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 SYLLABUS

MASTER OF SCIENCE

PROGRAMME CODE - PP

COURSE STRUCTURE

(w.e.f. 2018 – 2019 onwards)

CRITERION - I

1.2.2 Details of Programmes offered through Choice Based Credit System (CBCS) / Elective Course System

> **Syllabus copies with highlights of contents focusing on Elective Course System**

To be Noted:

HIGHLIGHTED	COURSE
	Elective

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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)	C.A	S.E	Total	Credits
						Marks alloted			
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

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DEPARTMENT OF PHYSICS
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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.

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(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.

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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.

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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

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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.

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.

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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.

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]

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.

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DEPARTMENT OF PHYSICS-PG

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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.

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

(An Autonomous Institution-Affliliated to Madurai Kamaraj University)
(Re-accreditated (3rd Cycle) with Grade A⁺ & 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.

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**

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.