B.Sc., PHYSICS



Program Code: UPH

2021-2022 onwards



MANNAR THIRUMALAI NAICKER COLLEGE

(AUTONOMOUS) Re-accredited with "A" Grade by NAAC PASUMALAI, MADURAI – 625 004

Eligibility for Admission

Candidate should have passed the Higher Secondary Examination conducted by the Board of Higher Secondary Education, Government of Tamil Nadu with Physics as one of the subject in Higher Secondary Education.

Subjects of Study

Part I : Tamil / Company Secretarial Practice and Modern Office Management

Part II : English

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:

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Part III

- 1. Core Subjects
- 2. Allied Subjects
- 3. Electives

Part IV

- 1. Non Major Electives (II Year)
- 2. Skill Based Subjects
- 3. Environmental Studies Mandatory Subject
- 4. Value Education Mandatory Subject

Part V

Extension Activities

Pattern of the question paper for the Continuous Internal Assessment Note: Duration – 1 hour

(For Part I, Part II & Part III)

The components for continuous internal assessment are:	
Part –A	
Four multiple choice questions (answer all) Part –B	4 x01= 04 Marks
Three short answers questions (answer all)	3 x02= 06 Marks
Part –C Two questions ('either or 'type)	2 x 05=10 Marks
Part –D	
Two questions out of three	1 x 10 =10 Marks
Total	30 Marks

The scheme of Examination for Part-I, II & III

 The components for continuous internal assessment are:

 (60 Marks of two continuous internal assessments will be converted to 15 marks)

 Two tests and their average
 --15 marks

 Seminar /Group discussion
 --5 marks

 Assignment
 --5 marks

 Total
 25 Marks

Pattern of the question paper for the Summative Examinations: **Note: Duration- 3 hours** Part –A 10 x01 = 10 Marks Ten multiple choice questions No Unit shall be omitted: not more than two questions from each unit.) Part –B Short answer questions (one question from each unit) = 10 Marks 5 x02 Part –C Five Paragraph questions ('either or 'type) 5 x 05 = 25 Marks (One question from each Unit) Part –D Three Essay questions out of five 3 x 10 =30 Marks (One question from each Unit) _____ Total 75 Marks _____

Part-IV- Skill Based Papers / NME:

The Scheme of Examination for Skill Based Papers: (Except Practical Lab Subjects) Pattern of the questions paper for the continuous Internal Assessment

45 MCQs will be asked for each internal assessment tests (45 x 1=45 Marks) **and converted for 15 marks**

The components for continuous internal assessment are:

Two tests and their average	15 marks
Seminar /Group discussion	5 marks
Assignment	5 marks
Total	 25 Marks
Totul	

Summative Examination Pattern

Pattern of the Question Paper for Skill Based Papers (External)

75 Multiple choice questions will be asked from five units (75 x 1=75 Marks)

(15MCQ's from each unit)

Part-IV- Environmental Studies and Value Education

The Scheme of Examination (Environmental Studies and Value Education)

Two tests and their average	15 marks
Project Report	10 marks*
Total	25 marks

* The students as Individual or Group must visit a local area to document environmental assets – river / forest / grassland / hill / mountain – visit a local polluted site – urban / rural / industrial / agricultural – study of common plants, insects, birds – study of simple ecosystem – pond, river, hill slopes, etc.

Question Paper Pattern

(Internal Assessment)

Pattern of the Question Paper for Environmental Studies & Value Education only) (Internal)

45 MCQs will be asked for each internal assessment tests (45 x 1=45 Marks) **and converted for 15 marks**

	Total	25 Marks
Project		 10 marks
Two tests and their average		 15 marks

Summative Examination Pattern

Pattern of the Question Paper for Environmental Studies & Value Education only) (External)

75 Multiple choice questions will be asked from five units (75 x 1=75 Marks)

(15MCQ's from each unit)

Part V Extension Activities: (Maximum Marks: 100)

- 1. NCC
- 2. NSS
- 3. Physical Education
- 4. YRC
- 5. RRC
- 6. Health & Fitness Club
- 7. Eco Club
- 8. Human Rights Club

Pattern of the Question Paper for (Internal Examination & Summative Examination)

Internal Examinations- - 40 MarksSummative Examinations- - 60 Marks

100

Minimum Marks for a Pass

40% of the aggregate (Internal +Summative Examinations).No separate pass minimum for the Internal Examinations.27 marks out of 75 is the pass minimum for the Summative Examinations.

VISION

To enable the students of physics evolve as innovators, leaders and responsible citizens through imparting strong foundation in basics

MISSION

To offer a comprehensive undergraduate physics degree program

The 12 Graduate Attributes*:

- 1. (KB) A knowledge base for engineering: Demonstrated competence in university level mathematics, natural sciences, engineering fundamentals, and specialized engineering knowledge appropriate to the program.
- 2. (PA) Problem analysis: An ability to use appropriate knowledge and skills to identify, formulate, analyze, and solve complex engineering problems in order to reach substantiated conclusions
- 3. (Inv.) Investigation: An ability to conduct investigations of complex problems by methods that include appropriate experiments, analysis and interpretation of data and synthesis of information in order to reach valid conclusions.
- 4. (Des.) Design: An ability to design solutions for complex, open-ended engineering problems and to design systems, components or processes that meet specified needs with appropriate attention to health and safety risks, applicable standards, and economic, environmental, cultural and societal considerations.
- 5. (Tools) Use of engineering tools: An ability to create, select, apply, adapt, and extend appropriate techniques, resources, and modern engineering tools to a range of engineering activities, from simple to complex, with an understanding of the associated limitations.
- 6. (Team) Individual and teamwork: An ability to work effectively as a member and leader in teams, preferably in a multi-disciplinary setting.
- 7. (Comm.) Communication skills: An ability to communicate complex engineering concepts within the profession and with society at large. Such ability includes reading, writing, speaking and listening, and the ability to comprehend and write effective reports and design documentation, and to give and effectively respond to clear instructions.
- 8. (Prof.) Professionalism: An understanding of the roles and responsibilities of the professional engineer in society, especially the primary role of protection of the public and the public interest.
- 9. (Impacts) Impact of engineering on society and the environment: An ability to analyze social and environmental aspects of engineering activities. Such ability includes an understanding of the interactions that engineering has with the economic, social, health, safety, legal, and cultural aspects of society, the uncertainties in the prediction of such interactions; and the concepts of sustainable design and development and environmental stewardship.

- 10. (Ethics) Ethics and equity: An ability to apply professional ethics, accountability, and equity.
- 11. (Econ.) Economics and project management: An ability to appropriately incorporate economics and business practices including project, risk, and change management into the practice of engineering and to understand their limitations.
- 12. (LL) Life-long learning: An ability to identify and to address their own educational needs in a changing world in ways sufficient to maintain their competence and to allow them to contribute to the advancement of knowledge

WA	Graduate Attributes	Caption as
WA1	Demonstrated competence in university level mathematics, natural sciences, engineering fundamentals, and specialized engineering knowledge appropriate to the program.	Knowledge Base
WA2	An ability to use appropriate knowledge and skills to identify, formulate, analyze, and solve complex engineering problems in order to reach substantiated conclusions	Problem Analysis &
WA4	An ability to conduct investigations of complex problems by methods that include appropriate experiments, analysis and interpretation of data and synthesis of information in order to reach valid conclusions.	Investigation
WA10	Communication skills: An ability to communicate complex engineering concepts within the profession and with society at large. Such ability includes reading, writing, speaking and listening, and the ability to comprehend and write effective reports and design documentation, and to give and effectively respond to clear instructions.	Communicati on Skills &
WA3	An ability to design solutions for complex, open-ended engineering problems and to design systems, components or processes that meet specified needs with appropriate attention to health and safety risks, applicable standards, and economic, environmental, cultural and societal considerations.	Design
WA9	An ability to work effectively as a member and leader in teams, preferably in a multi-disciplinary setting.	Individual and Team Work
WA6	An understanding of the roles and responsibilities of the professional engineer in society, especially the primary role of protection of the public and the public interest.	Professionalis m, Ethics and equity
WA12	An ability to identify and to address their own educational needs in a changing world in ways sufficient to maintain their competence and to allow them to contribute to the advancement of knowledge	Lifelong learning
WA5	An ability to create, select, apply, adapt, and extend appropriate techniques, resources, and modern engineering tools to a range of engineering activities, from simple to complex, with an understanding of the associated limitations.	Use of engineering tools
WA7	An ability to analyze social and environmental aspects of engineering activities. Such ability includes an understanding of the interactions that engineering has with the economic, social, health, safety, legal, and cultural aspects of society, the uncertainties in the prediction of such	Impact of engineering on society and

	interactions; and the concepts of sustainable design and development and	the
	environmental stewardship.	environment
	An ability to appropriately incorporate economics and business practices	Economics
WA11	including project, risk, and change management into the practice of	and project
	engineering and to understand their limitations	management

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO1:	The accumulation of facts of nature and the ability to develop an understanding and
	knowledge of basic Physics.
PEO2 :	The ability to use this knowledge to analyze new situations and learn skills and
	interpret the results and make predictions for the future developments
PEO3:	Apply knowledge of Physics in theoretical and laboratory skills to unfamiliar
	contexts to identify and analyze problems in Physics
PEO4 :	Demonstrate Physics-related technological skills that are relevant to employment
	opportunities.
PEO5:	Adapt to the constantly evolving scientific thinking and be life- long learners.
PEO6 :	Understand the concepts of physics and apply that knowledge to manage projects in
	multidisciplinary fields

PO NO	PROGRAMME OUTCOMES (POs)	
At the end	l of the programme, the students will be able to	
PO – 1	Demonstrate the knowledge and understanding of Science concepts and its relevant fields.	Disciplinary Knowledge
PO – 2	Identify, formulate, analyse complex problems and reach valid conclusions using the methodologies of Science.	Problem Solving
PO – 3	Employ critical and analytical thinking in understanding the concepts and apply them in various problems appearing in different branches of Science.	Analytical Reasoning & Critical Thinking
PO - 4	Communicate the known concepts effectively within the profession and with any forum	Communication Skills
PO - 5	Function successfully as a member/leader in any team and to apply ethics, accountability and equity in their life.	Team Work and Moral/Ethical Awareness
PO - 6	Use ICT tools in various learning situations, related information sources, suitable software to analyze data and furthermore participating in learning activities throughout life to meet the demands of work place through knowledge /up-skilling / re-skilling	Digital Literacy & Life-long Learning

DDOG	
PROG	RAM SPECIFIC OUTCOME (PSOs)
PSO1:	Demonstrate a fundamental/systematic or coherent understanding of the academic field of Physics, its different learning areas and applications in basic Physics like Mechanics & Properties of Matter, Heat & Thermodynamics, Electricity & Magnetism, Optics & Spectroscopy, Nuclear & Particle Physics, Condensed matter Physics, Atomic & Molecular Physics, Mathematical Physics, Classical & Statistical Mechanics, Quantum Mechanics & relativity, Electronics and its linkages with related disciplinary areas / subjects like Chemistry, Mathematics, Life sciences, Environmental sciences, Atmospheric Physics, Computer science, Information Technology.
PSO2:	Tackle problems and offer out of the box solutions based on analysis and critical thinking deeply rooted in concepts of Physics.
PSO3:	Problem–solving skills that are required to solve different types of Physics–related problems with well–defined solutions, and tackle open–ended problems that belong to the disciplinary–area boundaries.
PSO4:	Demonstrate the ability to use skills in Physics and its related areas of technology for formulating and tackling Physics–related problems and identifying and applying appropriate physical principles and methodologies to solve a wide range of problems associated with Physics.
PSO5:	Recognize the importance of mathematical modeling simulation and computing, and the role of approximation and mathematical approaches to describing the physical world.
PSO6:	Plan and execute Physics-related experiments or investigations, analyze and interpret data/information collected using appropriate methods, including the use of appropriate software such as programming languages and purpose-written packages, and report accurately the findings of the experiment/investigations while relating the conclusions/findings to relevant theories of Physics.

Bloom's Taxonomy



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS), MADURAI PHYSICS CURRICULUM

(For the student admitted during the academic year 2021-2022 onwards)

Course	Title of the Course	Hours	Cred	Max	imum N	Aarks	
Code	The of the Course	110015	its	Int	Ext	Total	
FIRST SEMESTER							
Part – I	Tamil / Alternate Course						
21UTAG11	இக்காலக் கவிதையும் நாடகமும்	6	3	25	75	100	
Part – II	English						
21UENG11	Communicative English - I	6	3	25	75	100	
Part - III	Core Courses						
21UPHC11	Mechanics, Properties of Matter and Sound	4	4	25	75	100	
21UPHCP1	Major Physics Practical – I	2	-	-	-	-	
Part III	Allied Course						
21UMTA11	Allied Mathematics – I	6	4	25	75	100	
Part IV	Skill Based Courses						
21UPHS11	Laser and Its Applications	2	2	25	75	100	
21UPHS12	Basics of Micro Soft office	2	2	25	75	100	
Part IV	Mandatory Course						
21UEVG11	Environmental Studies	2	2	25	75	100	
	Total	30	20	175	525	700	
	SECOND SEME	STER					
Part – I	Tamil / Alternate Course						
21UTAG21	இடைக்கால இலக்கியமும் சிறுகதையும்	6	3	25	75	100	
Part – II	English						
21UENG21	Communicative English -II	6	3	25	75	100	
Part - III	Core Courses						
21UPHC21	Heat and Thermodynamics	4	4	25	75	100	
21UPHCP1	Major Physics Practical – I	2	2	40	60	100	
Part III	Allied Course						
21UMTA21	Allied Mathematics – II	6	4	25	75	100	
Part IV	Skill Based Courses						
21UPHS21	Bio physics	2	2	25	75	100	
21UPHS22	Basics of C Programming	2	2	25	75	100	
Part IV	Mandatory Course						
21UVLG21	Value Education	2	2	25	75	100	
	Total	30	22	215	585	800	

THIRD SEMESTER						
Part – I	Tamil / Alternate Course					
21UTAG31	காப்பிய இலக்கியமும் உரைநடையும்	6	3	25	75	100
Part – II	English					
21UENG31	Communicative English-III	6	3	25	75	100
Part - III	Core Courses					
21UPHC31	Electricity	4	4	25	75	100
21UPHC32	Magnetism	4	4	25	75	100
21UPHCP2	Major Physics Practical – II	2	-	-	-	-
Part III	Allied Courses					
21UCHA31	Allied Chemistry – I	4	4	25	75	100
21UCHAP1	Allied Chemistry Practical – I	2	-	-	-	-
Part IV	NME					
21UPHN31	Physics Appliances in Everyday life	2	2	25	75	100
	Total	30	20	150	450	600
	FOURTH SEME	STER				000
Part – I	Tamil / Alternate Course					
21UTAG41	பண்டைய இலக்கியமும் புதினமும்	6	3	25	75	100
Part – II	English					
21UENG41	Communicative English -IV	6	3	25	75	100
Part - III	Core Courses					
21UPHC41	Optics and Photometry	4	4	25	75	100
21UPHC42	Medical Instrumentation	4	4	25	75	100
21UPHCP2	Major Physics Practical – II	2	2	40	60	100
Part III	Allied Courses					
21UCHA41	Allied Chemistry – II	4	3	25	75	100
21UCHAP1	Allied Chemistry Practical –I	2	1	40	60	100
Part IV	NME					
21UPHN41	Non Conventional Energy Resources	2	2	25	75	100
Part V	Extension Activities					
21UEAG40 - 21UEAG44	NSS, NCC, YRC, RRC	-	1	40	60	100
	Total	30	23	270	630	900

