

NALLAMUTHU GOUNDER MAHALINGAM COLLEGE (AUTONOMOUS)-POLLACHI

553	B.A.Economics	Core III Elective: Rural Economics	22UEO5E3	2022
554	B.A.Economics	Core III Elective: Urban Economics	22UEO6E3	2022
555	B.A.Economics	Core III Elective: Computer Application in Economics	22UEO6E5	2022
556	B.A.Economics	Core III Elective: Health Economics	22UEO6E6	2022
557	B.Sc. Mathematics	Core I: Classical Algebra	22UMS101	2022
558	B.Sc. Mathematics	Anicillary Mathematics for Physics I	22UPS1A1	2022
559	B.Sc. Mathematics	Anicillary Mathematics for Physics II	22UPS2A2	2022
560	B.Sc. Mathematics	Anicillary Mathematics for Chemistry I	22UCY1A1	2022
561	B.Sc. Mathematics	Anicillary Mathematics for Chemistry II	22UCY2A2	2022
562	B.Sc. Mathematics	Core III: Trigonometry, Vector Calculus and Fourier Series	22UMS203	2022
563	B.Sc. Mathematics	Core VI: Numerical Techniques	22UMS306	2022
564	B.Sc. Mathematics	Core X: Real Analysis-I	22UMS511	2022
565	B.Sc. Mathematics	Core XIV: Real Analysis-II	22UMS615	2022
566	B.Sc. Mathematics	Core Elective III: Fundamentals of Differential Geometry	22UMS6E5	2022
567	B.Sc. Mathematics	Project	22UMS6P1	2022
568	B.Sc. Physics	Optics & Spectroscopy	22UPS508	2022
569	B.Sc. Physics	Mechanics	22UPS507	2022
570	B.Sc. Physics	Core Elective II Digital Circuit Systems & Microprocessor	22UPS6E16	2022
571	B.Sc. Physics	Core Elective II: Biomedical Instrumentation	22UPS6E17	2022
572	B.Sc. Physics	Core Elective II: Nano Materials and Applications	22UPS6E18	2022
573	B.Sc. Botany	Major Paper IV- Cell Biology, Anatomy and Embryology	22UBY304	2022
574	B.Sc. Botany	Major Paper V – Biochemistry, Biophysics & Bioinstrumentation	22UBY405	2022
575	B.Sc. Botany	Non Major elective: Bioinformatics	22UBY4N22	2022
576	B.Sc. Botany	Major Paper – VII - Taxonomy of Angiosperms and Economic Botany	22UBY507	2022
577	B.Sc. Botany	Elective I– Herbal & Ethno Botany	22UBY5E2	2022

BoS Minutes
Highlighted



Dr. R. MUTHUKUMARAN,
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N.G.M. College, Pollachi - 642 001
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New Course Introduced

BOARD OF STUDIES IN PHYSICS (UG)

04-06-2022, SATURDAY

MINUTES OF THE MEETING

The meeting of Board of Studies in Physics was held on 04-06-2022. The Complete Syllabi for UG Courses for the students admitted from the academic year 2021-22 batch was reviewed and the necessary suggestions given by the members, BOS were considered and the necessary modifications to be carried for the students admitted from the academic year 2022-25 onwards.

- 1) E-learning website link should be included at the end of each course.
- 2) 21UPS101 - Properties of Matter
 - * Topic "Melde's apparatus" to be included
 - * Unit III & IV to be reframed
 - * Title of the paper to be changed as "Gravitation, Properties of Matter & Sound".
- 3) 21UPS202 - Thermal Physics
 - * Self study topics may be included
 - * "Quantum theory of sp. heat" statement to be removed
 - * Unit II title to be changed as "Transmission".
- 4) 21UPS304 - Mathematical Physics
 - * Dirac Matrices to be changed as "Pauli's Spin matrices"
 - * Unit IV - Group theory to be removed and Fourier series to be added.
- 5) 21UPS507 - Mechanics
 - * Unit-I to be removed, Unit II & III to be merged & reframed
 - * Unit IV - Lagrangian Formulation & Unit V - Hamiltonian Formulation

6) 21 UPS 508 - Optics & Spectroscopy

- * Geometric optics to be included
- * Unit IV to be removed

7) 21 UPS 509 - Relativity & Quantum Mechanics

- * "Hydrogen atom and Bohr atom model" to be removed
- * Unit II - the word "Derivation" to be removed
- * Include statistical interpretation of wave function
- * Unit V - Relativity
- * Unit IV - Operator Mechanism to be included
- * Linear harmonic oscillator (Qualitative study only)
- * Photoelectric effect topic repeated & may be removed

8) 21 UPS

8) 21 UPS 614 - Atomic & Nuclear Physics

- * Syllabus to be reframed

9) 21 UPS 615 - Solid state Physics & Statistical Mechanics

- * Unit IV title of the topic to be changed as "Magnetic properties of Solids & Superconductivity"

Suggestion given by Dr. S.S. Naina Mohammed

- * To develop interest ^{among} the students "Medical Physics" may be included for Ancillary physics student.

