B.Sc., Physics

Employability **Entrepreneurship** **Skill Development**

Name of the Programme	Course code	Title of the Course	Employability	Entrepreneurship	Skill development
B.Sc Physics	PUE1	Energy Physics	✓		
	PUI	CC XI – Electronics		✓	
	PUE3	MBE I – Microprocessor and C Programming		✓	
	PUE5	MBE –III Communications Physics	✓		
	PUS1	SBE – Astrophysics			✓
	PUS2	SBE –II- Biomedical Instrumentation	✓		

Employability

Semester-III / NON-MAJOR ELECTIVE I	Title/Class: ENERGY PHYSICS / II BSc.,	Course Code: PUE1
Instruction Hours: 2	Credits: 2	Exam Hours: 3
Internal Marks -25	External Marks-75	Total Marks: 100

Cognitive Level	**K-1** Acquire/Remember **K-2** Understand **K-3** Apply **K-4** Analyze **K-5** Evaluate **K-6** Create
Course Objectives:	• To make the students to understand the present day crisis of need for conserving energy and alternatives are provided. • Know percentages and have understanding for magnitudes of energy and resources used • Understand the special engineering challenges of using each of these sources of energy efficiently and environmentally effectively. • Understand the economics behind the costs of the uses and applications of each of these forms of energy • Understand the energy conversion systems for nuclear power plants, the advantages/disadvantages (including overall environmental effects) of each type of present plants.

UNIT	CONTENT	NO OF HOURS
I	**Conventional Energy Sources** World reserve- Commercial energy sources and their availability – Various forms of energy – Renewable and Conventional energy system – comparison – Coal, oil and natural gas – applications – Merits and Demerits.	**6 Hrs**

II	**Solar energy** Renewable energy sources – Solar energy – nature and Solar radiation – components – Solar heaters – Crop dryers – Solar cookers – Water desalination (block diagram) –Photovoltaic generation – merits and demerits.	**6 Hrs**
III	**Biomass energy fundamentals:** Biomass Resources –Biofuels – Liquid Fuel –Biomass Conversion Technology – Biochemical Conversion – Biomass Gasification – Bio Gas Plants.	**6 Hrs**
IV	**Biomass Utilization** Bio Gas Plants – Wood Gasification – Advantage & Disadvantages of Biomass as Energy Source Power Generation Liquid Waste, Bio Mass Co Generation –Ethanol, Biodieselc - Biomass Resource Development In India	**6 Hrs**
V	**Other forms of Energy Sources** Geothermal energy – Wind energy – Ocean thermal energy conversion – Energy from waves and tides (basic ideas).	**6 Hrs**

Text Book:

1. D.P. Kothari, K.C. Singal& Rakesh Ranjan, *Renewable energy sources and emerging Technologies*, Prentice Hall of India Pvt. Ltd., New Delhi (2008).
2. Study Material by Department of Physics –Unit V

Reference Books:

1. S.A. AbbasiandNasemaAbbasi, *Renewable Energy sources and their environmental impact,* PHI Learning Pvt. Ltd., New Delhi (2008).

E- Resources:

1. http://www.lanl.gov/external

http://fnalpubs.fnal.gov

Course Outcomes:

On completion of the course the learner will be able

CO 1: Understand the sources of energy and their contributions to the energy and power needs of the nation and the world.

CO 2: Be able to effectively use Rankine Cycle analysis

CO 3: Understand the differences between large quantities of fuel and waste

CO 4: Fully appreciate the aspect of capital cost amortization and allocation to unit of energy produced.

CO 5: Be able to analyze comparisons of capital cost allocation, operating cost, including fuel costs. Special attention is given to the renewables for which there is zero or negligible fuel cost.

Mapping of COs with POs & PSOs:

CO/PO	PO					PSO				
	1	2	3	4	5	1	2	3	4	5
CO1	S	S	M	S	S	S	S	S	S	S
CO2	M	S	M	S	S	S	M	S	S	S
CO3	S	M	M	S	S	S	S	S	S	S
CO4	S	M	S	S	S	S	M	M	M	M
CO5	S	S	S	S	S	S	S	S	M	S

S – Strongly Correlating

M – Moderately Correlating

W – Weakly Correlating

N – No Correlation

Semester-III / **NON-MAJOR ELECTIVE I**	**Course Title/Class: PHYSICS FOR COMPETITIVE EXAMINATIONS / II BSc.,**	Course Code: PUE1
Instruction Hours: 2	Credits: 2	Exam Hours: 3
Internal Marks -25	External Marks-75	Total Marks: 100

Cognitive Level	**K-1** Acquire/Remember **K-2** Understand **K-3** Apply **K-4** Analyze **K-5** Evaluate **K-6** Create	
Course Objectives:	• To provide awareness to the students about the various types of jobs offered both in the central and state government • To help the students to choose the area where they are interested • To develop competitive skills through various types of objective tests • To train them by conducting aptitude test • To enhance their ability to face the competitive exams	
UNIT	**CONTENT**	**NO OF HOURS**
I	**Units & Dimensions** SI units & dimensions -Dimensional analysis -Least count -Significant figures.	**6Hrs**
II	**Kinematics** Velocity-Acceleration-Motion in one and two dimensions (Cartesian coordinates only)-Motion of projectiles.	**6 Hrs**
III	**Dynamics** Newton's law of motion-Inertial and uniformly accelerated frames of reference-Force-Static and dynamic friction.	**6 Hrs**