FIFTH SEMESTER						
Part - III	Core Courses					
21UPHC51	Atomic Physics and Quantum Mechanics	6	6	25	75	100
21UPHC52	Analog Electronics	6	6	25	75	100
21UPHCP3	Non - Electronics Practical	3	-	-	-	-
21UPHCP4	Electronics Practical	3	-	-	-	-
Part III	Core Elective Courses					
21UPHE51	Concepts of Nuclear Physics					
21UPHE52	Condensed Matter Physics	5	5	25	75	100
21UPHE53	Basics of Astrophysics					
Part III	Core Elective Courses					
21UPHE54	Fundamentals of Molecular Spectroscopy					
21UPHE55	Sensors and Organic Electronics	5	5	25	75	100
21UPHE56	Particle Physics					
Part IV	Skill Based Course					
21UPHS51	Gemology	2	2	25	75	100
	Total	30	24	125	375	500
	SIXTH SEMESTER	2		1		
Part - III	Core Courses					
21UPHC61	Principles of Classical and Statistical Mechanics	6	6	25	75	100
21UPHCP3	Non - Electronics Practical	3	4	40	60	100
21UPHCP4	Electronics Practical	3	5	40	60	100
21UPHPR1	Project and Viva - Voce	6	4	40	60	100
Part III	Core Elective Courses					
21UPHE61	Digital Principles and Applications					
21UPHE62	Basics in Microprocessors	5	5	25	75	100
21UPHE63	Mathematical Physics					
Part III	Core Elective Courses					
21UPHE64	Nanotechnology					
21UPHE65	Non-renewable Energy Physics	5	5	25	75	100
21UPHE66	Communication Electronics					
Part IV	Skill Based Course					1.0.0
21UPHS61	Optoelectronics	2	2	25	75	100
	Total	30	31	220	480	700
	Grand Total	180	140	1155	3045	4200



Academic Council Meeting Held On 29.04.2021



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF PHYSICS (For those who joined in 2021-2022 and after)

Course Name	MECHANICS, PRO	PE	RTIES O	F MATTER	ANI	D SOUND				
Course Code	21UPHC11						L	Р	С	
Category	CORE						4	-	4	
Nature of course:	EMPLOYABILITY	✓	SKILL O	RIENTED	✓	ENTREPREN	EUR	SHIP	,	
Course Objectives:										
 The learners will be able: 1. To review the fundamental concepts in Centre of Mass, Linear Momentum, Collision 2. To recall the Properties of Rotational Mechanics 3. To analyze the basic concepts of Properties of Matter like elasticity, surface tension and 										
 4. To understa gravity, Kep 5. To understa 	and the concepts of M plar's laws, escape veloc nd the Nature and Prop	leas city	surement of black holes ation of Science Scien	of Gravitatio e ound Waves a	nal (Constant, accele	eratio	n due	e to	
Unit: I Cen	ttre of Mass, Linear M	om	entum, Co	ollision				12	1	
Many body pro Bodies - Motio Momentum and One Dimension Elastic Collision Unit: II <i>Rot</i> Rotation of a R of a Force abou Horizontal Turr Impulse - Kinet Work Done by a of Inertia - Con Rotation and Tr Rolling of spher	blem - Single body p n of the Centre of M its Conservation Prin - Perfectly Inelastic <u>in Two Dimensions -</u> ational Mechanics igid Body about a Give t the Axis of Rotation - Angular Momentur ic Energy of a Rigid a Torque - Calculation bined Rotation and Tr anslation - Angular More without slipping.	rob lass cip Co Imj en l - l n - Boo of l ans	blem - Cer - Ballisti le - Rocke llision in b pulse and l Fixed Line Γ=Ια - Boc L=Ιω - C dy Rotatin Moment of lation - Ro entum of a	tre of Mass c pendulum et Propulsion One Dimens impulsive For e - Kinematic dies in Equili onservation g About a G Inertia - Tw olling - Kinet Body in Co	- Co - Co ion - Co rce. rce. briur of A iven o Imp ic Er mbin	entre of Mass of ompound pende ollision - Elasti Coefficient of Rotational Dyna n - Bending of ngular Moment Axis - Power portant Theorer nergy of a Body ed Rotation and	of Co ulum ic Co f Res mics a Cyo cum - Deliv ns on y in C d Tran	ntinu - Lin llision titutio - Ton clist o Ang ered Mon ombi nslatio	ious near a in on - rque on a ular and nent ined on -	
Unit: III Pro	perties of Matter							12	i	
Elasticity – Str Longitudinal St Young's Modu Determination of - Surface Tensio Bubble - Contac Tube: Poiseuille by Stokes' Meth Unit: IV Gra	ess – Strain - Hooke ress and Strain - Elast lus of the beam sub of Young's Modulus of on - Surface Energy - ct Angle - Rise of Liqu c's Equation - Stokes' L od - Critical Velocity a witation	is l ject the Exe id aw	Law and Potential I red to un beam sub cess Press in a Capill - Termina Reynolds	the Modulii Energy of a s iform bendin jected to non ure Inside a lary Tube - V l Velocity - M Number - Eff	of E Strain ng u -unif Drop /isco /leasu fect o	Elasticity - Relation and Body - De- sing pin and form bending us o - Excess Press sity - Flow through uring Coefficient of temperature of	ation termin micro sing o sure i ough a ough a on viso	betw betw	veen a of be - ever boap row bsity 7.	
Comparison of Energy - Gravi Relation betwee in the Value o	four forces - Measure tational Potential - Ca en Gravitational Field a f g with altitude, latit	me alcu and	nt of Grav lation of Potential e and dep	vitational Co Gravitational - Calculation th - Planets	nstan Pote of C and	t G - Gravitati ential - Gravita Gravitational Fie Satellites - Ke	ional ationa eld - ' epler's	Poter 1 Fie Varia Lav	ntial ld - tion vs -	

Weigh	tlessness in a Satellite - Escape Velocity - Gravitational Binding Energy - Black H	Ioles.					
Unit:	V Sound and Acoustics	12					
Propag	ation of Sound Waves - Displacement Wave and Pressure Wave - Speed of a Sou	nd Wave in					
a Mate	rial Medium - Speed of Sound in a Gas: Newton's Formula and Laplace's Correct	tion - Effect					
of Pres	sure, Temperature and Humidity on the Speed of Sound in Air - Intensity of Sou	nd Waves -					
Percep	tion of Sound to Human Ear - Beats - Interference of Sound Waves - Standing L	ongitudinal					
Waves	in Air Columns - Determination of Speed of Sound in Air - Diffraction - Dopp	oler Effect -					
Sonic	Sonic Booms - Musical Scale - Acoustics of Buildings.						
	Total Lecture Hours	60 Hrs					
Books	for Study:						
1.	H.C.Verma, "Concepts of Physics - Volume 1", BharatiBhawan (Publishers &						
	Distributors), New Delhi, 2020						
	* Unit – I: Chapter 9						
	* Section – 9.1 to 9.11. Worked Out Examples						
	* Unit – II: Chapter 10						
	* Section – 10 1 to 10 14 10 14 (A B C D G H) 10 15 to 10 20 Worked Ou	t Examples					
	* Unit – III: Chapter 14	a Examples					
	 Soction 14.1 to 14.20 Worked Out Examples 						
	* Section – 14.1 to 14.20, Worked Out Examples						
	* Unit – IV: Chapter II 11.1 + 11.17 W $1 + 10.4 F$						
	* Section – 11.1 to 11.17, Worked Out Examples						
	* Unit – V: Chapter 16						
* Section – 16.1 to 16.16, Worked Out Examples							
Books	for References:						
1.	R. Murugeshan, Mechanics, Properties of Matter and Sound, 1 st edition,						
	July 2016, Madurai						
2.	D. Halliday Resnick, Jearl Walker, Principles of physics , 9 th Edition,						
	Wiley India Pvt Ltd.,						
3.	D.S. Mathur, Elements of Properties of matter, S. Chand & Co., 2004						
4.	4. Brijlal & N. Subrahmanyam, A Text Book of Sound, 2 nd Edition, Vikas Publi	shing					
	House Pvt. Ltd., 2019.						
Web h	Resources:						
1.	https://youtu.be/fDJeVR0ow						
2.	https://youtu.be/o7_zmuBweHI						
3.	https://youtu.be/QPoWoCh0vQw						
4.	https://en.wikipedia.org/wiki/Temperature_dependence_of_viscosity						
5.	https://www.nasa.gov/audience/forstudents/k-4/stories/nasa-knows/what-is-a-bla	ck-hole-					
_	k4.html						
6.	https://wonderopolis.org/wonder/what-is-a-sonic-boom						
7.	https://youtu.be/PG_u4NDJtwU						
Cours	e Outcomes	K Level					
Alter	Explain the conservation laws properties of rotational machanics, properties						
CO1:	explain the conservation laws, properties of rotational mechanics, properties	K2					
CO2:	Apply conservation principles to Rocket Propulsion and collision	КЗ					
COL	Summarize theorems on Moment of Inertia properties of matter gravitational	110					
003:	potential and field, acoustics of buildings	K3					
004	Analyze the variation of σ effect of Pressure Temperature and Humidity on						
CO4:	the Speed of Sound	K4					
	ne speed of sound						

CO5: Illustrate Coefficient of Restitution, Kinetic Energy of a Body in Combined Rotation and Translation, properties of matter, Black Holes

K4

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	3	2	2	2
CO 2	3	3	2	2	2	2
CO 3	3	3	2	2	2	2
CO 4	3	3	2	2	2	1
CO5	3	2	1	1	2	2

CO & PO Mapping:

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

Unit	MECHANICS, PROPERTIES OF MATTER AND SOUND	Hrs	Pedagogy
I	Centre of Mass, Linear Momentum, Collision Many body problem - Single body problem - Centre of Mass - Centre of Mass of Continuous Bodies - Motion of the Centre of Mass - Ballistic pendulum - Compound pendulum - Linear Momentum and its Conservation Principle - Rocket Propulsion - Collision - Elastic Collision in One Dimension - Perfectly Inelastic Collision in One Dimension - Coefficient of Restitution - Elastic Collision in Two Dimensions - Impulse and Impulsive Force.	12	Chalk & Talk, Videos, PPT and Demonstration
П	Rotational Mechanics Rotation of a Rigid Body about a Given Fixed Line - Kinematics - Rotational Dynamics - Torque of a Force about the Axis of Rotation - Γ =I α - Bodies in Equilibrium - Bending of a Cyclist on a Horizontal Turn - Angular Momentum - L=I ω - Conservation of Angular Momentum - Angular Impulse - Kinetic Energy of a Rigid Body Rotating About a Given Axis - Power Delivered and Work Done by a Torque - Calculation of Moment of Inertia - Two Important Theorems on Moment of Inertia - Combined Rotation and Translation - Rolling - Kinetic Energy of a Body in Combined Rotation and Translation - Angular Momentum of a Body in Combined Rotation and Translation - Rolling of sphere without slipping.	12	Chalk & Talk, Videos, PPT and Demonstration
III	Properties of Matter Elasticity – Stress – Strain - Hooke's Law and the Modulii of Elasticity - Relation between Longitudinal Stress and Strain - Elastic Potential Energy of a Strained Body - Determination of Young's Modulus of the beam subjected to uniform bending using pin and microscope - Determination of Young's Modulus of the beam subjected to non-uniform bending using opticlever - Surface Tension - Surface Energy - Excess Pressure Inside a Drop - Excess	12	Chalk & Talk, Videos, PPT and Demonstration

	Pressure in a Soap Bubble - Contact Angle - Rise of Liquid in a Capillary Tube - Viscosity - Flow through a Narrow Tube: Poiseuille's Equation - Stokes' Law - Terminal Velocity - Measuring Coefficient of Viscosity by Stokes' Method - Critical Velocity and Reynolds Number - Effect of temperature on viscosity.		
IV	Gravitation Compare the four forces - Measurement of Gravitational Constant G - Gravitational Potential Energy - Gravitational Potential - Calculation of Gravitational Potential - Gravitational Field - Relation between Gravitational Field and Potential - Calculation of Gravitational Field - Variation in the Value of g with altitude, latitude and depth - Planets and Satellites - Kepler's Laws - Weightlessness in a Satellite - Escape Velocity - Gravitational Binding Energy - Black Holes.	12	Chalk & Talk, Videos, PPT and Demonstration
V	Sound and Acoustics Propagation of Sound Waves - Displacement Wave and Pressure Wave - Speed of a Sound Wave in a Material Medium - Speed of Sound in a Gas: Newton's Formula and Laplace's Correction - Effect of Pressure, Temperature and Humidity on the Speed of Sound in Air - Intensity of Sound Waves - Perception of Sound to Human Ear - Beats - Interference of Sound Waves - Standing Longitudinal Waves in Air Columns - Determination of Speed of Sound in Air – Diffraction - Doppler Effect - Sonic Booms - Musical Scale - Acoustics of Building.	12	Chalk & Talk, Videos, PPT and Demonstration

Course Designed by: 1. Dr.P.Kavitha, 2. Dr.S.S.Jayabalakrishnan

	Learning Outcome Based Education & Assessment (LOBE)										
	Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)										
			Section	n A	Section	n B		Section D			
Internal	Cos	K Level	MCQ)s	Short Ans	swers	Section C Either or				
	Cub		No. of. Questions	K - Level	No. of. Questions	K – Level	Choice	Open Choice			
CI	CO1	Up to K4	2	K1,K2	1	K1	2(K2&K2)	1 K2			
AI	CO2	Up to K4	2	K1,K2	2	K2	2(K3&K3)	1 K3			
CI	CO3	Up to K4	2	K1,K2	1	K1	2(K3&K3)	1K3			
AII	CO4	Up to K4	2	K1,K2	2	K2	2(K4&K4)	1 K4			
	Que	No. of estions to e asked	4		3		4	2			
Question Pattern CIA I & II	Que be a	No. of estions to answered	4		3		2	1			
	Marl q	ks for each uestion	1		2		5	10			
	Tot fo	tal Marks or each section	4		6		10	10			

***Note:** It is the decision of the course teacher to ask 2 Questions in any unit under section-B (short answer questions)

		Dist	ribution of M	arks with I	K Level Cl	A I & CIA	II		
	K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either / Or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consoli date of %	
	K1	2	2			4	8	60	
	K2	2	4	10	10	26	52	00	
	K3			10	10	20	40	40	
CIA I	K4								
	K5								
	Marks	4	6	20	20	50	100	100	
	K1	2	2			4	8	20	
	K2	2	4			6	12	20	
СТА	K3			10	10	20	40	40	
	K4			10	10	20	40	40	
	K5								
	Marks	4	6	20	20	50	100	100	

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

<u>UNIT-V</u> will be allotted for individual Assignment in <u>CO5 - K4</u> level which carries five marks as part of CIA component.

S	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)										
S No	COs	К-	Init	MO)Qs	Short Answers		Section (Either Cho	on C* er / or bice)	Section D* (Open Choice)	
5.INO. C	COS	Level	Umt	No.of Ques tions	K – Level	No.of Ques tions	K – Level	No.of Ques tions	K – Level	No.of Ques tions	K – Level
1	CO1 - CO5	K1 to K4	Ι	2	K1 & K2	1	K 1	2	K2 & K2	1	K2
2	CO1 - CO5	K1 to K4	п	2	K1 & K2	1	K1	2	K3 & K3	1	К3
3	CO1 - CO5	K1 to K4	ш	2	K1 & K2	1	K2	2	K3 & K3	1	К3
4	CO1 - CO5	K1 to K4	IV	2	K1 &K2	1	K2	2	K4 & K4	1	K4
5	CO1 - CO5	K1 to K4	v	2	K1 & K2	1	K2	2	K4 & K4	1	K4
No. of	Questio	ns to be	Asked	10		5		1	0		5
No. of Questions to be answered		10		5			5		3		
Marks for each question		1		2			5 10		10		
Total Marks for each section				10		10		2	.5		30
		* I	n Sectio	on C & l	D - One	question	should	be a pro	oblem	\	
		Section	\mathbf{C} shou	ild conta	in minin	num of fo	our CO le	evels (C	02 - CO) 5)	
		Section	D shou	ld contai	n minim	um of th	ree CO l	evels (C	CO3 - CC	J5)	

	Distribution of Marks with K Level										
K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %				
K1	5	4			9	12	17				
K2	5	6	10	10	31	34.66	47				
K3			20	20	40	27	27				
K4			20	20	40	26.66	26				
Marks	10	10	50	50	120	100	100				
NB: Hig	NB: Higher level of performance of the students is to be assessed by attempting higher level										
of K lev	els.										