Suggestions by Academic Auditor (UG)

Based on the discussion that all the BOS members had today (04/06/2022) in the Department of Physics, I would like to present the following suggestions that can be implemented by the Department of Physics to make Learning Physics more joyous for Students.

i) Mandatory Practical Exams at the end of each Semester so that the workload of study on students is less. Students need not wait a whole year to do the Practicals

ii) Inclusion of "STUDENT PROJECT" in B.Sc. PHYSICS course ~~so that~~ in the last Semester so that students ~~find~~ have freedom and choice to select a topic of their interest for study and get an opportunity to present their findings in the form of a presentation. This will also motivate the more number of students to take/go for PG Course in Physics

Harish M. Raj.
04/06/2022
(Dr. HARISH RAO)

Board of Studies - Physics (UG)

Chairman	
Dr. T. E. Manjulavalli Head, Department of Physics NGM College, Pollachi	<i>Manjulavalli</i> 04/06/22
University Nominee	
Dr. L. Senthilkumar Professor, Department of Physics Bharthiar University, Coimbatore	<i>Sh</i> 04/6/22
Academic Auditor	
Dr. Haresh M. Pandya Associate Professor and Head Chikkanna Government Arts College Tiruppur - 641 602	<i>Haresh M. Pandya</i> 4/6/22
Subject Expert	
Dr. S. S. Naina Mohammed Assistant Professor Government Arts College Udumalpet - 642 126	<i>S. S. Naina Mohammed</i> 4/6/22
Industrial Expert	
Mr. M.S. Karthik Profenaa Technologies Agni Amman Complex Pollachi - 642 001	<i>M. S. Karthik</i> 4/6/22
Internal Members	
Ms. N. Revathi, Assistant Professor	<i>N. Revathi</i> 4.6.22
Dr. M. Karthika, Assistant Professor	<i>MD</i>
Dr. S. Shanmugapriya, Assistant Professor	<i>S. S. Shanmugapriya</i> 4/6/22
Dr. A. Sureshkumar, Assistant Professor	<i>A. Sureshkumar</i> 4/6/22
Ms. S. Yogeswari, Assistant Professor	<i>S. Yogeswari</i>
Dr. T. Ponraj, Assistant Professor	<i>T. Ponraj</i>
Dr. A. G. Kannan, Assistant Professor	<i>A. G. Kannan</i> 4/6/22
Ms. M. Gayathri, Assistant Professor	<i>M. Gayathri</i>
Alumnus nominated by Principal / HoD	
Ms. Jamunadevi. K B.Sc, Physics (2017-2020 Batch)	<i>Jamunadevi</i>
Student Member	
Dharanesh. N III BSc Physics (2019-2022 Batch)	<i>Dharanesh</i>

Percentage of Revision of B.Sc. Physics
Syllabus Revised for the Academic Year - 2022-2023