IV	**Gravity** Law of gravitation-Gravitational potential and field -Acceleration due to gravity-Motion of planets and satellites in circular orbits-Escape velocity.	**6 Hrs**
V	**Law of thermodynamics** Zeroth law -First and second law of thermodynamics and its applications (only for ideal gases)	**6 Hrs**

Text Book:

Study Material Prepared by Department of Physics

Course Outcomes:

On completion of the course the learner will be able

CO 1: Deeper knowledge of subjects

CO 2: It motivates the students to prepare for high level competitive exams

CO 3: Competitive exams will enhance the skill of understanding the application of concepts, which is required in a broader context when we appear for higher level exams

CO 4: Early exposure to learning and competition builds confidence and sharpens skills which raise ones level from other students on the same platform.

CO5:It boosts morale while moving ahead in the future

Mapping of COs with POs & PSOs:

CO/PO	PO					PSO				
	1	2	3	4	5	1	2	3	4	5
CO1	S	S	M	S	S	S	S	S	S	S
CO2	S	S	S	S	M	S	S	M	M	S
CO3	S	S	S	S	S	S	M	S	M	S
CO4	S	S	M	S	M	S	M	S	M	S
CO5	S	S	M	S	M	S	M	S	M	S

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Semester- VI **Major Based Elective III**	**COMMUNICATION PHYSICS**	Course Code: PUE5
Instruction Hours: 6	Credits: 6	Exam Hours: 3
Internal Marks -25	External Marks-75	Total Marks: 100

Cognitive Level	**K-1** Acquire/Remember **K-2** Understand **K-3** Apply **K-4** Analyze **K-5** Evaluate **K-6** Create	
Course Objectives:	• To promote scientific temper among students and update the basic functioning of various communication systems. • To be highly skilled, interdisciplinary professionals who can identify and solve engineering problems from unusually broad physical perspectives. • To engage vigorously in further studies in interdisciplinary graduate programs and a wide variety of other lifelong learning opportunities. • To pursue careers that in corporate ethical and professional responsibility, as well as good citizenship. • Students will demonstrate a thorough understanding of the analytical approach to modeling of physical phenomena.	
UNIT	**CONTENT**	**NO OF HOURS**
I	**UNIT I Radio transmission and reception** Transmitter-modulation-need for modulation- types of modulation-amplitude, frequency and phase modulation- modulation factor-sideband frequencies in AM wave-limitations of amplitude	**18 Hrs**

	modulation - frequency modulation-block diagram of AM and FM Transmitter. Receiver- demodulation-AM & FM radio receivers-super heterodyne radio receiver.	
II	**UNIT II Fiber Optic Communication** Introduction –structure of optical fiber –total internal reflection in optical fiber – principal and propagation of light in optical fiber - acceptance angle - numerical aperture – types of optical fibers based on material – number of modes – refractive index profile - fiber optical communication system (block diagram) - fiber optic sensors – Temperature sensor – fiber optic endoscope.	**18 Hrs**
III	**UNIT III Radar Communication** Basic radar system -Radar range –Antenna scanning – Pulsed radar system - A-Scope- Plan position indicator- Tracking radar- Moving target indicator- Doppler effect-MTI Principle- CW Doppler Radar-Frequency modulator CW Radar.	**18 Hrs**
IV	**UNIT IV Satellite Communication** Introduction – history of satellites – satellite communication system – satellite orbits – classification of satellites – types of satellites – basic components of satellite communication – constructional features of satellites- multiple access – communication package – antenna- power source – satellite foot points- satellite communication in India.	**18 Hrs**
V	**UNIT V Mobile Communication** GSM – mobile services- concept of cell – system architecture – radio interface – logical channels and frame hierarchy – protocols – localization and calling – Handover- facsimile (FAX) – application – VSAT (very small aperture terminals) – Modem – IPTV (internet protocol television) – Wi-Fi - 3G ,4G (Basic ideas only).	**18 Hrs**

Text Books:

1. Metha V.K., *Principles of Electronics*, S. Chand & Company Ltd., 2013
2. Anokh Singh and Chopra A.K., *Principles of communication Engineering*, S. Chand & Company PVT. Ltd., 2013.
3. Mani I. P., *A text book of Engineering Physics*, Dhanam Publications, Chennai-42, 2014.

Reference Books:

1. PoornimaThangam I, *Satellite communication*, Charulatha Publications, 2012.
2. Dennis Roddy and John Coolen, *Electronic Communication*, PHI, 1990.
3. William C.Y. lee, *Cellular telecommunication* (second edition), Tata Mcgraw hill, 1991.

e- Resources:

1. **https://publons.com/journal/65968/communications-physics/**
2. **https://vjs.ac.vn/index.php/cip**

Course Outcomes:

On completion of the course the learner will be able

CO 1: Students will demonstrate an understanding of core knowledge in Physics, including the major premises of classical mechanics, Example and Modern Physics.