Section	Section A (Multiple Choice Questions)							
Answei	r All Q	uestions	(10x1=10 marks)					
Q.No	CO	K Level	Questions					
1	CO1	K1						
2	CO1	K2						
3	CO2	K1						
4	CO2	K2						
5	CO3	K1						
6	CO3	K2						
7	CO4	K1						
8	CO4	K2						
9	CO5	K1						
10	CO5	K2						
Section	B (She	ort Answei	rs)					
Answei	r All Q	uestions	(5x2=10 marks)					
Q.No	CO	K Level	Questions					
11	CO1	K1						
12	CO2	K1						
13	CO3	K2						
14	CO4	K2						
15	CO5	K2						
Section	C (Eit	her/Or Ty	pe)					
Answei	r All Q	uestions	(5 x 5 = 25 marks)					
Q.No	CO	K Level	Questions					
16) a								
16) b								
17) a								
17) b								
18) a								
18) b								
19) a								
19) b								
20) a								
20) b								
NB: Hi	gher le	vel of perf	ormance of the students is to be assessed by attempting higher					
level of	K leve	ls						
Section	D (Op	en Choice						
Answe	r Any	Inree ques	Guons (3x10=30 marks)					
Q.N0	CO	K Level	Questions					
21								
22								
23								
24								
23								

Summative Examinations - Question Paper – Format



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF PHYSICS (For those who joined in 2021-2022 and after)

Course Name	MAJOR PHYSICS F	PRACTICAL - I									
Course Code	21UPHCP1				L	P	С				
Category	Core				-	2	-				
Nature of cours	EMPLOYABILITY	✓ SKILL ORIENTED	✓	ENTREPREN	IEUR	SHIP)				
Course Objecti	ves:										
COURSE OBJ	ECTIVES:										
The learners will be able:											
1. To create the practical knowledge in basic physics experiments.											
3. To understand	current conduction in	electrical circuits.	UI SIC	ni pendulum.							
4. To motivate t	ne students to apply the	experimental techniques in	n Op	otics and Sound	•						
5. To create skil	in doing the experime	nt individually									
LIS	T OF EXPERIMENT	XPERIMENTS (Any Fourteen Experiments)									
1. Your	g's Modulus	- Uniform bending (Pin & Microscope)									
2. Your	g's Modulus	- Non –Unifor	- Non –Uniform bending – Optic lever								
3. Rigio	ity Modulus	- Torsion Pend	lulu	m with loads							
4. Surfa	ce tension	- By capillary	rise	method							
5. Visc	sity of Liquid	- By Capillary	rise	method							
6. Mon	ent of Inertia	- Torsion Pend	lulu	m							
7. Acce	leration due to gravity	- Compound P	endu	ulum							
8. Laws	of transverse vibration	- Sonometer									
9. Freq	ency of tuning fork	- Sonometer									
10. A.C	Frequency	- Melde's appa	ratu	S							
11. Velo	city of Sound waves	- Ultrasonic In	terfe	erometer							
12. Ther	nal conductivity of Bac	d conductor - Lee's disc									
13. Emis	sivity of the Surface	- Joule's Calor	imet	er							
14. Spec	fic Heat Capacity	- Newton's Law	v of	Cooling							
15. Thic	tness of a wire	- Air wedge									
16. Spec	rometer	- Refractive inc	lex c	of a prism							
		,	Tota	al Practical Ho	urs	30 H	[rs				
Books for Stud	/:										

1. Srinivasan.M.N., Balasubramanian.S., Ranganathan.R., A Text Book of Practical Physics,

	2017 Edition, Sultan Chand & Sons						
Books	Books for References:						
1.	1. Ouseph.C., Practical Physics and Electronics, 2013, S.Viswanathan.P.Ltd.						
Web R	Web Resources:						
1.	https://nptel.ac.in/course.html/physics/experimental physics I, II and III						
2.	https://nptel.ac.in/courses/115/105/115105110/						
3.	https://www.youtube.com/playlist?list=PLuiPz6iU5SQ8-rZn_LgLofRX7n8z	<u>4tHYK</u>					
Course Outcomes K Level							
On successful completion of the course, the learners should be able to							
COl·	Analyze the concepts of Viscosity, Surface Tension and Young's Modulus of	K/					
001	different substances	N4					
CO2:	Explore the knowledge of Spectrometer and other Optical instruments	К3					
CO3:	Realize the principles and applications of Potentiometer, Sonometer,	K4					
CO4·	Explore the knowledge of Melde's apparatus to find Frequency of tunning	K2					
04.	fork	K3					
CO5:	Understand the Thermal conductivity of Bad conductor	K4					

CO & PO Mapping:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	3	2	3	1
CO 2	3	1	3	3	1	3
CO 3	2	2	2	3	2	1
CO 4	3	3	2	3	1	2
CO5	3	3	2	2	3	3

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

Semester	Major Physics Practical - I	Hrs	Pedagogy
	1. Young's Modulus - Uniform bending (Pin &		
I	Microscope)		
	2. Rigidity Modulus - Torsion Pendulum with loads		
	3. Surface tension - By capillary rise method		
	4. Acceleration due to gravity - Compound Pendulum	30	Demonstration
	5. Laws of transverse vibration - Sonometer		
	6. Thermal conductivity of Bad conductor - Lee's disc		
	7. Specific Heat Capacity - Newton's Law of Cooling		
	8. Thickness of a wire - Air wedge		

LESSON PLAN

Course Designed by: 1. Dr.S.S.Jayabalakrishnan, 2. Dr.P.Kavitha



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF PHYSICS (For those who joined in 2021-2022 and after)

Course Name	Allied Mathematics –	Allied Mathematics – I							
Course Code	21UMTA11				L	Р	С		
Category	Allied				6	-	4		
Nature of course:	EMPLOYABILITY	✓	SKILL ORIENTED	ENTREPRENI	EURS	HIP			
Course objectiv	ves:								
• To familiarize with the theory of equations.									
• To introduce transformation of equations.									
• To apply No	ewton's method and Hor	ner's	Method.						
To provides	the capability of solving	the	physical problems on s	kill development	t.				
To develop	the knowledge of algebra	aic c	oncepts on mathematic	8					
Unit: I						1	8		
Theory of Equa	tion – An n th degree equa	ntion	has exactly n roots $-R$	elation between	the ro	oots a	nd		
the coefficients.									
Unit: II						1	8		
Reciprocal Equ	ations- Transformation of	of Eq	luations						
Unit: III						1	8		
Finding the roo	ts up to two decimals by	Nev	vton's method and Ho	rner's Method					
Unit: IV						1	8		
Radius of curva	Radius of curvature, Center of curvature of plane curves.								
Unit: V						1	8		
Integral calculu	s – Evaluation of Definit	te In	tegrals.						
				Total Lecture	Hou	rs 9	0		
Books for Stud	y:		• • • • • •						
S.Arumugam, A	Ancillary Mathematics	Volu	ime I, New Gamma Pu	blication, 1999,	Repri	nt,			
Palayamkottai,	2006.	T 1							
Unit I -	Chapter 1: Page N		to 26						
	- Chapter 1 : Page 1	NO 2	/ to 40						
	- Chapter 1: Page N	10 40 Io 65) to 48						
Unit V	- Chapter 3. Page N Chapter 3: Page N	1000	to 112						
Books for Dofo	rongos:	10 91	1 10 115						
1 T K M_2	nickavashagamPillai and	ISN	Jaravanan Algehra Vo	lume I and					
	wanthanPrinters and Pub	lishe	ers Pyt Ltd Chennai 20	10111C 1 and 109					
2 Hari kis	han Theory of equations	Atl	antic publishers and Di	stributers Pyt Lt	d De	cemb	er		
2013	and, Theory of equations	, 1 101	unite publishers and Di	Stributers I vt Lt	u, DU	como	01		
3. Narayan	an. S and Manickavasag	am F	- Pillai, T.K. Calculus Vo	lume II. (2015)					
Web Resources	5								
https://www.r	nath24.net/curvature-ra	adiu	s/						
https://www.i	ntmath.com/application	ns-di		-curvature.php					

COUI	RSE OUTCOMES	K Level			
On the successful completion of the course, the students will be able to					
CO1:	Find the real and imaginary roots of given equation	K3			
CO2:	Determine the sum of the powers of the roots of equations using Newton's theorem and roots of reciprocal equations	К3			
CO3:	Solve Numerical equations to obtain the approximate solutions using Newton's and Horner's method.	К3			
CO4:	Determine the Radius, Center and Circle of curvature.	K4			
CO5:	Evaluate the Definite Integral.	K4			

CO & PO Mapping:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	2	2	2	3	-
CO 2	2	1	2	2	2	-
CO 3	2	2	2	2	3	2
CO 4	3	2	3	3	2	1
CO5	2	1	2	2	3	-

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

UNIT	COURSE NAME	Hrs	Pedagogy
Ι	Theory of Equation – An n th degree equation has exactly n roots – Relation between the roots and the coefficients.	18	Chalk & Talk
II	Reciprocal Equations- Transformation of Equations	18	Chalk & Talk
III	Finding the roots up to two decimals by Newton's method and Horner's Method.	18	Chalk & Talk
IV	Radius of curvature, Center of curvature of plane curves.	18	Chalk & Talk
V	Integral calculus – Evaluation of Definite Integrals.	18	Chalk & Talk

Course Designed by: Mrs.S.Andal and Mrs.S.Ragavi

		Learning	g Outcome B	ased Edu	cation & Ass	essment	(LOBE)			
	Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)									
		Articulation		Section A		n B				
Inte	Cog	K L ovol	MCOs		Short An	swers	Section C	Section D		
rnal	COS	K Level	No. of.	K -	No. of. Questions	K -	Choice	C Section D Open Choice 3 3 3 3 2 1 1 10		
CI	CO1	Upto K3	2	K1&K2	1	K1	2	3		
AI	CO2	Upto K3	2	K1&K2	2	K2	2	3		
CI	CO3	Upto K3	2	K1&K2	1	K2	2	3		
AII	CO4	Upto K4	2	K1&K2	2	K2	2	3		
		No. of Questions to be asked	4		3		4	2		
Question Pattern	estion tern	No. of Questions to be answered	4		3		2	1		
	1 & 11	Marks for each question	1		2		5	10		
		Total Marks for each section	4		6		10	10		

	Distribution of Marks with K Level CIA I & CIA II									
	K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either / Or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidate of %		
	K1	2	2			4	8	20		
	K2	2	4			6	12	20		
СІА	K3			10	10	20	40	40		
I	K4			10	10	20	40	40		
-	Marks	4	6	20	20	50	100	100		
	K1	2	2			4	8	20		
	K2	2	4			6	12			
CIA	K3			10	10	20	40	40		
II	K4			10	10	20	40	40		
	Marks	4	6	20	20	50	100	100		

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

S	Summative Examination – Blue Print Articulation Mapping – K Level with Course									
	Outcomes (COs)									
		K - Level	MOQs		Short An	swers		Sectio		
S.No	COs		No. of	K –	No. of	K –	Section C (Either / or Choice)	n D (Ope		
			Ouestions	Level	Question	Level		n Cl.		
					C		,	Choic		
								e)		
1	CO1	Upto K3	2	K1 & K2	1	K1	2(K1 & K1)	1(K2)		
2	CO2	Upto K3	2	K1 & K2	1	K1	2(K3 & K3)	1(K3)		
3	CO3	Upto K3	2	K1 & K2	1	K2	2(K3 & K3)	1(K4)		
4	CO4	Upto K4	2	K1 & K2	1	K2	2(K4 & K4)	1(K3)		
5	CO5	Upto K4	2	K1 & K2	1	K2	2(K2 & K2)	1(K3)		
No.	of Quest. Aske	tions to be ed	10		5		10	5		
No.	of Quest . answe	tions to be bred	10		5		5	3		
Mar	ks for eac	ch question	1		2		5	10		
Total Marks for each section		10		10		25	30			
	(Figures	in parenthesi	is denotes, qu	estions sho	uld be aske	d with th	ne given K leve	l)		

	Distribution of Marks with K Level										
K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %				
K1	5	4			9	7.5	17				
K2	5	6			11	9.17	17				
K3			25	20	45	37.5	37				
K4			25	30	55	45.83	46				
Marks	10	10	50	50	120	100	100				
ND. II:	han land of m	and a mark a mark a se	f the stradent	aia to ho oga	aged by	ttom time	high on lovel				

NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.

Section	Section A (Multiple Choice Questions)							
Answe	r All Q	uestions	(10x1=10 marks)					
Q.No	CO	K Level	Questions					
1	CO1	K1						
2	CO1	K2						
3	CO2	K1						
4	CO2	K2						
5	CO3	K1						
6	CO3	K2						
7	CO4	K1						
8	CO4	K2						
9	CO5	K1						
10	CO5	K2						
Section	B (She	ort Answei	rs)					
Answe	r All Q	uestions	(5x2=10 marks)					
Q.No	CO	K Level	Questions					
11	CO1	K1						
12	CO2	K1						
13	CO3	K2						
14	CO4	K2						
15	CO5	K2						
Section	C (Eit	her/Or Ty	pe)					
Answe	r All Q	uestions	(5 x 5 = 25 marks)					
Q.No	CO	K Level	Questions					
16) a	CO1	K3						
16) b	CO1	K3						
17) a	CO2	K3						
17) b	CO2	K3						
18) a	CO3	K3						
18) b	CO3	K3						
19) a	CO4	K3						
19) b	CO4	K3						
20) a	CO5	K4						
20) b	CO5	K4						
NB: Hi	gher le	vel of perf	ormance of the students is to be assessed by attempting higher					
level of	K leve	ls						
Section	D (Op	en Choice						
Answe	r Any '	Three ques	stions (3x10=30 marks)					
Q.No	CO	K Level	Questions					
21	COI	K3						
22	CO2	K3						
23	CO3	K3						
24	CO4	K3						
25	CO5	K4						

Summative Examinations - Question Paper – Format



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF PHYSICS (For those who joined in 2021-2022 and after)