B.Sc. Physics							
S.No	Course Code	Course Title	Change Details	% of Changes	Content Deleted	Content Updated	Reason for Change
1	22UPS508	Optics & Spectroscopy	Modified	20%	ATOMIC & NUCLEAR SPECTRA Normal and Anomalous Zeeman effects - Experimental study of normal Zeeman effect - Lorentz Classical interpretation and Expression for the Zeeman shift - Quantum mechanical theory of Normal Zeeman effect - Paschen Back effect - Stark effect – Basic theory of NMR, ESR and NQR - Techniques and Instrumentation - Applications	GEOMETRICAL OPTICS Fermat's Principle - Aberrations - Spherical aberrations in lens - coma - Astigmatism - chromatic aberration - dispersion by a prism - Cauchy's dispersion formula - dispersive power, achromatism in prism - deviation without dispersion - chromatic aberrations in a lens - circle of least confusion - achromatic lens - condition for achromatism of two thin lenses separated by a finite distances.	Feedback from Expert
2	22UPS507	Mechanics	Modified	40%	PROJECTILES Vertical motion under gravity- motion of particle projected horizontally from a point above the earth - particle projected in any direction - path of projectile is a parabola - range of projectile on a plane inclined to the horizontal maximum range on the inclined plane - angle of projection for a particular range- velocity at a point in the path of a projectile - enveloping parabola. NEWTON'S LAWS OF MOTION Examples -electric and magnetic forces on a charged particle - The magnetic field and Lorentz force -Examples - motion of charged particle in a uniform constant electric field. Conservation of momentum - contact forces: friction - Problems. CONSERVATION LAWS Conservation of Linear and angular momentum: Internal forces and momentum	LAGRANGIAN FORMULATION Delta-Variation process - Hamilton's principle - Deduction of Lagrange's equations of motion from Hamilton's principle - Principle of virtual work - D'Alembert's principle - Deduction of Lagrange's equations by D'Alembert's principle for both conservative system and non-conservative system - Deduction of Hamilton's principle from D'Alembert's principle - Deduction of Newton's second law of motion from Hamilton's principle - Applications of Lagrange's equation: Linear harmonic oscillator, Simple pendulum, <i>Compound pendulum</i> . HAMILTONIAN FORMULATION OF MECHANICS View points of the new development - Phase space	Feedback from Expert

					conservation - center of mass – Examples - General elastic collision of particles of different masses - System with variable mass- Examples- Conservation of angular momentum - Torque due to internal forces - Torque due to gravity - Angular momentum about center of mass.	and the motion of systems - Hamiltonian - Hamilton's canonical equations of motion - Cyclic coordinates - Physical significance of H - Advantages of Hamiltonian approach - Deduction of canonical equations from variational principle - Applications of Hamilton's equations of motion; Simple Pendulum, Compound pendulum, Linear harmonic oscillator.	
3	22UPS6E16 / 22UPS6E17 / 22UPS6E18	Core Elective II : Digital Circuit systems & Microprocessor / Biomedical Instrumentation/ Nanomaterials and applications	New	100%	-	-	Feedback from Experts
4	22VAD603	PCB and Circuit Designing	New	100%	-	-	Feedback from Experts



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HoD



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SEMESTER – V

Part	Subject Code	Subjects	Ins. Hrs Per Week	Examinations				Credits
				Dur. Hrs	CIA	ESE	Total	
III	22UPS507	Core VII : Mechanics	5	3	50	50	100	5
	22UPS508	Core VIII: Optics & Spectroscopy	5	3	50	50	100	5
	22UPS509	Core IX: Relativity and Quantum Mechanics	5	3	50	50	100	5
	22UPS5E10 / 22UPS5E11/ 22UPS5E12	Core Elective - I : Basic Electronics & Circuit Systems/ Communication Electronics/ Material Science	5	3	50	50	100	5
	22UPS513	Summer Internship or Vocational training/ Project	-	-	-	-	100	3
		Electronics Lab	3					
		Digital & Microprocessor Lab	3					

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	22UPS5AL1	Advanced Learner Course - I (Optional) - Problem Solving - Self Study	-	-	50	50	100	5*
IV	22UPS5S1/ 22UPS5S2	Skill based Elective I: Mechanical measurements/Fundamentals of Bio-Physics	1	2	-	50	50	2
	22GKL501	General Knowledge & General Awareness	SS					Grade
	22HEC505	HE - (National values & SKY Yoga Practice - V)	1	2	25	25	50	1
	22VAD501	Fluency - V						Grade
Total							600	26 + 5*
SEMESTER – VI								
Part	Subject Code	Subjects	Ins. Hrs Per Week	Examinations				Credits
				Dur. Hrs	CIA	ESE	Total	
III	22UPS614	Core X : Atomic & Nuclear Physics	5	3	50	50	100	5
	22UPS615	Core XI : Solid State Physics & Statistical Mechanics	5	3	50	50	100	5