CO 2: Students will demonstrate written and oral communication skills in communicating physics-related

CO 3: Students will demonstrate understanding of the applications of numerical techniques for modeling physical systems for which analytical methods are inappropriate or of limited utility.

CO 4: Students will demonstrate a thorough understanding of the analytical approach to modeling of physical phenomena.

CO 5: Students will demonstrate an understanding of the impact of Physics and Science on society.

Mapping of COs with POs & PSOs:

CO/PO	PO					PSO				
	1	2	3	4	5	1	2	3	4	5
CO1	S	S	M	S	S	S	S	S	M	S
CO2	S	S	M	S	S	S	S	M	S	S
CO3	S	S	M	S	S	S	S	M	S	S
CO4	S	S	M	S	S	S	S	M	S	S
CO5	S	S	M	S	S	S	S	M	S	S

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Semester VI / Major Based Elective III	COMPUTER ORGANIZATION AND ARCHITECTURE	Course Code: PUE5
Instruction Hours: 6	Credits: 5	Exam Hours: 3
Internal Marks -25	External Marks-75	Total Marks: 100

Cognitive Level	K-1 Acquire/Remember K-2 Understand K-3 Apply K-4 Analyze K-5 Evaluate K-6 Create

Course Objectives:

- To promote scientific temper among students and update the basic functioning of various communication systems.
- To understand the principles of digital computer logic circuits and their design.
- To understand the working of a central processing unit architecture of a computer
- Students will demonstrate a thorough understanding of the analytical approach to modeling of physical phenomena.

UNIT	CONTENT	NO OF HOURS
Unit I	Number Systems – Decimal, Binary, Octal and Hexadecimal Systems – Conversion from one system to another – Binary Addition, Subtraction, Multiplication and Division – Binary Codes– 8421, 2421, Excess-3, Gray, BCD – Alphanumeric Codes – Error Detection Codes.	18 Hrs

Unit II	Boolean Laws and Theorems – Boolean Expressions – Sum of Products – Product of Sums – Simplification of Boolean Expressions – Karnaugh Map Method (up to 4 Variables) – Implementation of Boolean Expressions using GateNetworks.	**18 Hrs**
Unit III	Combinational Circuits – Multiplexers – Demultiplexers – Decoders – Encoders – Arithmetic Building Blocks – Half and Full Adders – Half and Full Subtractors – Parallel adder –2's Complement Adder – Subtractor – BCD Adder.	**18 Hrs**
Unit IV	Sequential Circuits – Flip Flops – RS, JK, and Master-Slave Flip Flops – Shift Register – Counters – Asynchronous, MOD-n and Synchronous Counters – BCD Counter –Ring Counter.	**18 Hrs**
Unit V	Central Processing Unit: General Register Organization – Stack Organization – Instruction Formats – Addressing Modes – Data Transfer and Manipulation – Program Control – Reduced Instruction Set Computer – CISC characteristics – RISC Characteristics.	**18 Hrs**

Text Books:

1. Donald P. Leach, Albert Paul Malvino and GoutamSaha, Digital Principles and Applications, TataMcGraw Hill, Sixth Edition, Third Reprint, 2007.

Unit:I : Chapter-5 Section (5.1-5.8)

Unit:II : Chapter-2 Section (2.1-2.2), Chapter-3 Section (3.1, 3.2, 3.5, 3.7)

Unit: III: Chapter-4 Section (4.1-4.3, 4.6), Chapter-6 Section (6.7, 6.8)

2. Thomas C. Bartee, Digital Computer Fundamentals, Tata McGraw-Hill, Sixth Edition, Twenty Fifth Reprint, 2006.

Unit:III : Chapter-5 Section (5.1, 5.3, 5.10, 5.11) Unit:IV : Chapter-4 Section (4.1-4.9)

3. Morris Mano M, Computer System Architecture, Prentice Hall of India, Third Edition,2008.

Unit: I: Chapter-3 Section (3.5-3.6)

Unit: V: Chapter-8 Section (8.2-8.8)

Books for Reference:

1. Morris Mano. M, Digital Logic and Computer Design, Prentice Hall of India, 2008.
2. 2.Linda Null, Julia Lobur, The Essentials of Computer Organization and Architecture, Fourth Edition2014.

e- Resources:

1. https://www.geeksforgeeks.org/computer-organization-and-architecture-tutorials/
2. https://onlinecourses.nptel.ac.in/noc21_cs61/preview

Course Outcomes:

On completion of the course the learner will be able

CO 1: Promoting scientific temper among students and update the basic functioning of various communication systems.

CO 2:Understanding the principles of digital computer logic circuits and their design.

CO 3: Understand the working of a central processing unit architecture of a computer

CO 4: Apply the analytical approach of physical phenomena.

CO 5: Promoting scientific temper among students and update the basic functioning of various communication systems.