Course Name	LASER AND ITS A	LASER AND ITS APPLICATIONS							
Course Code	21UPHS11					L	Р	С	
Category	Skill					2	-	2	
Nature of course:	EMPLOYABILITY	✓	SKILL ORIENTED	~	ENTREPRENE	EURSHIP			
Course Objectives:									
The Learner will	l be able:								
1. To understar	nd the principle and cha	aracte	eristics of laser.						
2. $\To remember 0$	er the Laser action and	Opti	cal resonators.						
3. To understar	nd the classification of	lasers	S.						
4. To understar	nd and apply the lasers	in me	edical field and process	of la	sers in materials	s.			
5. To understar	nd and apply the lasers	in co	mmunication and comm	ierci	al fields.				
Unit: I Prin	nciples of Lasers						6		
Absorption, Sp	Absorption, Spontaneous and Stimulated emission of radiation – Einstein's coefficients – Relation								
between Einstei	in's A and B coefficient	ients(No derivation) – Popu	ilati	on Inversion –	Defi	nitior	n of	
Pumping - meth	nods of pumping – Cha	aracte	eristics of a Laser beam	– L	aser medium – I	Expre	ssion	for	
threshold gain.									
Unit: II Las	er action and Optical	reso	nator				6		
Principle of Lase	er action – optical feed	back	– Efficiency of Laser –	Thre	ee, Four level la	sers -	- Opt	cical	
resonators – Fel	bry-Perot resonator –	conc	entric resonator – Cont	loca	l resonator – C	ombir	nation	1 of	
plane and spheri	cal resonator – Q-Swit	ching	g – Techniques for Q-Sw	vitch	ing.		-		
Unit: III Las	er Systems						6		
Solid state lasers	s- Ruby Laser, Nd-YA	G las	er – Nd-Glass laser – G	as la	ser-He:Ne Lase	r, Ion	ic La	sers	
– Molecular Gas	$(CO_2 Gas)$ laser – Liq	uid la	aser – Diode Laser-Diod	e Pi	umped Laser				
Unit: IV App	olications of Laser's in	n mat	terials				6		
Lasers in Medic	ine and Surgery – Mat	erial j	processing – Laser weld	ing	 Laser cutting 	– Met	rolog	gy –	
LIDAR Mo	nostatic pulsed coher	ent l	LIDARS – Differentia	I A	bsorption LIDA	AR (I	DIAL	.) –	
Advantages of L	IDAR - Second and T	hird H	Harmonic Generation						
Unit: V App	olications of Laser's in	ı Cor	nmunication and Com	mer	cial fields		6		
Optical fiber con	mmunication - Lasers	in opt	tical communication – F	Free	space communi	catior	n - L	aser	
Velocimeter – p	ollutant Detection syst	em –	Laser printing process	– C	olour laser print	ers –	Barc	ode	
reader – types of	f Barcode scanner – LH	ED sc	anners – Camera based	read	ers.				
				To	tal Lecture Ho	ars (<u>30 H</u>	rs	
Books for Study	y:								
		P							

Material will be given by the Department

Boo	ks for References:						
1.	Sathya Prakash, Laser Systems and Applications, Pragati Prakashan ,Me	erut,Fourth					
]	Edition,2016.						
2.	Richa Sharma and Vibhu Sharma, Laser Systems and Applications, AITBS Publishers, New						
]	Delhi, First Edition, 2010.						
3.	3. Mohan.S, Arjunan.V, Selvarani.M, and Kanchana Mala.M , Laser Physics, MJP publishers						
(Chennai,, First Edition,2012.						
Web	Resources:						
1.	Laser: Fundamentals and Applications - Course (nptel.ac.in)						
2.	Laser Basics - YouTube						
3.	vww.edvicer.com/course/Laser-Fundamentals-and-Applications-53						
4.	Laser: Fundamentals and Applications - Course (nptel.ac.in)						
Cou	Course Outcomes K Level						
After successful completion of the course, the student is expected to							
Aft	r successful completion of the course, the student is expected to						
Aft	br successful completion of the course, the student is expected to Define Spontaneous and Stimulated emission of radiation, Population						
After CO1	 ber successful completion of the course, the student is expected to Define Spontaneous and Stimulated emission of radiation, Population Inversion, Principle of Laser action, Q-Switching, Gas and liquid laser, 	K2					
After CO1	 ber successful completion of the course, the student is expected to Define Spontaneous and Stimulated emission of radiation, Population Inversion, Principle of Laser action, Q-Switching, Gas and liquid laser, LIDAR 	K2					
After CO1	 er successful completion of the course, the student is expected to Define Spontaneous and Stimulated emission of radiation, Population Inversion, Principle of Laser action, Q-Switching, Gas and liquid laser, LIDAR Describe Relation between Einstein's A and B coefficients, Techniques for Q- 	K2					
Afte CO2	 ar successful completion of the course, the student is expected to Define Spontaneous and Stimulated emission of radiation, Population inversion, Principle of Laser action, Q-Switching, Gas and liquid laser, LIDAR Describe Relation between Einstein's A and B coefficients, Techniques for Q- is Switching, Solid state lasers, Lasers in Medicine and Surgery, Laser 	K2 K3					
Afte CO1 CO2	 ber successful completion of the course, the student is expected to Define Spontaneous and Stimulated emission of radiation, Population Inversion, Principle of Laser action, Q-Switching, Gas and liquid laser, LIDAR Describe Relation between Einstein's A and B coefficients, Techniques for Q- Switching, Solid state lasers, Lasers in Medicine and Surgery, Laser Velocimeter 	K2 K3					
After CO2	 ber successful completion of the course, the student is expected to Define Spontaneous and Stimulated emission of radiation, Population Inversion, Principle of Laser action, Q-Switching, Gas and liquid laser, LIDAR Describe Relation between Einstein's A and B coefficients, Techniques for Q- Switching, Solid state lasers, Lasers in Medicine and Surgery, Laser Velocimeter Write methods of pumping, Efficiency of Laser, Optical resonators, Molecular 	K2 K3					
Afto CO2 CO2	 ar successful completion of the course, the student is expected to Define Spontaneous and Stimulated emission of radiation, Population Inversion, Principle of Laser action, Q-Switching, Gas and liquid laser, LIDAR Describe Relation between Einstein's A and B coefficients, Techniques for Q- Switching, Solid state lasers, Lasers in Medicine and Surgery, Laser Velocimeter Write methods of pumping, Efficiency of Laser, Optical resonators, Molecular Gas (CO₂ Gas) laser, Laser material processing, Laser communication 	K2 K3 K3					
Afto CO2 CO2 CO3	 ar successful completion of the course, the student is expected to Define Spontaneous and Stimulated emission of radiation, Population Inversion, Principle of Laser action, Q-Switching, Gas and liquid laser, LIDAR Describe Relation between Einstein's A and B coefficients, Techniques for Q- Switching, Solid state lasers, Lasers in Medicine and Surgery, Laser Velocimeter Write methods of pumping, Efficiency of Laser, Optical resonators, Molecular Gas (CO₂ Gas) laser, Laser material processing, Laser communication Functioning of threshold gain, optical feedback,Nd:YAG gas laser, Laser in 	K2 K3 K3					
Afto CO2 CO2 CO2	 ber successful completion of the course, the student is expected to Define Spontaneous and Stimulated emission of radiation, Population Inversion, Principle of Laser action, Q-Switching, Gas and liquid laser, LIDAR Describe Relation between Einstein's A and B coefficients, Techniques for Q- Switching, Solid state lasers, Lasers in Medicine and Surgery, Laser Velocimeter Write methods of pumping, Efficiency of Laser, Optical resonators, Molecular Gas (CO₂ Gas) laser, Laser material processing, Laser communication Functioning of threshold gain, optical feedback,Nd:YAG gas laser, Laser in Metrology, LED scanners 	K2 K3 K3 K4					
After CO2 CO2 CO2	 r successful completion of the course, the student is expected to Define Spontaneous and Stimulated emission of radiation, Population Inversion, Principle of Laser action, Q-Switching, Gas and liquid laser, LIDAR Describe Relation between Einstein's A and B coefficients, Techniques for Q- Switching, Solid state lasers, Lasers in Medicine and Surgery, Laser Velocimeter Write methods of pumping, Efficiency of Laser, Optical resonators, Molecular Gas (CO₂ Gas) laser, Laser material processing, Laser communication Functioning of threshold gain, optical feedback,Nd:YAG gas laser, Laser in Metrology, LED scanners Examine Laser medium, Febry-Perot resonator, Ruby Laser, Differential 	K2 K3 K3 K4 K4					

CO & PO Mapping:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	2	2	3	3
CO 2	3	2	3	2	2	2
CO 3	3	3	3	1	2	3
CO 4	3	2	3	3	1	2
CO5	3	2	2	2	2	1

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

UNIT	Laser and Its Application	Hrs	Pedagogy
I	Absorption, Spontaneous and Stimulated emission of radiation – Einstein's coefficients – Relation between Einstein's A and B coefficients – Population Inversion – Definition of Pumping – methods of pumping – Characteristics of a Laser beam – Laser medium – Expression for threshold gain.	6	PPT, Lecture, Chalk&Talk, Demonstration
II	Principle of Laser action – optical feedback – Efficiency of Laser – Three ,Four level lasers – Optical resonators – Febry-Perot resonator – concentric resonator – Confocal resonator – Combination of plane and spherical resonator – Q-Switching – Techniques for Q-Switching.	6	PPT, Lecture, Chalk&Talk, Demonstration
III	Solid state lasers- Ruby Laser, Nd-YAG laser – Nd-Glass laser – Gas laser-He:Ne Laser,Ionic Lasers – Molecular Gas (CO ₂ Gas) laser – Liquid laser	6	PPT, Lecture, Chalk&Talk, Demonstration
IV	Lasers in Medicine and Surgery – Material processing – Laser welding –Laser cutting – Metrology – LIDAR – Monostatic pulsed coherent LIDARS – Differential Absorption LIDAR (DIAL) – Advantages of LIDAR	6	PPT, Lecture, Chalk&Talk, Demonstration
V	Lasers in optical communication – optical fiber communication – Free space communication – Laser Velocimeter – pollutant Detection system – Laser printing process – Colour laser printers – Barcode reader – types of Barcode scanner – LED scanners – Camera based readers	6	PPT, Lecture, Chalk&Talk, Demonstration

LESSON PLAN

Course Designed by: 1. Dr.S.S.Jayabalakrishnan, 2. Dr.P.Kavitha



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) **DEPARTMENT OF PHYSICS** (For those who joined in 2021-2022 and after)

Course Name BASICS OF MICROSOFT OFFICE								
Course Code 21UPHS12					L	Р	С	
Category	ategory Skill					2	-	2
Nature of course:	EMPLOYABILI	EMPLOYABILITY - SKILL ORIENTED - ENTREPRENE					HIP	
Course Obj	ectives:							
 The learners will be able: 1. To remember desktop, recycle bin, creating shortcuts and control panel windows vista. 2. To understand the opening screen of Microsoft word screen, home panel, page setup and mailing panel in Microsoft office word 2007. 3. To understand formatting and alignment of text, spell checking, saves as options and printing the document in Microsoft office word 2007. 4. To understand worksheet in excel 2007, worksheet fitting on a pages, formatting numbers and labels and adding-deleting rows and columns in Microsoft office word 2007. 								
Unit: I	Microsoft Windows vi	sta					6	
Introduction	- What's new in Wind	lows V	ista – Desktop of Wind	ows	Vista - Explori	ng the	Task	cbar
– Computer	– Recycle Bin – Creat	ing Sh	ortcuts – Introduction to	o Co	ntrol Panel of V	Vindo	ws V	'ista
- Accessing	Control Panel.							
Unit: II	Microsoft Office Word	1 2007					6	
Introduction	to Microsoft Office	Word	2007 - What's new in	n Mi	crosoft Office	Word	1 200	- 7
Creating pro	fessional looking docu	ments	- Share documents con	fider	tly – Go beyon	d doc	umen	ıts –
Recover fro	m Computer Problems	- Ope	ening Screen of Micros	oft V	Word Screen –	Home	e Pan	el –
Insert Panel	- Page Layout Panel -	- Page	setup – Reference Pane	1 – 1	Mailing Panel –	Revie	ew Pa	anel
- views - O	ffice Button.							
Unit: III Working with Documents in Word 2007 6								
Introduction– Saving the file – Formatting the text – Alignment of text – Applying fonts – Spell								
checking - Consulting Thesaurus - Assign Character Styles - Borders and Shading - Closing the								
file -Save as option - Printing your Document - Editing the Document - Editing Tools -								
AutoCorrect – AutoFormat – Find and Replace – Find – Replace Text – Page Numbering – Header								
and Footer - Footnotes and Endnotes - Splitting Panes - Tiling of the Documents - Using Mail								
Merge in Word 2007.								
Unit: IV	Microsoft Office Exce	1 2007					6	

mit: IV Microsoft Office Excel 2007

Understanding Spreadsheets – Creating a Worksheet in Excel 2007 – Copying Formula – Formulas that Make Decisions – Styles – Functions in Excel – Using Auto calculate – References – Sum Function – Average Function – Creating Charts in Excel – Auditing a Workbook – Comments Inserting – Outlines – Worksheet Fitting on a Pages – Function Wizard – Goal Seeking – Scenarios Manager – Creating a Pivot Table Report – Typing with AutoFill – Formatting Numbers and Labels – Changing the size of Rows and Columns – Adding and Deleting Rows and Columns – Inserting (and Removing) Page Breaks – Applying Themes – Add or Remove a Sheet Background – Convert text to Columns – Protect Worksheet or Workbook Elements – Functions in Excel.

Unit: V	Microsoft Office PowerPoint 2007	6				
Creating Presentation from Template - Creating a New Presentation - PowerPoint Views -						
Entering th	Entering the Text - Moving the Text - Changing the Colour - Adding Graphics to a Slide -					
Reordering	$Slides-Duplicating\ Slides-Deleting\ Slides-Adding\ an\ Animated\ Cartoon\ to$	a Slide				
– Adding S	- Adding Slide Transitions - Adding Text Transitions - Viewing a Presentation - Making Slide					
Shows – H	iding a Slide – Notes, Handouts and Masters for Presentation – Packing Presentat	ions to				
Go.						

Total Lecture Hours30 Hrs

Books for Study: 1. Dinesh Maidasani, Microsoft Office 2007, Firewal Media, An Imprint of Laxmi Publications Pvt. Ltd., 2012.

- * Unit –I :Pages 1 to 49
- * Unit II :Pages 55 to 84
- * Unit-III :Pages 89 to 115
- * Unit-IV :Pages 119 to 167
- * Unit –V :Pages 171 to 191

Books for References:

1. Prof. Satish Jain, M. Geetha, Kratika, **Microsoft office 2007 Training Guide**, BPB Publications.

- 2. Bittu Kumar, Mastering MS Office, V & S Publications.
- 3. Ramesh Bangia, Learning MS Office 2007, Khanna Book Publishing Co. (p) Ltd.

