SEMESTER IV			
NME II	**Applied Physics II**		
Course Code : 21UPHN41	**Hrs./Week : 2**	**Hrs./Sem : 30**	**Credits : 2**

Objectives:

1. To enlighten students to be aware of solar energy sources
2. To make students understand the working of windmills, OTEC and Geothermal process used for power generation and biomass energy conversion
3. To enrich the knowledge of our students on communication physics
4. To make students knowledgeable on nano physics

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO –1	construct solar ponds for water desalination and solar cookers	7	Cr
CO –2	understand the working of solar dryers and solar water heater.	7	Un
CO –3	explain the bio mass energy conversion	`7	Un
CO –4	understand the working of windmills, otec and geothermal process used for power generation	7	Un
CO –5	explain the advantages of fibre optics communication.	2	Un
CO –6	define nanomaterials	10	Re
CO –7	list out special features of nanophase materials	10	Re
CO –8	describe pulsed laser deposition	10	Un

SEMESTER IV			
NME II	**Applied Physics II**		
Course Code : 21**UPHN41**	**Hrs./Week : 2**	**Hrs./Sem : 30**	**Credits : 2**

Unit I: Energy Physics – I

Conventional and non conventional energy sources (Introduction) – Solar energy – Solar cooker(box type) – Solar ponds – Solar Crop Dryers – Solar Water Heater - Water Desalination.

Unit II: Energy Physics – II

Bio mass energy – Biomass conversion process digestion - Ocean Thermal energy - Geothermal Energy – Wind Energy.

Unit III: Medical Physics

Nuclear medicine - Radiation Therapy - Magnetic Resonance Imaging (MRI) – Endoscopy– Electroencephalogram (EEG) – Electrocardiogram (ECG) – Cardiac Pacemaker – Blood Pressure Apparatus (Sphygmomanometer).

Unit IV: Fibre Optics

Introduction – Optical fibre and cable – Total internal reflection - Principles and propagation of optical fibre – Acceptance angle – Numerical aperture – Types of optical fibres (Material and Number of modes) – Fibre optic communication system – Advantages and disadvantages.

Unit V: Nanomaterials

Introduction– Definition – Special features of nanophase materials – Different forms of nanomaterials – Synthesis of nanomaterials (basics) – Preparation of nanomaterials: Pulsed laser deposition – Properties of nanophase materials - Applications of nanophase materials.

Text Books:

1. Jose Robin G and Ubald Raj A, *Energy Physics*. Marthandam: Indira Publications. First edition 2014.
2. Dr. Sr. GerardinJayam. *Physics Every day*. First Edition 2008.
3. Dr. Mani P. *A text book of Engineering Physics –I*. Dhanam Publication. Tenth Edition 2013.
4. Dr. Mani P. *A text book of Engineering Physics –II*. Dhanam Publication. Tenth Edition 2016.

Book for Reference:

1. Rai G.D. *Nonconventional Energy Sources*. Khanna Publishers. Reprint, 2014.

2. Ubald Raj A and Jose Robin G. *Solid State Physics*. Marthandam: Indira Publications. second edition 2018.
3. Murugeshan R and Kiruthiga Sivaprasath. *Optics and Spectroscopy*. S. Chand and Company Ltd. Ninth edition 2019.
4. Arumugam M. *Biomedical Instrumentation*. Anuradha Agencies. Reprint, 2002.

SEMESTER III			
Core Skill Based Elective Instrumentation Physics			
Course Code: 21UPHS31	**Hrs/Week:2**	**Hrs/Sem:30**	**Credits:2**

Objectives:

1. To enrich students with the knowledge of instrumentation physics
2. To facilitate students in understanding the basic principles of instrumentation physics
3. To aid the students in measurement techniques

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO–1	identify the errors of instruments	4	Un
CO–2	find out the arithmetic mean, deviation from the mean, average deviation, standard deviation	8	Cr
CO–3	list out the characteristics of resting potential	3	Re
CO–4	compare active and passive transducers	3	Ev
CO–5	understand the working of bio medical equipments such as electron microscope.	3	Un
CO–6	read and interpret the output of bio potential recorders such as CT scan	3	Ev
CO–7	recall the functional elements of measuring instruments	3	Re
CO–8	describe the applications of physics in the field of medicine	3	Un