Mapping of COs with POs & PSOs:

CO/PO	PO					PSO				
	1	2	3	4	5	1	2	3	4	5
CO1	S	S	M	S	S	S	S	S	M	S
CO2	S	S	M	S	S	S	S	S	M	S
CO3	S	S	M	S	S	S	S	S	M	S
CO4	S	S	M	S	S	S	S	M	S	S
CO5	S	S	M	S	S	S	S	M	S	S

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N – No Correlation

Semester - V / **Skill Based Elective -II**	**COURSE TITLE/CLASS: BIOMEDICAL INSTRUMENTATION / III BSc., Physics**	Course Code: PUS2
Instruction Hours: 2	Credits: 2	Exam Hours: 3
Internal Marks -25	External Marks-75	Total Marks: 100

Cognitive Level	**K-1** Acquire/Remember **K-2** Understand **K-3** Apply **K-4** Analyze **K-5** Evaluate **K-6** Create	
Course Objectives:	• To understand the underlying physical principles of the biological phenomena • To gain the knowledge about the design and functioning of various biomedical instruments. • To introduce an fundamentals of transducers as applicable to physiology • To explore the human body parameter measurements setups • To make the students understand the basic concepts of forensic techniques.	
UNIT	**CONTENT**	**NO OF HOURS**
I	**Human Physiological System** Different systems of human body –skeletal system –circulatory system-respiratory system –digestive system –excretory system –regulatory system –reproductive system –muscular system –components of bio medical instrument system –types of electrodes and transducers(basic ideas**).**	**18 Hrs**

II	**Biopotential Recorders** Characteristics of the recording system –electrocardiography(ECG)-ECG lead configuration –ECG recording set up –electroencephalography(EEG)-anatomy of the brain –placement of electrodes –recording setup –analysis of EEG**.**	**18 Hrs**
III	Electromyography(EMG) -recording setup –determination of conduction velocities in motor nerves –electroretinography (ERG) –Recording Techniques- electrooculography (EOG)- records with high accuracy .	**18 Hrs**
IV	**Physiological Assist Device** Introduction- pacemakers –types of pacemakers –methods of stimulation- external and internal pacemaker-different modes of operation –ventricular synchronous –ventricular inhibited pacemaker (demand pave maker)-defibrillators –types of defibrillators - external and internal defibrillators –heart lung machine –kidney machine-dialysis-hemodialyser.	**18 Hrs**
V	**Specialized Medical Equipment 2hrs** Digital thermometer - X-RAY machine - block diagram- radiography and fluoroscopy-application of X-RAY examination –elements of bio-telemetry system – single channel telemetry system.	**18 Hrs**

Text Books:

1. Biomedical Instrumentation -Dr.M.Arumugam (Anuratha Agencies).

Reference:

1. Biomedical Instrumentation and Measurements –Leslie Cromwel, Fred J. Weibell, Ericha. Pfeiffer, Prientice Hall of India, Second Edition**.**

E- Resources:

1. https://www.sciencedirect.com/science/article/pii/B9780128183182000039

http://smegnr.cpas.ac.in/department-of-biomedical-instrumentation/

Course Outcome

On completion of the course the learner will be able

CO 1: Study the function of bioelectric potentials and its importance and understand the different types of waveforms generated by organs.

CO 2: Learn the fundamental knowledge of the electrodes to sense bio potentials.

CO 3: Learn the basic concepts and interpretations of ECG and BP.

CO 4: Understand the anatomy of the nervous system and its signal measurements (EMG, CAT).

CO 5: Analyze and understand the applications of the imaging techniques transmission(x-ray and ultrasound)

Mapping of COs with POs & PSOs:

CO/PO	PO					PSO				
	1	2	3	4	5	1	2	3	4	5
CO1	S	S	M	M	S	S	S	M	M	S
CO2	S	S	M	M	S	S	S	S	M	S
CO3	S	S	M	S	S	S	S	S	S	S
CO4	S	S	M	S	S	S	M	M	M	S
CO5	S	S	M	S	S	S	M	M	M	S

S – Strongly Correlating

M – Moderately Correlating

W – Weakly Correlating

N – No Correlation

semester-V / **Skill Based Elective -II**	**COURSE TITLE/CLASS: MEDICAL PHYSICS/ III BSc Physics**	Course Code: PUS2
Instruction Hours: 2	Credits: 2	Exam Hours: 3
Internal Marks -25	External Marks-75	Total Marks: 100

Cognitive Level	**K-1** Acquire/Remember **K-2** Understand **K-3** Apply **K-4** Analyze **K-5** Evaluate **K-6** Create	
Course Objectives:	• To understand the basics about the biological systems in our body, their behavior, and the diagnostic devices. • To give basic ideas about how multimedia evidences are useful in crime investigation • To Understand the knowledge in recent trends of measuring bio-signals • To provide knowledge on preparation, Characterization and use of biocompatible metals and non metals for bio implant application. • Designed to provide the knowledge for use of different laser spectroscopic methods in bioanalysis.	
UNIT	**CONTENT**	**NO OF HOURS**
I	Basic Anatomical Terminology- Modeling and Measurement – Forces on and in the Body – Physics of the Skeleton – Heat and Cold in Medicine- Energy work and Power of the Body	**6 Hrs**