Web Resources:

- 1. <u>https://www.google.com/url?sa=t&source=web&rct=j&url=https://m.youtube.com/watch %3Fv%3DMWEhXzJoz8E&ved=2ahUKEwjdme7GnoLwAhV54XMBHYkABa0O28sG</u> MAN6BAgDEHs&usg=AOvVaw0YxneLhgQojEMkBCBl C2d
- 2. <u>https://www.google.com/url?sa=t&source=web&rct=j&url=https://m.youtube.com/watch %3Fv%3D8ROOt0xiNyQ&ved=2ahUKEwjdme7GnoLwAhV54XMBHYkABa0Q28sGM</u> <u>AZ6BQgDEPAB&usg=AOvVaw2HbowzhglpSwyqYlJL71u8</u>

3. <u>https://www.google.com/url?sa=t&source=web&rct=j&url=https://m.youtube.com/watch</u> <u>%3Fv%3Dc7pRb2Sy1zo&ved=2ahUKEwjdme7GnoLwAhV54XMBHYkABa0Q28sGMA</u> <u>d6BQgDEPwB&usg=AOvVaw0iKbXMf1OKAqhq-vGsV81f</u>

Course Outcomes				
On suc	ccessful completion of the course, the learners should be able to			
CO1:	Understand Desktop of Windows Vista and Exploring the Taskbar.	K2		
CO2:	Analyze the new in Microsoft Office Word 2007 – Creating professional looking documents.	K3		
CO3:	Analyze the Saving the file, Formatting the text, Alignment of text, Applying fonts, Spell checking, Consulting Thesaurus, Assign Character Styles, Borders and Shading, Closing the file and Save as option.	К3		
CO4:	Applying Themes, Add or Remove a Sheet Background, Convert text to Columns, Protect Worksheet or Workbook Elements and Functions in Excel.	K4		
CO5:	Influence of Creating Presentation from Template, Creating a New Presentation and PowerPoint Views.	K 4		

CO & PO Mapping:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	3	2	2	2
CO 2	3	3	2	2	2	2
CO 3	3	3	2	2	2	2
CO 4	3	3	2	2	2	1
CO5	3	2	1	1	2	2

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

Unit	Basics of Microsoft Office	Hrs	Pedagogy
Ι	Introduction – What's new in Windows Vista – Desktop of Windows Vista - Exploring the Taskbar – Computer – Recycle Bin – Creating Shortcuts – Introduction to Control Panel of Windows Vista – Accessing Control Panel.	6	Lecture, Chalk&Talk, Demonstration
Ш	Introduction to Microsoft Office Word 2007 - What's new in Microsoft Office Word 2007 - Creating professional looking documents - Share documents confidently - Go beyond documents - Recover from Computer Problems - Opening Screen of Microsoft Word Screen - Home Panel - Insert Panel - Page Layout Panel - Page setup - Reference Panel - Mailing Panel - Review Panel - views - Office Button.	6	Lecture, Chalk&Talk, Demonstration
ш	Introduction– Saving the file – Formatting the text – Alignment of text – Applying fonts – Spell checking – Consulting Thesaurus – Assign Character Styles – Borders and Shading – Closing the file – Save as option – Printing your Document – Editing the Document – Editing Tools – AutoCorrect – AutoFormat – Find and Replace – Find – Replace Text – Page Numbering – Header and Footer – Footnotes and Endnotes – Splitting Panes – Tiling of the Documents – Using Mail Merge in Word 2007.	6	Lecture, Chalk&Talk, Demonstration
IV	Understanding Spreadsheets – Creating a Worksheet in Excel 2007 – Copying Formula – Formulas that Make Decisions – Styles – Functions in Excel – Using Auto calculate – References – Sum Function – Average Function – Creating Charts in Excel – Auditing a Workbook – Comments Inserting – Outlines – Worksheet Fitting on a Pages – Function Wizard – Goal Seeking – Scenarios Manager – Creating a Pivot Table Report – Typing with AutoFill – Formatting Numbers and Labels – Changing the size of Rows and Columns – Adding and Deleting Rows and Columns – Inserting (and Removing) Page Breaks – Applying Themes – Add or Remove a Sheet Background – Convert text to Columns – Protect Worksheet or Workbook Elements – Functions in Excel.	6	Lecture, Chalk&Talk, Demonstration
v	Creating Presentation from Template – Creating a New Presentation – PowerPoint Views – Entering the Text – Moving the Text – Changing the Colour – Adding Graphics to a Slide – Reordering Slides – Duplicating Slides – Deleting Slides – Adding an Animated Cartoon to a Slide – Adding Slide Transitions – Adding Text Transitions – Viewing a Presentation – Making Slide Shows – Hiding a Slide – Notes, Handouts and Masters for Presentation – Packing Presentations to Go.	6	Lecture, Chalk&Talk, Demonstration

Course Designed by: 1. Dr.S.Francis, 2. Dr.P.Kavitha


Academic Council Meeting Held On 29.04.2021



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF PHYSICS (For those who joined in 2021-2022 and after)

Course Name HEAT AND THERMODYNAMICS	HEAT AND THERMODYNAMICS								
Course Code 21UPHC21	L	Р	С						
Category Core	4	-	4						
Nature of course:EMPLOYABILITYImage: Main ScienceImage: Skill ORIENTEDImage: Skill ORIENTED	URSH	IP							
Course Objectives:									
 The learners will be able: 1. To remember the fundamental concepts in Law of Thermodynamics. 2. To recall the Properties of Kinetic Theory of Gases. 3. To analyze and apply the basic concepts Specific Heat Capacity. 4. To understand and apply Isothermal and Adiabatic Processes 5. To reveal the properties of Thermal Radiation. 									
Unit: I Heat, Temperature and Laws of Thermodynamics		12							
Hot and Cold Bodies - Zeroth Law of Thermodynamics - Defining Scale of Temperand Resistance Thermometers - Constant Volume Gas Thermometer - Callender'sConstant Pressure Thermometer - Adiabatic and Diathermic Walls - Thermal ExpanLaw of Thermodynamic - Work Done by a Gas - Heat Engines - The SecThermodynamics - Reversible and Irreversible Processes - Entropy - Otto cycle - CarneUnit: IIKinetic Theory of GasesIntroduction - Assumptions of Kinetic Theory of Gases - Calculation of the Pressure orms Speed - Kinetic Interpretation of Temperature - Deductions from Kinetic TheorEquation - Maxwell's Distribution Law - Thermodynamic State - Brownian MotioEvaporation - Saturated and Unsaturated Vapour: Vapour Pressure - Boiling PoinDetermination of Relative Humidity - Fog and Dew - Dew Point - Phase Diagrams: TriUnit: IIICalorimetryUnits of Heat and Calorimetry - Specific Heat Capacity and Molar Heat Capacity - DSpecific Heat Capacity by Regnault's apparatus - Specific Latent Heat of Fusion andMeasurement of Specific Latent Heat of Fusion of Ice - Measurement of SpecificVaporization of Water - Mechanical Equivalent of Heat.	ature: s Com sion -' ccond ot Eng ot Eng ot Eng ory - I on - V on - V nt- Hu ple Po etermi Vapo Latent	Meropens The l Law ine 12 eal C deal Vapor int. 12 natio rizati Hea	cury ated First of Gas ur – ty - n of on - it of						
Unit: IV Specific Heat Capacities of Gases		12							
Unit: IVSpecific Heat Capacities of Gases12Specific Heat Capacities $C_p \& C_v$ and relation between them for an Ideal Gas - Determination of C_p of a Gas by Regnault's apparatus- Determination of C_v of a Gas by Joly's differential steam calorimeter - Isothermal and Adiabatic Processes - Relations between p, V, T in a Reversible Adiabatic Process - Work Done in an Adiabatic Process - Equipartition of Energy									
Unit: V Heat Transfer		12							
Three Processes of heat transfer - Series and Parallel Connection of Rods - Measurement of Thermal Conductivity of a Solid by Forbe's method - Thermal Conductivity of a bad conductor by Lee's disc method - Convection - Radiation - Prevost Theory of Exchange - Nature of Thermal Radiation - Blackbody Radiation - Kirchhoff's Law - Planck's law - Stefan-Boltzmann Law - Newton's Law of Cooling - Detection and Measurement of Radiation by Bolometer and Thermopile. Total Lecture Hours 60 Hrs									

Books for Study:									
1. H.C.Verma, "Concepts of Physics - Volume 2", Bharati Bhawan (Publishers & Distributors).									
New Delhi, 2020									
* Unit – I:Chapter 23&Chapter 26									
* Section – 23.1 to 23.10. Worked Out Examples									
* Section = 26.1 to 26.7. Worked Out Examples * Section = 26.1 to 26.7. Worked Out Examples									
* Unit – II:Chapter 24									
* Section – 24.1 to 24.19. Worked Out Examples									
* Unit – III:Chapter 25									
* Section – 25.1 to 25.9. Worked Out Examples									
 * Unit – IV:Chapter 27 									
* Section – 27.1 to 27.8. Worked Out Examples									
* Unit – V:Chapter 28									
* Section – 28.1 to 28.12. Worked Out Examples									
Books for References:									
1. Brjlal, Subramaniyam and P.S. Hemne, Heat, Thermodynamics and									
Statistical Physics, S.Chand & Co.2004									
2. D.S. Mathur, Heat and Thermodynamics, S. Chand & Co.2002.									
3. R. Murugesan, Heat and Thermodynamics, S. Chand & Co.2004									
4. D. Halliday Resnick, Jearl Walker, Fundamental of physics, Wiley India Pvt Ltd., 6	th Edition								
Web Resources:									
1. https://youtu.be/G-unUOg1bvY									
2. https://youtu.be/-42JmVBdlM4									
3. https://youtu.be/dHdlH3l8FkM	• -								
4. https://komonews.com/weather/faq/what-is-the-dew-point-and-how-does-fog-form-12	-26-								
2015#:~:text=The% 20dew% 20point% 20is% 20the,60% 2C% 20that% 20feels% 20quite%	%20humid.								
5. https://userpages.umbc.edu/~tokay/chapter5new.html									
6. https://www.britannica.com/science/Stefan-Boltzmann-law									
/. https://youtu.be/8Z5Vcppax9k									
Course Outcomes	K Level								
After successful completion of the course, the student is expected to									
CO1: Explain the laws of thermodynamics, kinetic theory of gases, calorimetry and	V2								
spacific host appointing of appag	r)								

CO1:	Explain the laws of thermodynamics, kinetic theory of gases, calorimetry and specific heat capacities of gases	К3
CO2:	Solve Ideal Gas equation, RMS Speed, mechanical equivalent of heat, p, V, T and Work Done in an Adiabatic Process	K3
CO3:	Calculate Specific Heat Capacities of gases and thermal conductivity of solids	K4
CO4:	Discuss about Mercury and resistance Thermometers, relation between C_p and C_v for an Ideal Gas, Specific latent heat of fusion and vaporization	K4
CO5:	Illustrate Callender's compensated constant pressure thermometer, Carnot engine, Blackbody radiation, Stefan-Boltzmann law	K4

CO & PO Mapping:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	3	2	2	2
CO 2	3	3	2	1	2	2
CO 3	3	3	3	1	2	2
CO 4	3	3	2	1	2	2
CO5	3	3	2	1	2	2

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

Unit	HEAT AND THERMODYNAMICS	Hrs	Pedagogy
I	Heat, Temperature and Laws of Thermodynamics Hot and Cold Bodies - Zeroth Law of Thermodynamics - Defining Scale of Temperature: Mercury and Resistance Thermometers - Constant Volume Gas Thermometer - Callender's Compensated Constant Pressure Thermometer - Adiabatic and Diathermic Walls - Thermal Expansion -The First Law of Thermodynamic - Work Done by a Gas - Heat Engines - The Second Law of Thermodynamics - Reversible and Irreversible Processes – Entropy - Otto cycle - Carnot Engine	12	Chalk & Talk, Videos and PPT
II	Kinetic Theory of Gases Introduction - Assumptions of Kinetic Theory of Gases - Calculation of the Pressure of an Ideal Gas - rms Speed - Kinetic Interpretation of Temperature - Deductions from Kinetic Theory - Ideal Gas Equation - Maxwell's Distribution Law - Thermodynamic State - Brownian Motion – Vapour – Evaporation - Saturated and Unsaturated Vapour: Vapour Pressure – Boiling Point– Humidity - Determination of Relative Humidity - Fog and Dew Dew Point - Phase Diagrams: Triple Point	12	Chalk & Talk, Videos and PPT
III	Calorimetry Units of Heat and Calorimetry - Specific Heat Capacity and Molar Heat Capacity - Determination of Specific Heat Capacity by Regnault's apparatus - Specific Latent Heat of Fusion and Vaporization - Measurement of Specific Latent Heat of Fusion of Ice - Measurement of Specific Latent Heat of Vaporization of Water - Mechanical Equivalent of Heat	12	Chalk & Talk, Videos and PPT
IV	Specific Heat Capacities of Gases Specific Heat Capacities $C_p & C_v$ and relation between them for an Ideal Gas - Determination of C_p of a Gas by Regnault's apparatus-Determination of C_v of a Gas by Joly's differential steam calorimeter - Isothermal and Adiabatic Processes - Relations between p, V, T in a Reversible Adiabatic Process - Work Done in an Adiabatic Process - Equipartition of Energy	12	Chalk & Talk, Videos and PPT
V	Heat Transfer	12	Chalk & Talk,

 Three Processes of heat transfer - Series and Parallel Connection of	Videos
Rods - Measurement of Thermal Conductivity of a Solid by	and PPT
Forbe's method - Thermal Conductivity of a bad conductor by	
Lee's disc method - Convection - Radiation - Prevost Theory of	
Exchange - Nature of Thermal Radiation -Blackbody Radiation -	
Kirchhoff's Law - Planck's law - Stefan-Boltzmann Law -	
Newton's Law of Cooling - Detection and Measurement of	
Radiation by Bolometer and Thermopile	

Course Designed by: 1. Dr.P.Kavitha, 2. Dr.R.Sangeetha

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)												
Internal			Section	n A	Sectior	n B	Section C	Section				
	Cos	K Level	MCQ)s	Short Ans	swers	Either or	D				
	005		No. of. Questions	K - Level	No. of. Questions	K – Level	Choice	Open Choice				
CI	CO1	Up to K3	2	K1,K2	1	K1	2(K2&K2)	1 K2				
AI	CO2	Up to K3	2	K1,K2	2	K2	2(K3&K3)	1 K3				
CI	CO3	Up to K4	2	K1,K2	1	K1	2(K3&K3)	1K3				
AII	CO4	Up to K4	2	K1,K2	2	K2	2(K4&K4)	1 K4				
	Que	No. of estions to e asked	4		3		4	2				
Question Pattern	Que	No. of estions to answered	4		3		2	1				
	Marl q	ks for each uestion	1		2		5	10				
	Tot	tal Marks or each section	4		6		10	10				

***Note:** It is the decision of the course teacher to ask 2 Questions in any unit under section-B (short answer questions)

	Distribution of Marks with K Level CIA I & CIA II									
	K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Question s)	Section C (Either / Or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolid ate of %		
	K1	2	2			4	8	60		
	K2	2	4	10	10	26	52	00		
	K3			10	10	20	40	40		
CI	K4									
AI	K5									
	Mark	4	6	20	20	50	100	100		
	S		0	20	20	50	100	100		
	K1	2	2			4	8	20		
	K2	2	4			6	12	20		
	K3			10	10	20	40	40		
CI	K4			10	10	20	40	40		
A II	K5									
	Mark s	4	6	20	20	50	100	100		

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

<u>UNIT-V</u> will be allotted for individual Assignment in <u>CO5 - K4</u> level which carries five marks as part of CIA component.