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	22UPS6E16/ 22UPS6E17/ 22UPS6E18	Core Elective II : Digital Circuit systems & Microprocessor / Biomedical Instrumentation/ Nanomaterials and applications	5	3	50	50	100	5
	22UPS6E19/ 22UPS6E20/ 22UPS6E21	Core Elective III: C Programming & Information Security / Industrial Instrumentation/ Python Programming	5	3	50	50	100	5
	22UPS622	Core XII : Electronics Lab	3	3	50	50	100	3
	22UPS623	Core XIII : Digital & Microprocessor Lab	3	3	50	50	100	3
	22UPS624	Core XIV : Computer lab in C	2	3	50	50	100	2
	22UPS6AL2	Advanced Learner Course - II (Optional) – Problem Solving - Self Study			50	50	100	5*
IV	22UPS6S3/ 22UPS6S4	Skill based Elective II:Environmental Instrumentation/Fundamentals of Astrophysics	1	2	-	50	50	2
	22HEC606	HE - (Global values & SKY Yoga Practice - VI)	1	2	25	25	50	1
	22VAD601	Fluency – VI						Grade
	22VAD603	PCB and Circuit Designing						Grade
Total							800	31 + 5*
Grand Total							3800	140+10*

* Extra credits for advanced learner course


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Programme Code:	B.Sc. PHY			Programme Title:	Bachelor of Science	
Course Code:	22UPS507			Title	Batch:	2022 – 2025
				Core VII: Mechanics	Semester:	V
Lecture Hrs./Week	5	Tutorial Hrs./Sem.			Credits:	5

Course Objective

To acquire a complete knowledge about mechanics and classical dynamics

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the laws involved in Rigid body dynamics and classical mechanics	K1
CO2	Gain a deeper insight into the physical concepts and its application to various physical systems	K2
CO3	Apply these formalisms to obtain equations of motion for simple systems	K3
CO4	Analyze the problem and frame equations of motion	K4
CO5	Ability to Use the necessary skills and tools to write equations for real time problems	K5



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Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2
CO1	H	H	H	H	M	L	H	H
CO2	H	M	H	H	M	H	H	H
CO3	H	M	H	H	H	H	M	M
CO4	H	M	M	H	H	H	M	M
CO5	H	M	M	H	H	H	M	H

H – High; M – Medium; L – Low

Mechanics

Units	Content	Hrs
Unit I	NEWTON'S LAWS OF MOTION AND CONSERVATION LAWS Newton's Laws of motion - forces and equations of motion - motion of a particle in a uniform gravitational field - Newtonian law of universal gravitation - Conservation laws - conservation of energy - Work - kinetic and potential energy - Examples - Conservative Forces - Potential energy and conservation of energy in gravitational and electric field – Examples - Conservation of Linear and angular momentum: Internal forces and momentum conservation - center of mass – Examples.	13



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Unit II	ELEMENTARY RIGID BODY DYNAMICS The equation of motion - angular momentum and kinetic energy - Moment of inertia - parallel axis theorem - Perpendicular axis theorem - examples - Rotation about fixed axis: time dependence of motion - Examples - Rolling without slipping - Torque about center of mass - Example - Rotation about fixed axes: Behavior of angular momentum vector.	13
Unit III	MECHANICS OF SYSTEM OF PARTICLES Conservation theorem for a system of particle: Conservation theorem for linear momentum, angular momentum and energy - Constrained motion - Types of constraints with examples - Forces of constraints - Degrees of freedom - Generalized coordinates - Generalized notation for Displacement, Velocity, Acceleration, Momentum, Force and Potential - Limitations of Newton's Law.	13
Unit IV	LAGRANGIAN FORMULATION Delta-Variation process - Hamilton's principle - Deduction of Lagrange's equations of motion from Hamilton's principle - Principle of virtual work - D'Alembert's principle - Deduction of Lagrange's equations by D'Alembert's principle for both conservative system and non-conservative system - Deduction of Hamilton's principle from D'Alembert's principle - Deduction of Newton's second law of motion from Hamilton's principle - Applications of Lagrange's equation: Linear harmonic oscillator, Simple pendulum, <i>Compound pendulum</i> .	


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Unit V	HAMILTONIAN FORMULATION OF MECHANICS View points of the new development - Phase space and the motion of systems - Hamiltonian - Hamilton's canonical equations of motion - Cyclic coordinates - Physical significance of H - Advantages of Hamiltonian approach - Deduction of canonical equations from variational principle - Applications of Hamilton's equations of motion; Simple Pendulum, Compound pendulum, Linear harmonic oscillator.	
	Total Contact Hrs	65

Pedagogy and Assessment Methods:

Chalk and Talk lectures, Group Discussion, Seminar, Interaction, power point presentation