II	Pressure system of the body- Physics of Cardiovascular system- Electricity within the Body – Applications of Electricity and Magnetism in Medicine	**6 Hrs**
III	Sound in medicine- Physics of the Ear and Hearing- Light in medicine- Physics of eyes and vision.	**6 Hrs**
IV	X-rays- Production of X-rays- X-ray spectra- continues spectra and characteristic spectra- Coolidge tube- Electro Cardio Graph (ECG) - Block diagram- ECG Leads- Unipolar and bipolar-ECG recording set up. 1982	**6 Hrs**
V	Electro Encephalo Graph (EEG) - origin- Block diagram- Electro Myogragh (EMG) – Block diagram- EMG recorder- Computer Tomography (CT) principle- Block diagram of CT scanner.	**6 Hrs**

Text Books

1. Medical Physics –John R. Cameron and James G.Skofronick, 1978, John Willy & Sons.

Reference Book

1. Bio medical instrumentation – E D II, Dr M. Arumugam, Anuradha Agencies 1997.

E- Resources:

1. https://aapm.onlinelibrary.wiley.com/journal/24734209
2. https://www.medicalphysics.org/

Course Outcomes:

On completion of the course the learner will be able

CO 1: To learn the internal architecture and working principle of various instruments used in medical field.

CO 2: Students will be able to use Laser, Ultra sound and microwaves for different diagnosis and Therapeutic applications

CO 3: To design and develop a new abutments that may be comparable to currently available esthetic implant abutments.

CO 4: To make the students to familiarize physical design , Maintenance of different biomedical instrument used in medical field

CO 5: The student can able to design different laser spectrometers and devices for spectroscopic analysis and imaging of cells and tissues.

Mapping of COs with POs & PSOs:

CO/PO	PO					PSO				
	1	2	3	4	5	1	2	3	4	5
CO1	S	S	M	S	S	S	M	S	S	S
CO2	S	S	M	S	S	S	M	S	S	S
CO3	S	S	M	S	S	S	S	S	S	S
CO4	S	S	M	S	S	S	M	S	S	S
CO5	S	S	M	S	S	S	S	M	S	S

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Entrepreneurship

Semester - V / Skill Based Elective -II	COURSE TITLE/CLASS: BIOMEDICAL INSTRUMENTATION / III BSc., Physics	Course Code: PUS2
Instruction Hours: 2	Credits: 2	Exam Hours: 3
Internal Marks -25	External Marks-75	Total Marks: 100

Cognitive Level	**K-1** Acquire/Remember **K-2** Understand **K-3** Apply **K-4** Analyze **K-5** Evaluate **K-6** Create
Course Objectives:	• To understand the underlying physical principles of the biological phenomena • To gain the knowledge about the design and functioning of various biomedical instruments. • To introduce an fundamentals of transducers as applicable to physiology • To explore the human body parameter measurements setups • To make the students understand the basic concepts of forensic techniques.

UNIT	CONTENT	NO OF HOURS
I	**Human Physiological System** Different systems of human body –skeletal system –circulatory system-respiratory system –digestive system –excretory system –regulatory system –reproductive system –muscular system –components of bio medical instrument system –types of electrodes and transducers(basic ideas**).**	6 Hrs

II	**Biopotential Recorders** Characteristics of the recording system –electrocardiography(ECG)-ECG lead configuration –ECG recording set up –electroencephalography(EEG)-anatomy of the brain –placement of electrodes –recording setup –analysis of EEG**.**	6 Hrs
III	Electromyography(EMG) -recording setup –determination of conduction velocities in motor nerves –electroretinography (ERG) –Recording Techniques- electrooculography (EOG)- records with high accuracy .	6 Hrs
IV	**Physiological Assist Device** Introduction- pacemakers –types of pacemakers –methods of stimulation- external and internal pacemaker-different modes of operation –ventricular synchronous –ventricular inhibited pacemaker (demand pave maker)-defibrillators –types of defibrillators - external and internal defibrillators –heart lung machine –kidney machine-dialysis-hemodialyser.	6 Hrs
V	**Specialized Medical Equipment 2hrs** Digital thermometer - X-RAY machine - block diagram- radiography and fluoroscopy-application of X-RAY examination –elements of bio-telemetry system – single channel telemetry system.	6 Hrs

Text Books:

2. Biomedical Instrumentation -Dr.M.Arumugam (Anuratha Agencies).

Reference:

1. Biomedical Instrumentation and Measurements –Leslie Cromwel, Fred J. Weibell, Ericha. Pfeiffer, Prientice Hall of India, Second Edition**.**

E- Resources:

2. https://www.sciencedirect.com/science/article/pii/B9780128183182000039

http://smegnr.cpas.ac.in/department-of-biomedical-instrumentation/

Course Outcome

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CO 1: Study the function of bioelectric potentials and its importance and understand the different types of waveforms generated by organs.