Sı	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)												
C No	COs	К-	The sta	MC	MOQs		Short Answers		Section C (Either / or Choice)		Section D (Open Choice)		
5.110.		Level	Umt	No.of Ques tions	K – Level	No.of Ques tions	K – Level	No.of Ques tions	K – Level	No.of Ques tions	K – Level		
1	CO1 - CO5	K1 to K3	Ι	2	K1 & K2	1	K1	2	K2 & K2	1	K2		
2	CO1 - CO5	K1 to K3	п	2	K1 & K2	1	K1	2	K3 & K3	1	К3		
3	CO1 - CO5	K1 to K4	ш	2	K1 & K2	1	К2	2	K3 & K3	1	К3		
4	CO1 - CO5	K1 to K4	IV	2	K1 &K2	1	К2	2	K4 & K4	1	K4		
5	CO1 - CO5	K1 to K4	v	2	K1 & K2	1	K2	2	K4 & K4	1	K4		
No. of	Questio	ns to be	Asked	10		5		1	0		5		
No. of Questions to be answered		10		5			5 3		3				
Marks for each question		1		2		5 1		10					
Total N	Aarks fo	or each se	ection	10		10		2	5		30		
		* In Section	n Section C shou	on C & I ild conta) - One in minim	question 1um of fo	ı <mark>should</mark> our CO le	be a pro evels (C	oblem O2 - CO	95)			

Section D should contain minimum of three CO levels (CO3 - CO5)

	Distribution of Marks with K Level												
K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %						
K1	5	4			9	12	17						
K2	5	6	10	10	31	34.66	47						
K3			20	20	40	27	27						
K4			20	20	40	26.66	26						
Marks	10	10	50	50	120	100	100						
NB: Hig of K lev	NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels												

Section	A (Mu	iltiple Cho	ice Questions)
Answei	r All Q	uestions	(10x1=10 marks)
Q.No	CO	K Level	Questions
1	CO1	K1	
2	CO1	K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	
6	CO3	K2	
7	CO4	K1	
8	CO4	K2	
9	CO5	K1	
10	CO5	K2	
Section	B (She	ort Answei	rs)
Answei	r All Q	uestions	(5x2=10 marks)
Q.No	CO	K Level	Questions
11	CO1	K1	
12	CO2	K1	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
Section	C (Eit	her/Or Ty	pe)
Answei	r All Q	uestions	(5 x 5 = 25 marks)
Q.No	CO	K Level	Questions
16) a			
16) b			
17) a			
17) b			
18) a			
18) b			
19) a			
19) b			
20) a			
20) b			
NB: Hi	gher le	vel of perf	ormance of the students is to be assessed by attempting higher
level of	K leve	ls	
Section	D (Op	en Choice	
Answe	r Any	Three ques	stions (3x10=30 marks)
Q.N0	CO	K Level	Questions
21			
22			
25			
24			
23			

Summative Examinations - Question Paper – Format



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF PHYSICS (For those who joined in 2021-2022 and after)

Course Name MAJOR PHYSICS PRACTICAL	MAJOR PHYSICS PRACTICAL - I									
Course Code 21UPHCP1				L	Р	С				
Category Core				-	2	2				
Nature of course:EMPLOYABILITY✓SKILL	ORIENTED	✓	ENTREPRENE	EURS	HIP					
Course Objectives:										
The learners will be able:										
1. To create the practical knowledge in basic physics experiments.										
2. To understand the bending of beam, compound j	pendulum and to	orsio	n pendulum.							
3. To understand current conduction in electrical ci	rcuits.									
4. To motivate the students to apply the experimen	tal techniques in	n Op	tics and Sound.							
5. To create skill in doing the experiment individua	ılly									
LIST OF EXPERIMENTS (Any Four	teen Experimen	ts)								
1. Young's Modulus	- Uniform bendi	ng (Pin & Microsco	pe)						
2. Young's Modulus	- Non –Uniform	ben	ding – Optic lev	/er						
3. Rigidity Modulus	- Torsion Pendu	lum	with loads							
4. Surface tension	- By capillary ris	se m	ethod							
5. Viscosity of Liquid	- By Capillary ri	ise n	nethod							
6. Moment of Inertia	- Torsion Pendu	lum								
7. Acceleration due to gravity	- Compound Per	ndulı	ım							
8. Laws of transverse vibration	- Sonometer									
9. Frequency of tuning fork -	Sonometer									
10. A.C Frequency -	Melde's appara	tus								
11. Velocity of Sound waves	Ultrasonic Inter	rferc	ometer							
12. Thermal conductivity of Bad conductor -	Lee's disc									
13. Emissivity of the Surface	Joule's Calorin	neter								
14. Specific Heat Capacity -	Newton's Law	of C	ooling							
15. Thickness of a wire -	Air wedge									
16. Spectrometer -	Refractive index	x of	a prism							
	I	Tota	al Practical Ho	urs	30 H	rs				
Books for Study:										
1. Srinivasan.M.N., Balasubramanian.S., Ranganat	han.R., A Text	Boo	ok of Practical	Physi	cs, 2	017				
Edition, Sultan Chand & Sons										
Books for References:										
1. Ouseph.C., Practical Physics and Electronics,	2013, S.Viswan	atha	n.P.Ltd.							
Web Resources:										
1. https://nptel.ac.in/course.html/physics/experiments/	mental physics	I, II	and III							
2. https://nptel.ac.in/courses/115/105/115105110	/									
3. <u>https://www.youtube.com/playlist?list=PLuiP</u>	<mark>z6iU5SQ8-rZn</mark>	Lg	<u>LofRX7n8z4tH</u>	IYK						
Course Outcomes				ŀ	K Lev	vel				
On successful completion of the course, the learner	s should be able	e to								

CO1:	Analyze the concepts of Viscosity, Surface Tension and Young's Modulus of different substances	K4
CO2:	Explore the knowledge of Spectrometer and other Optical instruments	K3
CO3:	Realize the principles and applications of Potentiometer, Sonometer,	K4
CO4:	Explore the knowledge of Melde's apparatus to find Frequency of tunning fork	K3
CO5:	Understand the Thermal conductivity of Bad conductor	K4

CO & PO Mapping:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	3	2	3	1
CO 2	3	1	3	1	1	3
CO 3	2	2	2	1	2	1
CO 4	3	3	2	2	1	2
CO 5	2	3	2	2	2	2

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

Semester	Major Physics Practical - I	Hrs	Pedagogy
Π	 Young's Modulus - Non –Uniform bending – Optic lever Viscosity of Liquid -By Capillary rise method Moment of Inertia - Torsion Pendulum Frequency of tuning fork - Sonometer A.C Frequency - Melde's apparatus Velocity of Sound waves - Ultrasonic Interferometer Emissivity of the Surface - Joule's Calorimeter Spectrometer - Refractive index of a prism 	30	Demonstration

Course Designed by: 1. Dr.S.S.Jayabalakrishnan, 2. Dr.P.Kavitha



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF PHYSICS (For those who joined in 2021-2022 and after)

Course	Allied Mathematics	5 –II						
Course Code	21UMTA21							С
Cotta a server								4
	Amed					0	-	4
Nature of course:	EMPLOYABILITY✓SKILL ORIENTED✓ENTREPRENEURSHIP							
Course objecti	ves:							
• To learn ab	out linear programmi	ng pi	oblems					
• To solve lin	ear programming pro	blen	n using simplex method	1				
• To solve Tr	ansportation problem	, Ass	signment problem					
• To recall lin	near differential equat	ions						
• To solve fir	st and second order d	iffer	ential equations					
Unit: I			•				1	8
Linear Program	ming Problems – Ma	then	natical Formulation of	a LPF	P – Graphical Sol	lution	of a	LPP
- Slack and Sur	plus Variables – Stan	dard	form of LPP.					
Unit: II							1	8
Transportation	Problem – Finding In	itial	feasible solution by No	orth W	est Corner Meth	od an	d Vo	gel's
Approximation	method - Optimal Sc	olutic	on of transportation pro	blem.				
Unit: III							1	8
Assignment pro	roblem – Solution of Assignment problems – Travelling sales man problem.							
Unit: IV							1	8
Exact Different	ial Equation – Linear	Diff	erential Equation					
Unit: V							1	8
Second Order I	Differential Equation v	with	RHS x ⁿ , e ^{ax} , sin ax, cos	s ax, e	$ax \sin x$, $e^{ax} \cos bx$	x.		
					Total Lecture	Hou	rs 9	0
Books for Stud	ly:							
1. Dr. S.	Arumugam and Issae	с, Т	opics in operations R	esearc	ch (Linear Progr	amm	ing)	New
Gamma	Publishing House, Ju	ne 2	012, Palayamkottai.					
Unit I	Chapter 3	Sect	tion $3.1 - 3.4$					
Unit II	Chapter 4	Sect	tion 4.1 & 4.2					
Unit III	Chapter 5	Sec	tion 5.1 & 5.2					
2. Dr. S.	Arumugam, Ancilla	ary	Mathematics Vol III	, Nev	w Gamma Publ	lishin	g Ho	ouse,
Palayan	nkottai.							
Unit IV	Chapter 1 Section 1.3,1.5							
Unit V	Chapter 2	Sec	tion 2.1,2.2					
Books for Refe	erences:							
1. Gupta. R.K.	1. Gupta. R.K, Operations Research, Krishna Prakash Mandir, Second Edition, 1988, Meerut.							
2. Kanti Swari	up, Gupta. P.K an	d N	ian Monan, Introduct	ion to	Operations			
Research, St	and Monisources	rudi u:u	ications, August 199/,	INEW	Delm.	tion		
5. Inarayanan.S	and Ivianicavasagam	P1118	al. I.K., Differential Eq	uation	and its Applicat	uon,		
v iswanathar	S, Printers and Publishers Pvt. Ltd., Reprint 2006, Chennai.							

Web R	Resources	
1. <u>htt</u>	os://nptel.ac.in/courses/112/106/112106134/	
2. <u>http</u>	<u>s://nptel.ac.in/courses/110/106/110106062/</u>	
COUI	RSE OUTCOMES	K Level
On th	e successful completion of the course, the students will be able to	
CO1.	Formulate Linear Programming Problem using graphical, writing standard form	K3
COI	of LPP	KJ
CO2:	Classify different techniques on solving LPP for TP.	K2
CO3:	Understand Assignment problems and travelling salesman problem.	K2
CO4:	Capable of solving the differential equation.	K3
CO5:	Develop logical skills in solving the differential equations with different RHS	K4

CO & PO Mappings:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	2	3	3	1	3	2
CO 2	3	2	2	1	3	3
CO 3	3	2	2	2	3	2
CO 4	2	-	1	1	2	-
CO5	3	1	-	-	3	-

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

UNIT	COURSE NAME	Hrs	Pedagogy
Ι	Linear Programming Problems – Mathematical Formulation of a LPP – Graphical Solution of a LPP – Slack and Surplus Variables – Simplex method of solving a LPP.	18	Chalk & Talk
II	Transportation Problem – Finding Initial feasible solution by North West Corner Method and Vogel's Approximation method – Optimal Solution of transportation problem.	18	Chalk & Talk
Ш	Assignment problem – Solution of Assignment problems – Travelling sales man problem.	18	Chalk & Talk
IV	Exact Differential Equation – Linear Differential Equation	18	Chalk & Talk
V	Second Order Differential Equation with RHS x^n , e^{ax} , sin ax, cos ax, $e^{ax} \sin x$, $e^{ax} \cos bx$.	18	Chalk & Talk

Course Designed by: Mrs.S.Ragavi and Mrs.S.Andal

	Learning Outcome Based Education & Assessment (LOBE)							
]	Formative	Examination	1 - Blue Pri	nt		
	T	Articulation N	/Iapping –	K Levels wit	h Course C	Jutcome	s (COs)	1
			Sect	tion A	Sectio	n B		
Inte			Μ	CQs	Short Ar	swers	Section C	Section D
rnal	Cos	K Level	No. of.		No. of.	K	Either or	Open
			Questio	K - Level	Questio	I evel	Choice	Choice
			ns		ns	Level		
CI	CO1	Upto K2	2	K1 & K2	1	K1	2	3
AI	CO2	Upto K3	2	K1 & K2	2	K2	2	3
CI	CO3	Upto K4	2	K1 & K2	1	K2	2	3
AII	CO4	Upto K4	2	K1 & K2	2	K2	2	3
		No. of						
		Questions to be	4		3		4	2
		asked						
0110	stion	No. of						
Que	torn	Questions to be	4		3		2	1
CIA I & II	answered							
	Marks for each	1		2		5	10	
		question	1					10
		Total Marks for each section	4		6		10	10

	Distribution of Marks with K Level CIA I & CIA II							
	K	Section A	Section B	Section	Section	Total	% of	Consolidate
	Level	(Multiple	(Short	С	D (Open	Marks	(Marks	of %
		Choice	Answer	(Either /	Choice)		without	
		Questions)	Questions)	Or			choice)	
				Choice)				
	K1	2	2			4	8	20
	K2	2	4			6	12	
CIA	K3			10	10	20	40	40
Ι	K4			10	10	20	40	40
	Marks	4	6	20	20	50	100	100
	K1	2	2			4	8	20
CIA	K2	2	4			6	12	
II	K3			10	10	20	40	40
	K4			10	10	20	40	40
	Marks	4	6	20	20	60	100	100

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

S	Summative Examination – Blue Print Articulation Mapping – K Level with Course							
	Outcomes (COs)							
			MO	DQs	Short An	swers	Section C	Section D
S.No	COs	K - Level	No. of Questio ns	K – Level	No. of Questio n	K – Level	(Either / or Choice)	(Open Choice)
1	CO1	Upto K2	2	K1 & K2	1	K1	2(K1 & K1)	1(K2)
2	CO2	Upto K3	2	K1 & K2	1	K1	2(K3 & K3)	1(K3)
3	CO3	Upto K4	2	K1 & K2	1	K2	2(K3 & K3)	1(K4)
4	CO4	Upto K4	2	K1 & K2	1	K2	2(K4 & K4)	1(K3)
5	CO5	Upto K3	2	K1 & K2	1	K2	2(K2 & K2)	1(K3)
No. of Questions to be Asked		10		5		10	5	
No. of Questions to be answered		10		5		5	3	
Marks for each question		1		2		5	10	
Total Marks for each section			10		10		25	30
	(Figures in parenthesis denotes, questions should be asked with the given K level)							

	Distribution of Marks with K Level						
K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5	4			9	7.5	17
K2	5	6			11	9.17	17
K3			25	20	45	37.5	37
K4			25	30	55	45.83	46
Marks	10	10	50	50	120	100	100
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels							
of K lev	eis.						

Section	A (Mu	ıltiple Cho	ice Questions)
Answei	r All Q	uestions	(10x1=10 marks)
Q.No	CO	K Level	Questions
1	CO1	K1	
2	CO1	K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	
6	CO3	K2	
7	CO4	K1	
8	CO4	K2	
9	CO5	K1	
10	CO5	K2	
Section	B (She	ort Answer	rs)
Answei	r All Q	uestions	(5x2=10 marks)
Q.No	CO	K Level	Questions
11	CO1	K1	
12	CO2	K1	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
Section	C (Eit	her/Or Ty	pe)
Answei	r All Q	uestions	(5 x 5 = 25 marks)
Q.No	CO	K Level	Questions
16) a	CO1	K3	
16) b	CO1	K3	
17) a	CO2	K2	
17) b	CO2	K2	
18) a	CO3	K2	
18) b	CO3	K2	
19) a	CO4	K3	
19) b	CO4	K3	
20) a	CO5	K4	
20) b	CO5	K4	
NB: Hi	gher le	vel of perf	ormance of the students is to be assessed by attempting higher
level of	K leve	ls	
Section	D (Op	en Choice	
Answe	r Any '	Three ques	stions (3x10=30 marks)
Q.No	CO	K Level	Questions
21	CO1	K3	
22	CO2	K2	
23	CO3	K2	
24	CO4	K3	
25	CO5	K4	

Summative Examinations - Question Paper – Format



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) **DEPARTMENT OF PHYSICS** (For those who joined in 2021-2022 and after)

Course Nan	ne	BIOPHYSICS								
Course Cod	le	21UPHS21						L	P	С
Category		Skill	2	-	2					
Nature of course:		EMPLOYABILITY SKILL ORIENTED ✓ ENTREPRENEURSHIP								
Course Obj	jectiv	ves:								
 The students To unde an atom. To reme To apply To unde To reme To reme 	s will erstar embe y the erstar mbe Basi	l be able: nd the electromagnetic rad r the radio activities and th concepts of biophysics in nd the structure of molecular <u>r the different molecular n</u> ic Biophysics	iatio neir inst ar c nech	on spectrum and applications. truments. omponents of cel nanisms.	arrang 1, lipi	gen ds a	nents of electro and nuclides.	n in o	rbital	s in
Flectromagn	petic	Radiation –Flectronic	C	onfiguration-Qua	ntum	N	Jumbers – R	ules	for	the
arrangement	ts of	Electrons in Orbitals –Hyl	brid	ization – Types c	of Hvb	orid	lization.	uics	101	the
Unit: II	Rad	iation Biophysics	0110	indución Types e	<u>111</u>	/110			6	
Non – Ionisi	ing F	Radiation- Ionising Radiati	ion -	– Radioactivity –	Prop	erti	ies of Radioacti	vitv –	Type	s of
Radiation-	Alph	a Rays – Beta Rays – G	amr	na Rays- X-Ray	s Neu	itro	on-Application	of Ra	diatio	n –
Carbon Dati	ing –	Clinical Diagnosis – X-ra	ıy R	adiography- Coi	npute	d T	Comography.			
Unit: III	Inst	rumentation in Biophysics	S						6	
Microscopy	– L	ight Microscopy –Fluores	scer	nce Microscopy -	– Eleo	ctro	on Microscopy-	Tran	smiss	sion
Electron Mi	crose	cope – Scanning Electron I	Mic	roscope – Instrui	nenta	tior	n of MRI –Ator	nic A	bsorp	tion
Spectroscop	y (A	AAS).								
Unit: IV	Cell	ular Biophysics							6	
Prokaryotes	and	Eukaryotes - Molecular (Con	nponents of Cell	– Car	bol	hydrates – Lipi	ds _ P	rotei	ns –
Nucleic Aci	ds									
Unit: V	Phy	sics of Biomolecules							6	
Molecular F	Force	s – Strong Force- Inter-Me	olec	cular Weak Force	s- Str	uct	ural Organizati	on of	Prote	ins-
Structural C	Orgar	nization of Nucleic Acids	s-Mo	olecular Mechan	ism o	fC	Genetic Informa	tion '	Trans	fer-
Genetic Co	de-1	ransfer of Genetic Info	orma	ation –Molecula	r Me	cha	anism of Prote	ein S	ynthe	S1S -
Principle of	NIOI	ecular Recognition.				To	tal Lastura IIa		20 11	140
						10	al Lecture no	urs	30 П	rs
Books for S	study	y:								
1. Mo	gant	yR.Rajeswari, An Introdu	ucti	on to Biophysic	s, Fir	st l	Edition, Rastog	i Pub	licatio	ons,
Nev	v De	elhi								
Uni	t: I	Page.No : 1 - 2 ; 10 - 22								
Uni	t:II	Page No: 314 – 323, 328-3	330							
Uni	t:III	Page No: 299 – 305; 292	2-29	4 ;297 , 298						
2. P.K	.Sriv	vastava, Elementary Biop	hys	ics,Second Editi	on, Na	aro	sa Publishing H	louse.		
Uni	t IV:	85-100					_			
Academ	nic C	Council Meeting Held On	29.	.04.2021				Pa	ge 40	•

Unit V: 7.1 to 7.10

Books for References:

1. Bio-Physics, Moan P. Arora, First edition (2004), Himalaya Publishin house.

2.Bio-Physics, Vasanthapattabi, N.Gautham, Reprint 2005, Narosa publishing House.