22UPS507

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Murugeshan. R	Mechanics and Mathematical Methods	S.Chand & Co Ltd, New Delhi \ Reprint	2006
2	Mathur D.S	Mechanics	S. Chand & Co Ltd, New Delhi \ 2 nd Edition	2012
3	Narayanamurthi. M and Nagarathinam. M	Dynamics	National Publishing Company \ Revised Edition	1988
4	Gupta, Kumar & Sharma	Classical Mechanics	Pragati Prakashan \ 19 th edition	2010
5	Murugeshan. R	Modern Physics	S. Chand & Co Ltd \ Ninth revised edition	2001


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Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Bhargava& Sharma	A Text Book of Mechanics	Ratan Prakshan Mandir \ 7 th edition	1990
2	Arthur Beiser	Concepts of Modern Physics	TMH-\ 6 th edition	2003
3	Related online contents [MOOC, SWAYAM, NPTEL, Websites etc] https://www.youtube.com/watch?v=83QCm3LkuEg https://nptel.ac.in/courses/115105098 https://www.youtube.com/watch?v=ApUFtLCrU90			



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Programme Code:	B.Sc. PHY			Programme Title:	Bachelor of Science	
Course Code:	22UPS508			Title	Batch:	2022 – 2025
				Core VIII: Optics & Spectroscopy	Semester:	V
Lecture Hrs./Week	5	Tutorial Hrs./Sem.	-		Credits:	5

Course Objective

To understand the mechanism of energy transfer and to impart knowledge in electromagnetic spectrum

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Demonstrate the characteristics of light and interaction of electromagnetic radiations with matter	K1
CO2	Apply the principle of molecular spectroscopy in identification of properties of materials and applications	K2
CO3	Categorize the spectra from vibrational and rotational motion of atoms or molecules	K3
CO4	Explain the theoretical models of spectroscopy that are suitable for each phenomena related to radiations	K4
CO5	Plan and design the instruments based on electromagnetic radiations by using the tools and methodologies of optics and spectroscopy	K5


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Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2
CO1	H	H	L	M	M	L	H	H
CO2	H	H	L	H	M	M	H	H
CO3	H	M	M	M	L	L	M	M
CO4	H	M	H	L	M	H	H	M
CO5	H	M	L	H	H	H	H	H

H – High; M – Medium; L – Low

Optics & Spectroscopy

Units	Content	Hrs
Unit I	GEOMETRICAL OPTICS Fermat's Principle - Aberrations - Spherical aberrations in lens - coma - Astigmatism - chromatic aberration - dispersion by a prism - Cauchy's dispersion formula - dispersive power, achromatism in prism - deviation without dispersion - chromatic aberrations in a lens - circle of least confusion - achromatic lens - condition for achromatism of two thin lenses separated by a finite distances.	13
Unit II	INTERFERENCE & DIFFRACTION Theory of interference - Fresnel's biprism experiment - Determination of wavelength - Interference due to reflected light – Air wedge - Newton's rings - Determination of wavelength and refractive index of a liquid - Fresnel's explanation of rectilinear propagation of light - Fresnel's diffraction at a circular aperture - Fraunhofer diffraction at a single slit - Theory of the plane transmission grating - Determination of wavelength.	13
Unit III	POLARISATION Polarization of transverse waves - Plane of polarization - Brewster's law and Brewster's window - Polarization by refraction - Double refraction - Principal section and principal plane - Nicol prism - Nicol prism as an analyzer - Theory of circularly and elliptically polarized light - Optical activity - Fresnel's explanation of rotation - Specific rotation - <i>Laurent's half shade Polarimeter</i> .	13



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Unit IV	MOLECULAR SPECTRA Rotation of molecules - Rotational spectra of rigid diatomic molecule - Techniques and Instrumentation of Microwave Spectroscopy - Energy of a Vibrating diatomic molecule - Simple harmonic oscillator - Techniques and Instrumentation of Infrared Spectroscopy - Applications of Microwave & Infrared Spectroscopy (Basic ideas) - Raman effect and characteristics - Experimental study - Quantum theory of Raman effect.	13
Unit V	LASER & FIBER OPTICS Laser characteristics - Einstein's coefficients - Population inversion - Pumping methods - Essential elements and Action of laser system - Ruby laser – He-Ne laser – <i>Applications: Holography and Lasers in medicine.</i> Construction and types of optical fiber - Critical angle - Acceptance angle, Acceptance cone and Numerical aperture - Propagation of light through optical fiber - Optical fiber configurations - Fiber optic communication system.	13
	Total Contact Hrs	65

- *Italic font denotes self-study*

Pedagogy and Assessment Methods:

