor programming III (Ascending and Descending order)
12. Susceptibility of the given liquid – Guoy's Balance
13. Ultrasonic Interferometer – Compressibility of the given liquid
14. e/m by Thomson method.
15. Laser based Diffraction Method.

Annexure 17

E.M.G. YADAVA WOMEN'S COLLEGE, MADURAI – 625014

(An Autonomous Institution – Affiliated to Madurai Kamaraj University)
(Re-accredited (3rd Cycle) with Grade A+ and CGPA 3.51 by NAAC)

CBCS

DEPARTMENT OF PHYSICS-PG

(w.e.f.2018-2019 Batch onwards)
Elective Paper-IV

Title of the paper: Microprocessor

Semester : IV **Contact Hours : 6**
Subject Code : 18PPE4A **Credits 5**

Objectives:

To be able to

1. Gain the knowledge of instructions used in 8085&8086
2. Have a brief knowledge of programming techniques
3. Gather information about 386 and 486 microprocessors

Unit: I

The 8085 Programming model -8085 Hardware Model – 8085 programming model - Instruction Classification – the 8085 Instruction Set - Instruction, Data format and Storage – Instruction word size – Opcode Format – Data Format - How to write, Assembly, and Executive a simple program - Micro processor architecture and its operations – Memory Classification.

Unit: II

Data Transfer operations – Addressing modes –Data Transfer from register to output –Data transfer to control output devices - Arithmetic Operations –Addition – Addition and Increment – Subtraction – Subtraction of two unsigned numbers - Logic Operations –Logic AND –Data Masking with Logic AND – OR, Exclusive-OR and

NOT- ORing Data from two Input Ports – Branch Operations-unconditional jump – conditional jumps – Writing Assembly Language Programs – debugging a program.

Unit: III

Counters and time delays –Time delay using One Register - Time delay using a Register pair – time delay using a loop with in a loop Technique – Counter design with time delay – Illustrative programs – Hexa decimal counters – 0 to 9 Counter – Generative pulse wave form – Debugging: Counters and Time delay program -Stack - Subroutines

Unit: IV

BCD to Binary conversion –Binary to BCD conversion - BCD to seven segment – Binary-to-ASCII and ASCII –to –binary code conversion –BCD addition – BCD subtraction - Multiplication – Subtraction with carry- The 8085 interrupts-RST(Reset) Instruction-Multiple Interrupts and Priorities.

Unit: V

Micro architecture of the 8088/8086 Microprocessor - Memory address space & data organization - data types – Segment registers & memory segmentation - Dedicated, Reserved and General - Use Memory - Instruction pointer – Data Registers –Pointer and Index Registers – Status Register - Generating a memory address – The Stack

Text Book

1. Ramesh Gaonkar ,*Microprocessor Architecture, Programming and Applications with the 8085*, PRI Penram International Publishing (India) Private limited, Mumbai, fifth Edition,1999.
2. Walter A. Triebel, Avtar Singh, the 8085 and 8086 microprocessors, Dorling Kindersley (India) private limited New Delhi, fourth Edition, 2007.

Unit : I	**Chapters 2,3**	**2.1,2.1.1,2.1.2, 2.2,2.2.1, 2.3, 2.3.1-2.3.3,2.4, 3.1, 3.2.7**
Unit : II	**Chapters 6**	**6.1-6.6**
Unit : III	**Chapters 8,9**	**8.1 – 8.5, 9.1 ,9.2**
Unit : IV	**Chapter 10,12**	**10.1-10.6,10.8,10.9,12.1,12.1.1-12.1.3**
Unit : V	**Chapter 2**	**2.1,2.3-2.12**

Reference Books:

1. Ajay,Deshmukh, *Micro controllers* , Tata McGraw Hill Education Private Limited, New Delhi, Fifth Edtion, 2010.

2.Arvin Grabel, Jacab Millman, *Micro Electronics*, Tata McGraw Hill Education Private Limited, New Delhi, Second Edition,1999.

*3.*Gupta.B.R. Singal.V, *Question Bank in Electronics & Communication Engineering,* S.K.Kataria & Sons, New Delhi, Second Edition,2004.

4.Mani.V.S.V, Rangan.C.S, Sarma.G.R, *Instrumentation Devices &systems*, Tata McGraw Hill Education Private Limited, New Delhi, Second Edition, 2012.

5.Santiram Kal, *Basic Electronics*, PHI Learning Private Limited , New Delhi, Tenth Edition, 2002.