3.Bio-Physics principles and techiques – M.A. Subramanian, MJP publishers, 2005.

Web Resources:

- 1. <u>https://onlinecourses.nptel.ac.in/noc20_cy33/preview</u>
- 2. <u>https://nptel.ac.in/courses/115/101/115101121/</u>
- 3. <u>https://onlinecourses.nptel.ac.in/noc20_ph02/preview</u>

Course	e Outcomes	K Level
After s	successful completion of the course, the student is expected to	
CO1.	Understand Electronic Configuration, Ionising Radiation, Basic concepts	K)
COI.	microscopy, Molecular Components of Cell, Molecular Forces.	K2
	Application of Rules for the arrangements of Electrons in Orbitals,	
CO2:	Application of Radiation Carbon Dating, Electron Microscopy,	K3
	Carbohydrates, Structural Organization of Proteins.	
	Analyse the structure of atoms, Properties of Radioactivity, Magnetic	
CO3:	Resonance Image, Proteins, Molecular Mechanism of Genetic Information	K3
	Transfer.	
CO4.	Evaluate Hybridization, X-ray Radiography, Atomic Absorption Spectroscopy,	V A
04:	Nucleic Acids, Molecular Mechanism of Protein Synthesis.	N 4
CO5.	Influence of Types of Hybridization ,Clinical Diagnosis ,Techniques, Hetro	V A
005:	Macromolecules, Molecular Recognition	N 4

CO & PO Mapping:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	3	3	3	1
CO 2	3	3	3	1	3	2
CO 3	3	2	1	2	3	2
CO 4	3	2	2	2	3	2
CO5	3	3	2	2	3	2

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

UNIT	Bio Physics	Hrs	Pedagogy
Ι	Electro Magnetic Radiation –Electronic Configuration-Quantum Numbers – Rules for the arrangements of Electrons in Orbitals – Hybridization – Types of Hybridization	6	Lecture, Chalk&Talk, PPT
II	Non – Ionising Radiation- Ionising Radiation – Radioactivity – Properties of Radioactivity –Types of Radiation- Alpha Rays – Beta Rays – Gamma Rays- X-Rays Newtron-Application of Radiation – Carbon Dating – Clinical Diagnosis – X-ray Radiography- Computed Tomography.	6	Lecture, Chalk&Talk, Demonstration
III	Microscopy – Light Microscopy –Fluorescence Microscopy – Electron Microscopy- Transmission Electron Microscope – Scanning Electron Microscope – Instrumentation of MRI –Atomic Absorption Spectroscopy (AAS)	6	Lecture, Chalk&Talk, PPT
IV	Prokaryotes and Eukaryotes - Molecular Components of Cell – Carbohydrates – Lipids _ Proteins – Nucleic Acids	6	Lecture, Chalk&Talk, PPT
V	Molecular Forces – Strong Force- Inter-Molecular Weak Forces- Structural Organization of Proteins- Structural Organization of Nucleic Acids-Molecular Mechanism of Genetic Information Transfer- Genetic Code-Transfer of Genetic Information – Molecular Mechanism of Protein Synthesis- Principle of Molecular Recognition	6	Lecture, Chalk&Talk, PPT

Course Designed by: 1. Dr.R.Sangeetha, 2. Dr.S.S.Jayabalakrishnan



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF PHYSICS (For those who joined in 2021-2022 and after)

Course Name	BASICS OF C PR	OGRA	MMING							
Course Code	21UPHS22		L	P	С					
Category	Skill	2	-	2						
Nature of course:	EMPLOYABILITY SKILL ORIENTED 🗸 ENTREPRENEURSHIP									
Course Objectives:										
 The learners will be able: To remember Programming fundamentals, Program Development Life Cycle and Algorithm. To understand the Data types, variables and constants. To understand simple, compound expressions and classification of Operators. To understand statements, classification of statements and branching statements. 										
Unit: I Pro	gramming fundamen	itals					6			
Programming for	undamentals – Progra	ım Dev	velopment Life Cycl	e – A	lgorithm – Contro	ol stru	uctur	es –		
Flow chart – Ps	eudo code – Programi	ming p	aradigms.							
Unit: II Dat	ta types, variables and	d const	tants				6			
Introduction – C	C standards – Learnin	g prog	ramming language a	nd na	tural language: A	n ana	logy	– C		
Character set –	identifiers and keywo	rds – d	leclaration statement	- D	ata types – type	quali	fiers	and		
type modifiers	- difference betwee	en decl	aration and definiti	on –	data object, L-	value	and	R-		
value – Variab	les and constants –	Structu	ure of a C program –	Exec	uting a C program	•				
Unit: III Ope	erators and Expression	ons					6			
Introduction –	Expression – simple	and o	compound express	ions -	- classification of	f Ope	erator	rs –		
Combined prec	edence of all operator	rs – re	ading strings from t	ne ke	yboard – printing	string	gs on	the		
screen – unform	natted functions.									
Unit: IV Dec	cision making statem	ents					6			
Introduction – s	tatements- classificat	ion of	statements – branchi	ng sta	tements.					
Unit: V Loc	ping statements						6			
Iteration statem	ents. Storage class: St	orage	duration – life time of	of an c	bject – storage cla	asses.				
Total Lecture Hours 30 Hrs										
Books for Study:										
1. Anita Goel, Ajay Mittal, Computer Fundamentals and Programming in C , Pearson, New										
Delhi, 2014. * Unit – J: Page No 2 25 – 2 35										
* Unit	- II : Page No 3.1 - 3	3.18.								
* Unit	 * Unit – III :Page No 4.1 – 4.32. 									

* Unit – IV : Page No 5.1 – 5.22.

* Unit – V :Page No 5.23 – 5.33, 10.1 – 10.9.

Books for References:

- 1. S.Ramasamy and P.Radhaganesan, **Programming in C (II Edition**), Scitech Publication (India) Private Limited, Chennai, 2010.
- 2. Byron Gottfried, **Programming with C** (**III Edition**), Tata McGraw Hill, New Delhi, 2012. **Web Resources:**
- 1. <u>https://www.google.com/url?sa=t&source=web&rct=j&url=https://m.youtube.com/watch%3Fv%3</u> D8PopR3x-VMY&ved=2ahUKEwiwj
 - nLn4LwAhXBILcAHdt9DtQQ28sGMA16BAgiEAc&usg=AOvVaw2YkCT2pE9EcsefuPr5ulDW
- 2. <u>https://www.google.com/url?sa=t&source=web&rct=j&url=https://m.youtube.com/watch%3Fv%3</u> <u>DKJgsSFOSQv0&ved=2ahUKEwiwj-</u>
 - nLn4LwAhXBILcAHdt9DtQQ28sGMA56BAgiEEI&usg=AOvVaw0yXF91f-O9M6mNzEx9n5q_
- 3. <u>https://www.google.com/url?sa=t&source=web&rct=j&url=https://m.youtube.com/watch%3Fv%3</u> Dqr7x2oAUp5k&ved=2ahUKEwicxIm9oILwAhVx7HMBHWjAA5A4ChCjtAF6BAgIEAQ&usg=A OvVaw3Jax4nzYCtoC0f9CRXTpNQ

Course	Course Outcomes				
On successful completion of the course, students will be able:					
CO1:	Recalling and Understanding concepts of the fundamentals of programming.	K2			
CO2:	Build the knowledge in the building blocks of C.	K3			
CO3:	Qualify the students with the basic knowledge of C programming.	K3			
CO4:	Utilize the statements, classification of statements and branching statements.	K4			
CO5:	Build the skill in writing C-language program.	K4			

CO & PO Mapping:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	3	2	3	1
CO 2	3	1	3	3	1	3
CO 3	2	2	2	3	2	1
CO 4	3	3	2	3	1	2
CO5	3	3	2	2	3	3

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

Unit	Basics of C Programming	Hrs	Pedagogy
Ι	Programming fundamentals – Program Development Life Cycle – Algorithm – Control structures – Flow chart – Pseudo code – Programming paradigms.	6	Lecture, Chalk&Talk, Demonstration
П	Introduction – C standards – Learning programming language and natural language: An analogy – C Character set – identifiers and keywords – declaration statement - Data types – type qualifiers and type modifiers – difference between declaration and definition – data object, L-value and R-value – Variables and constants – Structure of a C program – Executing a C program.	6	Lecture, Chalk&Talk, Demonstration
III	Introduction – Expression – simple and compound expressions – classification of Operators – Combined precedence of all operators – reading strings from the keyboard – printing strings on the screen – unformatted functions.	6	Lecture, Chalk&Talk, Demonstration
IV	Introduction – statements– classification of statements – branching statements.	6	Lecture, Chalk&Talk, Demonstration
V	Iteration statements. Storage class: Storage duration – life time of an object – storage classes.	6	Lecture, Chalk&Talk, Demonstration

Course Designed by: 1. Dr.S.Francis, 2. Dr.R.Sangeetha



Academic Council Meeting Held On 17.05.2022



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF PHYSICS (For those who joined in 2021-2022 and after)

Course Name	ELI	ECTRICITY						
Course Code	21UPHC31							С
Category	Cor	e				4	-	4
Nature of cour	se:	EMPLOYABILITY	✓	SKILL ORIENTED	ENTREP	RENE	EURS	HIP
COURSE OBJ	ЕСТ	IVES:						
The learners will be able to: 1. Remember the Coulomb's Law, Flux of an Electric Field, Capacitors and Capacitance, Kirchhoff's Law, RMS Current. 2. Recall the Relation between Electric field and Potential, Flux of an Electric Field, Combination of Capacitors, Drift speed, Simple AC Circuits. 3. Analyze about Torque on an Electric Dipole placed in an Electric Field, Earthing a conductor, Corona Discharge, Temperature Dependence of Resistivity, AG Generator 4. Understand the Potential Energy of a Dipole, Spherical Charge Distribution, Electric Field due to a point charge, Stretched-wire potentiometer, Vector Method to Find the Current in an AC Circuit. 5. Reveal the Electric Field inside a Conductor, Application of Gauss's Law, Parallel-plate Capacitor with a Dielectric, Wheatstone Bridge, Hot-wire Instruments. Unit: I Electric Field and Potential 12 Electric charge - Coulomb's Law - Electric Field - Lines of Electric Force - Electric Potential Energy of Electric Force - Electric Potential								
field and Poten Potential Energy	tial -	Electric Dipole - Torque	e on Inifo	an Electric Dipole pla rm Electric Field - C	ced in an	Electi Insul	ric Fi lators	eld -
Semiconductors	s - Th	e Electric Field inside a C	Cond	uctor.	, ondee to 15,	11150	ator	unu
Unit: II Ga	uss's	Law					1	2
Flux of an Elec Coulomb's Lav conductor.	etric l v - 2	Field through a Surface - Application of Gauss's I	Soli Law	id Angle - Gauss's Lav - Spherical Charge	w and its I Distribution	Deriva n - E	tion Earthi	from ng a
Unit: III Ca	pacit	ors					1	.2
Capacitors and Capacitance - Calculation of Capacitance - Combination of Capacitors - Force between the Plates of a Capacitors - Energy Stored in a Capacitors and Energy Density in Electric Field - Dielectrics - Parallel-plate Capacitor with a Dielectric - An Alternative Form of Gauss's Law - Electric Field due to a point charge q placed in an Infinite Dielectric - Energy in the Electric field in a Dielectric - Corona Discharge.								
Unit: IV Ele	ctric	Current In Conductors					1	.2
Electric Current and current Density - Drift speed - Ohm's Law - Temperature Dependence of Resistivity - Battery and e.m.f Energy Transfer in an Electric Circuit - Kirchhoff's Law - Combination of Resistors in Series and Parallel - Grouping of Batteries - Wheatstone Bridge – Desauty's Bridge- Ammeter and Voltmeter - Stretched-wire potentiometer - Charging and discharging of Capacitors. Unit: V Alternating Current 12								
Alternating Current 12 Alternating Current - AC Generator or AC Dynamo - Instantaneous and RMS Current - Simple AC Circuits - Vector Method to Find the Current in an AC Circuit - More AC Circuits - Power in AC Circuits - Choke Coil - Hot-wire Instruments.								