Chalk and Talk lectures, Group Discussion, Seminar, Interaction, power point presentation

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Subramanyam N. Brijlal	Waves and Oscillations	S.Chand & Co, New Delhi	
2	Subrahmanyam. N. Brijlal, Avathanulu M.N.	A Textbook of Optics	S.Chand and Co Ltd., New Delhi	2008
3	Colin N .Banwell, Elaine M. Mc Cash	Fundamentals of Molecular Spectroscopy	Tata McGraw-Hill, New Delhi	2004
4	Gupta S.L. Kumar V. Sharma R.C.	Elements of Spectroscopy	Pragati Prakashan, Meerut	2001


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Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Halliday, Resnick	Physics Part I & II	Wiley Eastern Ltd, New Delhi	1994
2	Jenkins, White	Fundamentals of Optics	McGraw-Hill., New York	1981
3	Manas Chanda	Atomic Structure and Chemical Bond	Tata McGraw Hill, New Delhi	1982
4	Gurdeep Chatwal, Sham Anand	Spectroscopy	Himalaya Publishers, Mumbai	1987
5	Related online contents [MOOC, SWAYAM, NPTEL, Websites etc] https://www.youtube.com/watch?v=ML7HcZo6laE https://nptel.ac.in/courses/115107095 https://nptel.ac.in/courses/104106122			


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Programme Code:	B.Sc. PHY			Programme Title:	Bachelor of Physics	
Course Code:	22UPS6E16			Title	Batch:	2022 – 2025
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.	-	Core Elective II:	Semester:	VI
				Digital Circuit systems & Microprocessor	Credits:	5

Course Objective

To study the number system, Logic circuits and its application and to understand the architecture and instruction set of 8085 microprocessor

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understanding the operations of BCD numbers and memory allocation in computers	K2
CO2	Develop effective problem solving abilities	K3
CO3	Analyze electronic circuits	K4
CO4	Apply the concept of basic electronic devices to design various circuits	K5
CO5	Understand and to implement digital electronics and Microprocessor.	K6


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Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2
CO1	H	M	M	M	L	H	H	M
CO2	M	H	H	H	H	M	H	M
CO3	M	H	H	H	H	H	H	M
CO4	M	M	H	M	M	H	H	M
CO5	H	H	M	H	M	M	H	M

H – High; M – Medium; L – Low

Digital Circuit systems & Microprocessor

Units	Content	Hrs
Unit I	NUMBER SYSTEMS AND CODES Binary numbers - 1's and 2's complement - Addition - Subtraction - Multiplication – Division - Binary to Decimal conversion and vice versa - Octal numbers - Octal to Binary conversion and vice versa - Hexadecimal numbers - Hexadecimal to Binary conversion and vice versa - BCD - ASCII LOGIC GATES Basic gates (OR, AND and NOT gates) - Universal building blocks (NAND and NOR gates) - XOR and XNOR gates	13
Unit II	THEOREMS OF BOOLEAN ALGEBRA & KARNAUGH MAP Demorgan's theorems - Laws and theorems of Boolean algebra - Simplification of Boolean expressions using Boolean laws and theorems - Karnaugh map – Simplification of expressions using pairs, quads and octets - Sum of product method and simplifications - Don't care conditions - Product of sum method and simplifications	13
Unit III	ARITHMETIC PROCESSING CIRCUITS Half and full adders - Half and full subtractors - Parallel binary adder and subtractor data Processing circuits. DATA PROCESSING CIRCUITS Multiplexers - Demultiplexers - 1 - of - 16 decoder - BCD to decimal decoder – Seven segment decoders - Encoders	13



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Unit IV	FLIP FLOPS , SHIFT REGISTERS RS Flip Flop - D Flip Flop - Edge triggering - JK and Master slave Flip Flop - Serial in serial out - Serial in parallel out - Parallel in serial out - Parallel in parallel out shift register COUNTERS Asynchronous Mod 8 up and down counters - Decoding gates - Synchronous Mod 8 up and down counters - Mod 3, Mod 5 counters	13
Unit V	MICROPROCESSOR ARCHITECTURE AND PROGRAMMING Organization of a Microcomputer system – Architecture of the 8085 - Microprocessor instruction set and computer languages - Overview of the 8085 instruction set: Data transfer, Arithmetical, Logical, Branch, Stack, I/O & Machine control groups – Addressing modes - Programming the 8085: The programming process - The stack and subroutines - Simple programming examples	13
	Total Contact Hrs	65