Annexure-17

E.M.G. YADAVA WOMEN'S COLLEGE, MADURAI – 625014

(An Autonomous Institution – Affiliated to Madurai Kamaraj University)
(Re-accredited (3rd Cycle) with Grade A+ and CGPA 3.51 by NAAC)

CBCS
DEPARTMENT OF PHYSICS-PG
(w.e.f.2018-2019 Batch onwards)
Elective Paper-IV

Title of the paper: Crystallography

Semester : IV **Contact Hours: 6**
Subject Code : 18PPE4B **Credits : 5**

Objectives :

To be able to

1.Know the fundamentals of Crystal growth

2.Understand various Crystal growth Technique

3.Know the properties of crystal

Unit : I Crystal Growth

Crystal growth techniques-Growth from the melt-The Bridgman and related techniques- Crystal pulling- Low temperature solution growth- solution, solubility, super solubility-Methods of crystallization.

Unit : II X-ray diffraction techniques

Diffraction from a one-Dimensional Crystal-Laue's Formulation of X-ray Diffraction –X-ray diffraction and Bragg's law-X-ray diffraction methods-Laue diffraction –Orientation of Single Crystals-Calculating Laue angles –Rotating Crystal method- X-ray powder diffraction-principle of powder diffraction-methods of powder diffraction pattern-interpretation of powder photographs.

Annexure-17

Unit : III Crystal Structure Determination

Scattering Factor-structure factor-centrosymmetric crystal and the phase problem-methods of solving the phase problem-patterson method-isomorphous replacement-anomalous dispersion-direct methods-structure refinement.

Unit : IV Methods of Recording x-ray Diffraction

The Oscillation Method- Theory- oscillation photographs- limitations of the method-precession Method- buerger's mark II precession X-ray Diffraction- X-ray source-Goniometer-video camera or Microscope-X-ray detector system.

Unit : V Electron and Neutron Diffraction

Low-energy electron diffraction-High- energy electron diffraction-comparison of low-energy and high energy electron diffraction- electron diffraction camera-simple electron diffraction camera and its working principle-Newton Diffractometer.

Text book:

1. SanthanaRaghavan.P,Ramasamy.P,*Crystal Growth Processes and Methods*,KRU Publications, Kumbakonam, First Edition,1999.

2. Velmurugan.D, *Elementray Crystallogtraphy*, MJP Publishers, Chennai, First Edition,2008.

Unit : I	**chapter 1,2,3,4**	**pageNo:13-15,74-80,151-154,156-157**
Unit : II	**chapter4**	**pageNo:125-150**
Unit : III	**chapter 4**	**pageNo:157-189**
Unit : IV	**chapter 4**	**pageNo:190-209**
Unit : V	**chapter 4**	**pageNo:256-274**

Annexure-17

References books:

1. Amit Kanani, Kakani.S.L, *Material Science*, New Age International (P) Limited, New Delhi, Second Edition, 2010.

2. Arumugam. M, *Material Science,* Anuradha Publications, Chennai, Third Revised Edition, 2002.

3. Gupta, Kumar, *Solid State Physics*,K.Nath &Co Educational Publishers, Meerut, Sixth Edition, 2012.

4. Rangarajan. G, Vijaya. M.S, *Material Science,* Tata McGraw Hill Education Private Limited, New Delhi, 2012.

5. Srivastava J.P, *Elements of Solid State Physics*, PHI Learning Private Limited, New Delhi, Third Edition , 2011.

Annexure-17

E.M.G. YADAVA WOMEN'S COLLEGE, MADURAI – 625014

(An Autonomous Institution – Affiliated to Madurai Kamaraj University)
(Re-accredited (3rd Cycle) with Grade A+ and CGPA 3.51 by NAAC)

CBCS
DEPARTMENT OF PHYSICS-PG
(w.e.f.2018-2019 Batch onwards)

Title of the paper : Project

Semester : IV **Contact Hours :2**
Subject Code : 18PPPR4 **Credits 2**

Students have to carry out Project Works under the guidance of the members of the Physics Department during III and IV semester 2 hours per week. PROJECT Work may be chosen in the fields of Theoretical Physics, Spectroscopy, Electronics, Crystallography, Thin films, Nano materials. Each batch will complete the project work in the month of February and submit their report in March. It will be duly signed by the project guide and the HOD of Physics. It will be evaluated 80 marks for external examiner and 20 marks for internal examiner. The viva on project work will be conducted during Practical Examination at the end of IV semester. The viva on project will be conducted jointly by Guide, External Examiner HOD and the members of staff.