SEMESTER III			
Core Skill Based Elective	**Instrumentation Physics**		
Course Code: 21UPHS31	**Hrs/Week:2**	**Hrs/Sem:30**	**Credits:2**

Unit I: Measurement and Error

Definition – Accuracy and precision – Significant figures - Types of error (Gross error, Systematic error, Random error) – Statistical analysis (Arithmetic mean, Deviation from the mean, Average deviation, Standard deviation)

Unit II: Electrodes

Electrode potential– Purpose of the electrode paste - Electrode material – Types of electrodes – Depth and needle electrodes (2.4.6) – Surface electrodes – Chemical electrodes (Hydrogen electrode, pH electrode, pCO_2 electrode).

Unit III: Microscope

Optical microscope - Electron microscope – Comparison between optical and electron microscope – Resolving and Magnification power – Depth of focus – Types of electron microscope – TEM – SEM – Comparison between TEM and SEM.

Unit IV: Specialized and Advances in Medical Instruments

Angiography – Endoscopes – Computed Tomography (CT scan) – X-ray machine – Comparison of Fluoroscopy and Radiography – Computers in medicine – Lasers in medicine – Cryogenic surgery.

Unit V: Displays and Oscilloscope

Classification of displays – Display devices – Liquid crystal diode – Incandescentdisplay

–Oscilloscope – Basic principle – CRT features – Block diagram of oscilloscope.

Text Books:

1. Albert D. Helfrick and William D. Cooper. *Modern Electronic Instrumentation and Measurement Techniques.* Prentice-Hall of India Pvt Limited. Reprint, 8th edition 2002.
2. Arumugam M. *Biomedical Instrumentation*. Anuradha Agencies. Reprint, 2002.
3. Kalsi H. S. *Electronic Instrumentation*. Tata Mc Graw Hill Education Pvt. Limited. Reprint 2012.

Books for Reference:

1. Mani P. *A textbook of Engineering Physics-I.* Dhanam Publications. Reprint, 2013.

Jose Robin G and Ubald Raj A. *Applied Physics*. Marthandam: Indira Publications. 3rd edition 1998.

SEMESTER III	
Self Study Course	**Maintenance of Electronic Equipment and Photography**
Course Code : 21UPHSS3	**Credits :2**

(Compulsory)

Objectives:

1. To know the students how to apply the electronic components in physics laboratory
2. To make the students to measure the physical quantities using measuring instruments
3. To enhance the students to know about photography

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO –1	describe different types of capacitors	10	Un
CO –2	define the method of soldering	10	Re
CO –3	compare audio frequency range and radio frequency bands	10	An
CO –4	usage of transducers	10	Ap
CO –5	define aperture of camera	10	Re
CO –6	construct the parts of camera	10	Cr
CO –7	define the terms of film structure and film speed	10	Re
CO –8	identify the types of filters used in photography	10	Un

SEMESTER III	
Self Study Course	**Maintenance of Electronic Equipment and Photography**
Course Code : 21UPHSS3	**Credits :2**

Unit I: Electronic Components

Active and passive components – Resistances - Capacitors: Uses, Types of capacitors, Detecting faulty capacitors, Characteristics, Working Voltage – Soldering techniques – Groove board – Bread board – Printed circuit board.

Unit II: Measuring Instruments

Multimeter – Cathode Ray Oscilloscope – Liquid Crystal Display – Audio Frequency Oscillator.

Unit III: Transducers

Transducer: Classification, Basic requirements – Inductive transducer – Piezoelectric transducer – Capacitive transducer – Resistive transducer: Potentiomentric type, Wheatstone bridge type.

Unit IV: Photography I

Camera – Photographic camera – Parts and their functions – Camera lens: Types – Camera lens shutters: Types.

Unit V: Photography II

Film structure – Film speed – Exposure triangle – Flash photography - Camera lens filter – DSLR camera – Digital format in DSLR camera.

Text Book:

1. Jose Robin G and Ubald Raj A. *Maintenance of Electronic Equipment & Photography*. Marthandam: Indira Publications. First Edition 2017.