- *Italic font denotes self-study*

Pedagogy and Assessment Methods:

Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Malvino A.P, Leach D.P.	Digital Principles and Applications	Tata Mc Graw Hill Publishing Company Ltd., New Delhi \ 4th Edition	2000
2	Swaminathan Madhu	Electronic Circuits and Systems	Howard W. Sams & Co., Inc-A publishing subsidiary of ITT \ 1st Edition	1985



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Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Jacob Millman, Halkias C.	Integrated Electronics	Mc Graw Hill Publishing Company \ 1st Edition	1985
2	Related online contents [MOOC, SWAYAM, NPTEL, Websites etc] https://nptel.ac.in/courses/117106114 https://nptel.ac.in/courses/108105113			

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Programme Code:	B.Sc. PHY			Programme Title:	Bachelor of Science	
Course Code:	22UPS6E17			Title	Batch:	2022 – 2025
				Core Elective	Semester:	VI
Lecture Hrs./Week	5	Tutorial Hrs./Sem.	-	II : Biomedical Instrumentation	Credits:	5

Course Objective

To familiarize with the use of medical instruments and gain the knowledge in operation of modern biomedical instruments

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Recall the structure of cell, physiology of different biological systems and their functions.	K1
CO2	Illustrate the types of electrodes and measurements of biological parameters.	K2
CO3	Explain the working of diagnostic instruments, therapeutic instruments and imaging systems.	K3
CO4	Analyse the different methods of measurements of biological parameters.	K4
CO5	Compare the different techniques of measurement in medical field.	K5


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Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2
CO1	H	H	L	M	M	L	H	H
CO2	H	M	L	H	M	H	H	H
CO3	H	M	M	L	H	H	M	M
CO4	H	M	M	M	H	M	H	M
CO5	H	M	L	H	H	H	M	H

H – High; M – Medium; L – Low

Biomedical Instrumentation

Units	Content	Hrs
Unit I	ELECTRO PHYSIOLOGY Cell-and Its Structure - Electrical, Mechanical and Chemical Activities - Action and Resting Potential- Organization of Nervous System - CNS - PNS - Neurons - Axons- Synapse - Propagation of Electrical Impulses along the Nerve-Sodium Pump - <i>Cardio Pulmonary System - Physiology of Heart, Lung, Kidney.</i>	13
Unit II	BIO POTENTIAL ELECTRODES AND TRANSDUCERS Design of Medical Instruments - Components of Biomedical Instrument-System - Electrodes: Micro Electrodes, Needle Electrodes, Surface Electrodes - Instrumentation amplifier - Biomedical Measurements Like pH, PCO ₂ , PO ₂ of Blood, Isolation Amplifier, Preamplifier, Current Amplifier, Chopper Amplifier.	13
Unit III	INSTRUMENTS USED FOR DIAGNOSIS ECG, Einthoven Triangle, Leads, Electrodes, Vector Cardiograph, Measurement of Cardiac Output, EEG, EMG, Plethysmography, Blood Flow Measurements, Holter Monitor - Respiratory Rate Measurement - Oximeter, Bone Density Measurement, Patient Monitoring System, ICCU.	13



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Unit IV	MODERN IMAGING SYSTEM Ultrasonic Diagnosis, Ultrasonic Scanning, Isotopes in Medical Diagnosis- Pace Makers, Defibrillators, Doppler Monitor(colour), Medical imaging - X-ray generation, DXA, Radiographic & Fluoroscopic Techniques - Image Intensifiers- Computer Aided Tomography, PET, SPECT - Laser Applications - Echocardiography - CT Scan Qualitative and Quantitative - <i>MRI/ NMR - Endoscopy.</i>	13
Unit V	RECENT TRENDS AND INSTRUMENTS FOR THERAPY Dialysers - Surgical Diathermy - Electro Anaesthetic and Surgical Techniques. Sources of Electric Hazards and Safety Techniques. Single Channel Telemetry, Multi channel Telemetry, Implantable Telemetry, Wireless Telemetry, Telemedicine, Telemedicine Applications.	13
	Total Contact Hrs	65

- *Italic font denotes self-study*

Pedagogy and Assessment Methods:

Chalk and Talk lectures, Group Discussion, Seminar, Interaction, power point presentation

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Khandpur	Handbook of Biomedical Instrumentation	Tata McGraw Hill	2003
2	Arumugam M.	Biomedical Instrumentation	Anuradha Publications	2009
3	Tompkins W.J. Webster J.G.	Design of Microcomputer Based Medical Instrumentation	Prentice Hall	1991