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CO 5: Analyze and understand the applications of the imaging techniques transmission(x-ray and ultrasound)

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CO3	S	S	M	S	S	S	S	S	S	S
CO4	S	S	M	S	S	S	M	M	M	S
CO5	S	S	M	S	S	S	M	M	M	S

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semester-V / **Skill Based Elective -II**	**COURSE TITLE/CLASS: MEDICAL PHYSICS/ III BSc Physics**	Course Code: PUS2
Instruction Hours: 2	Credits: 2	Exam Hours: 3
Internal Marks -25	External Marks-75	Total Marks: 100

Cognitive Level	**K-1** Acquire/Remember **K-2** Understand **K-3** Apply **K-4** Analyze **K-5** Evaluate **K-6** Create	
Course Objectives:	• To understand the basics about the biological systems in our body, their behavior, and the diagnostic devices. • To give basic ideas about how multimedia evidences are useful in crime investigation To Understand the knowledge in recent trends of measuring bio-signals • To provide knowledge on preparation, Characterization and use of biocompatible metals and non metals for bio implant application. • Designed to provide the knowledge for use of different laser spectroscopic methods in bioanalysis.	
UNIT	**CONTENT**	**NO OF HOURS**
I	Basic Anatomical Terminology- Modeling and Measurement – Forces on and in the Body – Physics of the Skeleton – Heat and Cold in Medicine- Energy work and Power of the Body	6 Hrs

II	Pressure system of the body- Physics of Cardiovascular system- Electricity within the Body – Applications of Electricity and Magnetism in Medicine	6 Hrs
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V	Electro Encephalo Graph (EEG) - origin- Block diagram- Electro Myogragh (EMG) – Block diagram- EMG recorder- Computer Tomography (CT) principle- Block diagram of CT scanner.	6 Hrs

Text Books

1. Medical Physics –John R. Cameron and James G.Skofronick, 1978, John Willy & Sons.

Reference Book

1. Bio medical instrumentation – E D II, Dr M. Arumugam, Anuradha Agencies 1997.

E- Resources:

3. https://aapm.onlinelibrary.wiley.com/journal/24734209
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Course Outcomes:

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biomedical instrument used in medical field

CO 5: The student can able to design different laser spectrometers and devices for spectroscopic analysis and imaging of cells and tissues.

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CO1	S	S	M	S	S	S	M	S	S	S
CO2	S	S	M	S	S	S	M	S	S	S
CO3	S	S	M	S	S	S	S	S	S	S
CO4	S	S	M	S	S	S	M	S	S	S
CO5	S	S	M	S	S	S	S	M	S	S

S – Strongly Correlating

M – Moderately Correlating

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N – No Correlation

Semester-V / **Core Course IX**	**COURSE TITLE/CLASS: ELECTRONICS / III BSc Physics**	Course Code: PUI
Instruction Hours: 5	Credits: 5	Exam Hours: 3
Internal Marks -25	External Marks-75	Total Marks: 100

Cognitive Level	**K-1** Acquire/Remember **K-2** Understand **K-3** Apply **K-4** Analyze **K-5** Evaluate **K-6** Create	
Course Objectives:	• To enable the students to understand all aspects of electronics in a lucid and comprehensive manner. • This course is familiarize the students about the transistor, operational amplifier and Digital electronics Circuit • Acquire the fundamental knowledge and application of the semiconductor Device • Knowledge of the basic principles of electronic circuits operation • Performance Analysis of electronic circuit	
UNIT	**CONTENT**	**NO OF HOURS**
I	**Semiconductors, diodes and Bipolar Transistors** Intrinsic and extrinsic semi -conductors –PN junction diode – Biasing– V-I Characteristics– Rectifiers – Half wave – full wave and Bridge rectifiers – Break down mechanisms – Zener diode- characteristics of Zener diode – Zener diode as voltage regulator-Bipolar junction transistor – Basic configurations -Relation between α and β –	**18** Hrs

	Characteristic curves of transistor – CB, CE mode – DC load line – DC bias and stabilization – fixed bias – voltage divider bias.	
II	**Amplifiers and Oscillators** Single stage CE amplifier – Analysis of hybrid equivalent circuit – Power amplifiers – Efficiency of class A,B& C Power amplifier - General theory of feedback – Properties of negative feedback – Criterion for oscillations – Hartley oscillator – Colpitt's oscillator.	18 Hrs
III	**Operational amplifier** Operational amplifier - Characteristics – Inverting and Non-inverting amplifier – Voltage follower – Adder, Subtractor, Integrator and Differentiator circuits – Log & antilog amplifiers – Op- amp as Comparator – Filters-low, bandpass, high pass filters -A/D conversion – Successive approximation method – D/A conversion – R-2R ladder network.	18 Hrs
IV	**Number Systems, Logic Gates and Boolean Algebra** Introduction to decimal, binary, octal, hexadecimal number systems – Inter conversions– 1's and 2's complements –Logic gates, Symbols and their truth tables – AND, OR, NOT, NAND, NOR, XOR, and XNOR – Universality of NAND and NOR gates. Boolean algebra – De-Morgan's theorems -Reducing Boolean expressions using Boolean laws – SOP forms of expressions (minterms) – Karnaugh map simplification(Four variables).	18 Hrs
V	**Combinational and Sequential Digital Systems** Half and full adders – Half and full subtractors – Decoder(2:4 line) – Encoder (4:2 line)– Multiplexer(4:1 line) – Demultiplexer (1:4 line) - Flip flop – RS – clocked RS – T and D flip flops – JK and master slave flip flops – Counters – Four bit asynchronous ripple counter – Mod-10	18 Hrs

	counter –– Synchronous counter – Ring counter - Shift registers – SISO and SIPO shift registers.	
VI	**ANY THREE:** • Analysis and Comparison of CC, CB and CE modes • Principle and working of Phase Shift Oscillator • Study of Counter type method in A/D and D/A conversion • Simplification of Boolean Algebra using circuit analysis • Analysis of Multiplexer(16:1) and Demultiplexer(1:16) • Study of Up/Down Counter	**Group Discussion**