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Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Geddes L.A. Baker L.E	Principle of Applied Biomedical Instrumentation	Wiley	1989
2	Hill D.W.	Principle of Electronics for Medical Research	Butterworths	1965
3	Related online contents [MOOC, SWAYAM, NPTEL, Websites etc] https://nptel.ac.in/courses/102105090			


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Programme Code:	B.Sc. PHY			Programme Title:	Bachelor of Physics	
Course Code:	22UPS6E18			Title	Batch:	2022 – 2025
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.		Core Elective II : Nanomaterials and applications	Semester:	VI
					Credits:	5

Course Objective

To lay foundation of Nano science and Nanotechnology.

To provide the fundamental knowledge of nano materials, their synthesis and fabrication, properties and applications.

To provoke the students to pursue research in the field of nanomaterials

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the fundamental of nanomaterials and nanotechnology	K1,K2
CO2	Synthesize nanomaterials using various physical and chemical methods	K3
CO3	Tune the size and shape of the nanomaterials for diverse applications	K4
CO4	Evaluate the properties of nanomaterials and defects nature of the materials	K4
CO5	Design nano materials-based devices and analysis their performance	K4,K5


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Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2
CO1	H	H	L	M	M	L	M	L
CO2	M	H	M	M	L	H	H	M
CO3	H	H	H	H	M	H	H	H
CO4	M	M	M	H	H	M	M	H
CO5	M	M	L	M	H	L	L	M

H-High; M-Medium; L-Low

Nanomaterials and applications

Units	Content	Hrs
Unit I	Basic Concepts of Nanoscience: Nanoscience- Nanotechnology-Nanomaterials definitions - Classification of carbon nanostructures- Allotropes, dimensions (one, two, three, and zero dimension), confinement-Surface to volume ratio-Energy at bulk and nano scale- Nature Nanophenomena- types of nanotechnology – Molecular Nanotechnology – Molecular and atomic size – Surface and dimensional space.	13
Unit II	Nano Materials: Classification of Nano structured materials – Present and potential with significant technological impact – Industrial in nano materials – Fullerenes and nano tubes – Metals and inorganic – Fundamental issues in nano materials. Introduction to polymer nanocomposites: Basic materials for polymer nanocomposite	13
Unit III	Nano Properties: Forces between atoms and molecules, particles and grain boundaries – Vander Waals and electrostatic forces between surface – Nano and Mesopores – size dependent variation in magnetic, electronic transport, resistivity, optical and etc – Misnomers and misconception of Nanotechnology	13



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Unit IV	Nano Materials Synthesis: Basic approaches of synthesis nanomaterials – Bottom up and top down process – fundamental of sol – gel process – Mechanical milling – thermal evaporation– Liquid solid reactions – Gas phase synthesis of nano materials – Chemical vapour condensation (CVC) – Microwave plasma processing – Laser ablation – vapour liquid – solid growth .	13
Unit V	Application of Nanomaterials: Implications of Drug delivery – Polymeric Nanoparticles as Drug carriers and controlled release implant devices – Magnetic Data Storage – Magneto optics and magneto – optic recording – Nano Sensors – Physical sensor and chemical sensors.	13
	Total Contact Hrs	65

Pedagogy and Assessment Methods:

Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Robert W. Kelsall, Ian W. Hamley, Mark Geoghegan	Nanoscale Science and Technology	John Wiley & Sons Ltd,	2005
2	T. Pradeep,	NANO:The Essentials- Understanding Nanoscience and Nanotechnology,	McGraw Hill Education (India) Private Limited,	2018
3	M.F.Ashby, P.J. Ferreira, Daniel L.,	Nanomaterials, Nanotechnologies and Design	Elsevier Publications	2009


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Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Masuo Hosokawa, Kiyoshi Nogi, Makio Naito, Toyokazu Yokoyama,	Nanoparticle Technology Handbook,	Elsevier Publications,	2007
2	K K Chattopadhyay, Arghya Narayan Banerjee,	Introduction to Nanoscience and Nanotechnology,	PHI Learning	2009
3	Related online contents [MOOC, SWAYAM, NPTEL, Websites etc] https://youtu.be/S-SOEBTplOM https://youtu.be/Ds_rzoyyfF0 https://youtu.be/M8d3pxVb4c4 https://youtu.be/ebO38bbq0_4			



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