Text Books:

1. Mehta V.K., *Principles of Electronics*, S. Chand and company Ltd, 2014.
2. A.P. Malvino, D.P. Leach, *Digital Principles and Application*, IV Edition, Tata McGraw Hill, New Delhi, 2011.
3. V. Vijayendran, *Digital Fundamentals*, S.Viswanathan, Printers & Publishers Private Ltd, Chennai, 2004.

Reference Books :

1. Theraja. B.L, *Basic electronics - Solid State*, S.Chand and Company Ltd 2002.
2. Sedha R.S., *A text book of applied Electronics*, S.Chand& company Ltd 2002.
3. W.H.Gothmann, *Digital Electronics*, Prentice Hall of India, Pvt. Ltd., New Delhi 1996.
4. V. Vijayendran, *Digital Fundamentals*, S.Viswanathan, Printers & Publishers Private Ltd, Chennai, 2004.

E- Resources:

1. https://www.electronics-tutorials.ws/
2. https://www.altair.com/electronics/

Course Outcomes:

On completion of the course the learner will be able

CO 1: Explain the theoretical principles essential for understanding the operation of electronic circuit

CO 2: Measure the characteristics of electronic circuit and present experiment result

CO 3: Analyze electrical circuit and calculate the main parameters

CO 4: Develop Design and create simple analogue and digital electronics circuit

CO 5: Know about the multistage amplifier using BJT and FET various configuration

Mapping of COs with POs & PSOs:

CO/PO	PO					PSO				
	1	2	3	4	5	1	2	3	4	5
CO1	S	S	M	S	S	S	S	M	M	S
CO2	S	S	M	S	S	S	S	S	S	S
CO3	S	S	M	S	S	S	S	S	S	S
CO4	S	S	M	S	S	S	S	S	S	S
CO5	S	S	M	S	S	S	S	S	S	S

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Semester-V / Major Based Elective I	**COURSE TITLE/CLASS: MICROPROCESSOR AND "C" PROGRAMMING / III BSc Physics**	Course Code: PUE3
Instruction Hours: 5	Credits: 5	Exam Hours: 3
Internal Marks -25	External Marks-75	Total Marks: 100

Cognitive Level	**K-1** Acquire/Remember **K-2** Understand **K-3** Apply **K-4** Analyze **K-5** Evaluate **K-6** Create

Course Objectives:

The purpose of this course is to introduce students about the key features and implementation of C language and 8085 Microprocessor assembly.

- To understand the basic concept of microprocessor
- To understand techniques for faster execution of instructions and improve speed of operation and performance microprocessors.
- To Learn the fundamental programming concept and methodologies.
- To understand the basic architecture of intel 8085 microprocessor.
- To practice the fundamental programming methodologies in c programming language.

UNIT	CONTENT	NO OF HOURS
I	**Basics of Digital Computer** Basic components of a digital computer - Evolution of microprocessors - Important INTEL microprocessors - Hardware, Software and Firmware - Memory - Semiconductor memories - RAM,ROM - Flash memory – CCD memory – Cache memory - Buses.	18 Hrs

II	**Intel 8085 and its Architecture** INTEL 8085 - Pin Diagram - Architecture - Various registers - Status Flags - Interrupts and their order of priority - Addressing modes - Direct, Register, Register indirect, Immediate and implicit addressing - Instruction set - Data transfer group - Arithmetic Group - Logical group - Branch group, Stack, I/O and Machine control group.	18 Hrs
III	**Assembly Language Programming** Addition - subtraction - multiplication -division of two 8- bit numbers - Finding the largest and smallest number in a data array-Arranging a list of numbers in ascending or descending order-complement – multibyte addition and subtraction –decimal addition - subtraction.	18 Hrs
IV	**Introduction To C** Basic Structure of C Programs – Character set – C tokens - Keywords and identifiers – constants – variables – Data types – declaration of variables – Assigning values to variables – Symbolic constants – Operators and Expressions - Arithmetic operators - Relational, Logical and Assignment operators, Increment and Decrement operators – Conditional operator, Bitwise and Special operators– Arithmetic Expressions – Mathematical functions.	18 Hrs
V	**Preliminaries and Functions** Data input and output – getchar, putchar, scanf, printf, gets, puts functions – Decision making and branching –if, if…else, else if ladder, switch, break, continue, goto – Decision making and looping – while, do… while, for, nested loops –Arrays (one-, two- and multi-dimensional arrays)- Declaration, Initialization of arrays.	18 Hrs

Text Books:

1. B. Ram – *Fundamentals of Microprocessors and Microcontrollers*–Dhanpat Rai Publications (P) Ltd., New Delhi, 2013.
2. E. Balagurusamy – *Programming in ANSI C* – Tata McGraw Hill Education Private Limited, New Delhi,2012.

Reference Books:

1. R. S.Gaonkar- *Microprocessor Architecture, Programming, and Applications with the 8085*, Penram International Publishing (India) Private Limited, Mumbai, 2007.
2. K. R. Venugopal and S. R. Prasad – *Programming with C* – Tata McGraw-Hill Publishing Company Limited, New Delhi, 2002.

Web Resource:

1. https://onlinecourses.nptel.ac.in/noc19_cs44/preview.
2. https://www.edaboard.com/threads/getting-started-with-microprocessor-programming-in-c-c.378550

Course Outcomes:

On completion of the course the learner will be able

CO 1: Write programs to run on 8085 microprocessor

CO 2: Understand and device techniques for faster execution of instruction, improve speed of operations.

CO 3: Understand microprocessor and its advantage.

CO 4: Describe the fundamental components of a C program, e.g source file, header file, mainfunction, functions and librarie.

CO 5: Explain and apply fundamental syntax rules for identifies, declarations, expressions, statements and functions.

Mapping of COs with POs & PSOs:

CO/PO	PO					PSO				
	1	2	3	4	5	1	2	3	4	5
CO1	S	S	M	S	S	S	S	S	M	S
CO2	S	S	M	S	S	S	S	S	S	S
CO3	S	S	M	S	S	S	S	S	M	S
CO4	S	S	M	M	S	S	S	S	S	S
CO5	S	S	M	S	S	S	M	S	S	S

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Skill development

Semester - IV / Skill Based Elective –I	**COURSE TITLE/CLASS: ASTROPHYSICS / II BSc., Physics**	**Course Code: PUS1**
Instruction Hours: 2	Credits: 2	Exam Hours: 3
Internal Marks -25	External Marks-75	Total Marks: 100

Cognitive Level	**K-1** Acquire/Remember **K-2** Understand **K-3** Apply **K-4** Analyze **K-5** Evaluate **K-6** Create

Course Objectives:

- To impart an understanding of the great number of diverse phenomena in the Universe through Demonstrate an understanding Stars.
- Establish competence in focuses areas of astrophysical theory an experiment.
- Student can describe the differences in the life cycles of low vs high-mass stars
- Student can describe stellar remnant and the role of degeneracy in forming stellar remnants.
- Demonstrate a fundamental understanding of the Solar System.

UNIT	**CONTENT**	**NO OF HOURS**
Unit I	**ELEMENTS OF SPACE DYNAMICS** Man's quest for space - the energy requirements - Rocket propulsion	6 Hrs
Unit II	**THE HEART OF THE SOLAR SYSTEM** Vital statistics of the Sun - the solar photosphere - the Fraunh offer lines - structure of solar atmosphere - the solar interior - Sunspots and solar	6 Hrs

	activity - other features of the solar activity - Radio radiation of the disturbed Sun	
Unit III	**SMALL BODIES IN THE SOLAR SYSTEM** Asteroids - Meteorites - Comets as members of the Solar system - Physical properties of comets - Origin and evolution of comets - Space studies of comets – Meteors.	6 Hrs
Unit IV	**OUR HOME:** Gross properties - internal structure - the terrestrial atmosphere - the Earth's magnetic field - motions - Solar terrestrial relations - the Earth in space - atmospheric circulation in the troposphere.	6 Hrs
Unit V	**Galaxies** Introduction-General structure of the galaxy – general region and the nucleus –the galactic disc –the galactic halo-the mass of the galaxy-continuous radio emission in the galaxy-black holes.	6 Hrs

Text Books:

1. Astrophysics of the Solar System – KD Abhyankar, University press pvt. Ltd., Hyderabad, 1999
2. An Introduction To Astrophysics- BaidyanathBasu (unit v)

SECTION UNIT

1. 1 - 3.61 I
1. 4.1 – 4.10 II
2. 9.1 - 9.11 III
3. 5.1 – 5.9, 6.1 – 6.6 IV
4. 15.8,16.1,16.7,16.8,16

Web Resources :

1. 1.http://www.physorg.com/space-news

2. http://www.newscientist.com/section/space

Course Outcomes:

On completion of the course the learner will be able

CO 1: Become familiar with nuclear particles and different particle accelerators. Student is expected to know the working of different accelerators.

CO 2: Have Peripheral ideas about astronomy and astrophysics

CO 3: Student describe all of the major structures of the Solar System.

CO 4: Student can describe the history of the Solar System.

CO 5: Atmospheres of objects in the solar system.

Mapping of COs with POs & PSOs:

CO/PO	PO					PSO				
	1	2	3	4	5	1	2	3	4	5
CO1	S	S	M	S	S	S	S	M	S	S
CO2	S	S	M	S	S	S	S	M	S	S
CO3	S	S	M	S	S	S	S	S	S	S
CO4	S	S	M	S	S	S	S	M	S	S
CO5	S	S	M	S	S	S	S	M	M	S

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