	Total Lecture Hours	60					
Book f	for Study:						
H.C.V	erma, "Concepts of Physics - Volume 2", Bharati Bhawan (Publishers & Distribu	utors), New					
Delhi,	2020	,,					
Unit –	I: Chapter 29						
Section	n – 29.1 to 29.13, Worked Out Examples						
Unit –	II: Chapter 30						
Section	n – 30.1 to 30.6, Worked Out Examples						
Unit –	III: Chapter 31						
Section	n – 31.1 to 31.11, Worked Out Examples						
Unit –	IV: Chapter 32						
Section	n - 32.1 to 37.13, Worked Out Examples						
Unit –	V: Chapter 39						
Section	n – 39.1 to 39.9, Worked Out Examples						
Books	for Reference:						
1. Nara	ayanamoorthy & Nagarathinam, Electricity & Magnetism , National Publishing C	20.					
2. Sehg	gal, Chopra & Sehgal, Electricity & Magnetism, Sultan Chand & Sons, New Del	hi, 1998.					
3. Brij	Ial & Subramaniyam, Electricity & Magnetism, S.Chand & Co. 20 th Revise	ed Edition,					
New D	elhi, 2007.						
4. R.N	Aurugesan, Electricity & Magnetism, S.Chand & Co., 9 th , Revised						
Edition	n, New Delhi, 2011.						
5. D. F	falliday Resnick, Jearl Walker, Fundamental of physics , Wiley India Pvt						
Ltd., 6	"Edition						
Web R							
https://	youtu.be/KAOZZMMstX4						
https://	youlu.be/nGQbA2jWKWI						
https://	youtu.be/x1-S1DW1P1V14						
https://	youtu.be/Pu9fi i diLiCA						
https://	youtu.be/ThJOAXISFE : IISt-PLyQSIV / A0102514IIIKyUIOILaOC21K0PC5j						
https://	youlu.be/Zu2gomaDqmWisils=PLyQSN/Z0102514mKy0101LaOC2nK0PC5j						
2007/r	equinas/						
	SE OUTCOMES reassful completion of the course, the students will be able to	K Level					
	Explain Coulomb's Law Flux of an Electric Field Canacitors and						
CO1	Capacitance, Electric Current and current Density Alternating Current	K2					
	Solve the Electric Potential due to a Point Charge Gauss's Law from						
CO2	Coulomb's Law, Combination of Capacitors, Combination of Resistors in	K3					
	Series and Parallel. Simple AC Circuits						
	Calculate Potential Energy of a Dipole. Flux of an Electric Field Energy						
CO3	CO3 Stored in a Capacitors and Energy Density in Electric Field. Current in an AC K3						
	Circuit, Power in AC Circuits						
<i></i>	Discuss about the Electric Field inside a Conductor. Application of Gauss's						
CO4	Law, Stretched-wire potentiometer, Grouping of Batteries.	K4					
	Illustrate the Potential Energy of a Dipole. Spherical Charge Distribution						
CO5	Parallel-plate Capacitor with a Dielectric. Wheatstone Bridge. Hot-wire	К4					
	Instruments.						
		1					

CO & PO Mapping:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	3	2	2	3
CO 2	3	3	2	2	2	3
CO 3	3	3	1	2	1	2
CO 4	3	2	1	1	1	2
CO5	3	1	2	1	1	2

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

UNIT	ELECTRICITY	Hrs	Mode
I	<i>Electric Field and Potential</i> Electric charge - Coulomb's Law - Electric Field - Lines of Electric Force - Electric Potential Energy - Electric Potential - Electric Potential due to a Point Charge - Relation between Electric field and Potential - Electric Dipole - Torque on an Electric Dipole placed in an Electric Field - Potential Energy of a Dipole placed in a Uniform Electric Field - Conductors, Insulators and Semiconductors - The Electric Field inside a Conductor	12	Chalk & Talk, Videos and PPT
II	<i>Gauss's Law</i> Flux of an Electric Field through a Surface - Solid Angle - Gauss's Law and its Derivation from Coulomb's Law - Application of Gauss's Law - Spherical Charge Distribution - Earthing a conductor.	12	Chalk & Talk, Videos and PPT
III	Capacitors Capacitors and Capacitance - Calculation of Capacitance - Combination of Capacitors - Force between the Plates of a Capacitors - Energy Stored in a Capacitors and Energy Density in Electric Field - Dielectrics - Parallel-plate Capacitor with a Dielectric - An Alternative Form of Gauss's Law - Electric Field due to a point charge q placed in an Infinite Dielectric - Energy in the Electric field in a Dielectric - Corona Discharge.	12	Chalk & Talk, Videos and PPT
IV	<i>Electric Current In Conductors</i> Electric Current and current Density - Drift speed - Ohm's Law - Temperature Dependence of Resistivity - Battery and e.m.f - Energy Transfer in an Electric Circuit - Kirchhoff's Law - Combination of Resistors in Series and Parallel - Grouping of Batteries - Wheatstone Bridge - Desauty's Bridge Ammeter and Voltmeter - Stretched-wire potentiometer - Charging and discharging of Capacitors.	12	Chalk & Talk, Videos and PPT
V	Alternating Current Alternating Current - AC Generator or Ac Dynamo - Instantaneous and RMS Current - Simple AC Circuits - Vector Method to Find the Current in an AC Circuit - More AC Circuits - Power in AC Circuits -	12	Chalk & Talk, Videos and PPT

Choke Coil - Hot-wire Instruments.	

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)								
			Section	n A	Section	n B	Section C	Section	
Internal	Cos	K Level	MCQ)s	Short Ans	swers	Either or	D	
	005		No. of.	K -	No. of.	K –	Choice	Open Choice	
			Questions	Level	Questions	Level			
CI	CO1	Up to K3	2	K1,K2	1	K1	2(K2&K2)	1 K2	
AI	CO2	Up to K3	2	K1,K2	2	K2	2(K3&K3)	1 K3	
CI	CO3	Up to K4	2	K1,K2	1	K1	2(K3&K3)	1K3	
AII	CO4	Up to K4	2	K1,K2	2	K2	2(K4&K4)	1 K4	
	Que	No. of estions to e asked	4		3		4	2	
Question Pattern CIA I & II	Que	No. of estions to answered	4		3		2	1	
	Marl q	ts for each uestion	1		2		5	10	
	Tot	al Marks or each section	4		6		10	10	

***Note:** It is the decision of the course teacher to ask 2 Questions in any unit under section-B (short answer questions)

		Distr	ibution of M	arks with	K Level	CIAI&	CIA II		
	K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either / Or Choice)	Section D (Open Choice)	Total Mark s	% of (Mark s withou t choice)	Consolidat e of %	
	K1	2	2			4	8	60	
	K2	2	4	10	10	26	52	00	
СТ	K3			10	10	20	40	40	
Δ	K4								
T	K5								
•	Marks	4	6	20	20	50	100	100	
	K1	2	2			4	8	20	
	K2	2	4			6	12	20	
CI	K3			10	10	20	40	40	
Α	K4			10	10	20	40	40	
Π	K5								
	Marks	4	6	20	20	50	100	100	

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)									
SI.N o	COs	K - Level	MCC No. of Questions)s K – Level	Short An No. of Question	swers K – Level	Section C (Either / or Choice)	Section D (Open Choice)	
1	CO1	K2	2	K1,K2	1	K2	2(K2,K2)	1(K2)	
2	CO2	K3	2	K1,K2	1	K2	2(K3,K3)	1(K3)	
3	CO3	K3	2	K1,K2	1	K2	2(K3,K3)	1(K3)	
4	CO4	K4	2	K1,K2	1	K2	2(K4,K4)	1(K4)	
5	CO5	K4	2	K1,K2	1	K2	2(K4,K4)	1(K4)	
No	of Quest. Aske	ions to be ed	10		5		10	5	
No.of Questions to be answered		10		5		5	3		
Marks for each question			1		2		5	10	
Total Marks for each section			10		10		25	30	
	(Figures	in parenthesi	s denotes, qu	estions s	hould be asl	ked with	the given K	level)	

	Distribution of Marks with K Level									
K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %			
K1	5		-	-	5	4	22			
K2	5	10	10	10	35	29				
K3	-	-	20	20	40	33.5	33			
K4	-	-	20	20	40	33.5	34			
Marks	10	10	50	50	120	100	100			
NB: Higher level of performance of the students is to be assessed by attempting higher level										
of K lev	els.									

Section	A (Mu	Itiple Choi	ice Questions)
Answei	r All Qı	uestions	(10x1=10 marks)
Q.No	CO	K Level	Questions
1	CO1	K1	
2	CO1	K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	
6	CO3	K2	
7	CO4	K1	
8	CO4	K2	
9	CO5	K1	
10	CO5	K2	
Section	B (Sho	ort Answer	s)
Answei	r All Qı	uestions	(5x2=10 marks)
Q.No	CO	K Level	Questions
11	CO1	K2	
12	CO2	K2	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
Section	C (Eit	her/Or Tyj	pe)
Answei	r All Qu	uestions	(5 x 5 = 25 marks)
Q.No	CO	K Level	Questions
16) a	CO1	K2	
16) b	CO1	K2	
17) a	CO2	K3	
17) b	CO2	K3	
18) a	CO3	K3	
18) b	CO3	K3	
19) a	CO4	K4	
19) b	CO4	K4	
20) a	CO5	K4	
20) b	CO5	K4	
NB: Hi	gher le	vel of perfo	ormance of the students is to be assessed by attempting higher level
of K lev	vels	~	
Section	D (Op	en Choice)	
Answei	r Any 'l	nree quest	tions (3x10=30 marks)
Q.No		K Level	Questions
21	COI	K2 K2	
22	CO_2	K3 K2	
23	CO_3	K3 V4	
24	CO4	K4 174	
25	005	К4	

Summative Examinations - Question Paper – Format



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF PHYSICS (For those who joined in 2021-2022 and after)

Course Name	MAG	SNETISM						
Course Code	21UP	РНС32				L	Р	С
Category	Core					4	-	4
Nature of cours	se: E	MPLOYABILITY	✓	SKILL ORIENTED	ENTREP	RENE	EURS	SHIP
COURSE OBJECTIVES:								
The learners will be able to:								
1. Remember th	e fund	amental concepts of N	Magn	etism.				
2. Recall Bio-Savart Law and Ampere's law.								
3. Analyze abou	it perm	anent magnets and ta	ngen	t galvanometer.				
4. Understand th	he mag	netic properties of ma	atter	and hysteresis				
5. Reveal the pr	opertie	es of electromagnetic	induc	ction			1	2
Unit: I Ma	gnenc	Fleid	d t	Deletion between Eles	tria and Ma			. <u>4</u> .1.1.a
Motion of a Ch	orgod	Don of Magnetic Field	IB- Mac	• Relation between Elec	Force on a c	igneti	c Fle	nuina
Wire - Torque o	argeu	rrent loop	Iviag	glietie Maglietie I		unen	i cai	rynig
Unit. II Ma	n a cu anotic	Field due to a Curre	nt				1	2
Biot-Savart Lay	$\frac{gnenc}{v}$ - M	agnetic Field due to	<u>a C</u> i	rrent in a straight wire	- Force be	etwee	n Pa	.≝ rallel
Currents - Field	due t	agnetic Piela due to		mere's I aw - Magnetic	Field at a	noin	n ra Edue	
Long Straight (⁷ urrent	t - Solenoid - Toroid	11	inpere s Law Magnetic	i iciu at a	pom	uue	to a
Unit: III Per	maner	nt Magnets					1	2
Magnetic poles	and B	ar Magnets - Torque	on a	Bar Magnet placed in a	Magnetic F	ield -	Mag	netic
field due to a B	ar Ma	gnet - Magnetic Scal	ar Po	tential - Terrestrial Mag	netism - D	eterm	inatio	on of
Dip at a Place	- Neu	tral point - Tangent	Gal	vanometer - Moving-co	il Galvanor	neter	- sh	unt -
Tangent Law o	f Perp	endicular Fields - D	eflec	tion Magnetometer - O	scillation N	lagne	tome	ter –
Determination of	of M+E	B _H		C		U		
Unit: IV Ma	gnetic	properties of Matter					1	2
Magnetization	of Ma	terials: Intensity of	Magi	netization - Paramagent	ism, Ferror	magn	etism	and
Diamagnetism -	- Mag	netic Intensity H - M	lagne	etic Susceptibility - Peri	neability -	Curie	e's La	aws -
Properties of	Dia- ,	Para- and Ferro- ma	gnet	ic Substances - Hystere	sis - Soft 1	fron a	and S	Steel-
Superconductiv	ity.							
Unit: V Ele	ctroma	ignetic Induction					1	.2
Faraday's laws	of Ele	ctromagnetic Induction	on -	Lenz's Law - The origin	n of Induce	d e.n	n.f - 1	Eddy
current - Self-in	nductio	on - Growth and Dec	ay o	f current in an LR Cir	cuit - Energ	gy sto	ored	in an
Inductor - Mutu	al Indu	iction - Induction coil	•					
Total Lecture Hours60								
Book for Study					1 0 D'		``	NT
H.C. Verma, "Concepts of Physics - Volume 2", Bharati Bhawan (Publishers & Distributors), New Dolbi 2020								
Delni, 2020								
Unit – I. Chapter 34								
Section $= 34.1$ to 34.6 Worked Out Examples								
Unit – II: Chan	ter 35		00					

Section – 35.1 to 35.8, Worked Out Examples Unit – III: Chapter 36 Section – 36.1 to 36.14, Worked Out Examples Unit – IV: Chapter 37 Section – 37.1 to 37.9, Worked Out Examples Unit – IV: Chapter 38 Section – 38.1 to 38.9, Worked Out Examples Books for Reference: 1. Narayanamoorthy & Nagarathinam, Electricity & Magnetism, National Publishing Co. 2. Sehgal, Chopra & Sehgal, Electricity & Magnetism, Sultan Chand & Sons, New Delhi, 1998. 3. Brijlal & Subramaniyam, Electricity & Magnetism, Sultan Chand & Co. 20 th Revised Edition, New Delhi, 2007. 4. R.Murugesan, Electricity & Magnetism, S.Chand & Co., 9 th , Revised Edition, New Delhi, 2011. 5. D. Halliday Resnick, Jearl Walker, Fundamental of physics, Wiley India Pvt Ltd., 6 th Edition Web Resources: https://youtu.be/rAOZZmMstX4 https://youtu.be/rAOZZmMstX4 https://youtu.be/rAOZZmMstX4 https://youtu.be/rAOZZmMstX4 https://youtu.be/rX15b?fist=PLyQSN7X0ro2314mKyUiOILaOC2hk6Pc3j https://youtu.be/rX15F2?list=PLyQSN7X0ro2314mKyUiOILaOC2hk6Pc3j https://ocw.mit.edu/course/physics/8-02-physics-ii-electricity-and-magnetism-spring- 2007/readings/ COULSE OUTCOMES On successful completion of the course, the students will be able to COI: Explain Magnetic Field B, Bio-Savart Law, Permanent Magnets, Magnetic properties, Faraday's laws of Electromagnetic Induction - Len/s Law Solve the Motion of a Charged Particle in a Uniform Magnetic Field, Magneti, Field due to a Current in a straight wire, Magnetic field due to a Bar Magnet, Intensity of Magnetization, Growth and Decay of current in an LR Magneti, Field due to a Current loop, Slenoid, Deflection Magnetometer, CO4: Co2: Biccuss about Torque on a current loop, Solenoid, Deflection Magnetometer, Fuporeties of Dia, Para and Ferromagnetic Substances, Mutual Induction Fluxtrate Motion of a Charged Particle in a Uniform Magnetic Field, Magnetic Field at a point due to a Long, Straight Current, Oscillation K4			
Unit – III: Chapter 36 Section – 36.1 to 36.14, Worked Out Examples Unit – IV: Chapter 37 Section – 37.1 to 37.9, Worked Out Examples Books for Reference: 1. Narayanamoorthy & Nagarathinam, Electricity & Magnetism, National Publishing Co. 2. Sehgal, Chopra & Sehgal, Electricity & Magnetism, Sultan Chand & Sons, New Delhi, 1998. 3. Brijlal & Subramaniyam, Electricity & Magnetism, S.Chand & Co. 20 th Revised Edition, New Delhi, 2007. 4. R.Murugesan, Electricity & Magnetism, S.Chand & Co., 9 th , Revised Edition, New Delhi, 2011. 5. D. Halliday Resnick, Jearl Walker, Fundamental of physics, Wiley India Pvt Ltd., 6 th Edition Web Resources: https://youtu.be/kAOZZmMstX4 https://youtu.be/RJOXAJSHEP?list=PLyQSN7X0ro2314mKyUiOILaOC2hk6Pc3j https://youtu.be/Zu2gomaDqnM?list=PLyQSN7X0ro2314mKyUiOILaOC2hk6Pc3j https://youtu.be/Zu2gomaDqnM?list=PLyQSN7X0ro2314mKyUiOILaOC2hk6Pc3j https://youtu.be/Zu2gomaDqnM?list=PLyQSN7X0ro2314mKyUiOILaOC2hk6Pc3j https://youtu.be/Zu2gomaDqnM?list=PLyQSN7X0ro2314mKyUiOILaOC2hk6Pc3j https://youtu.be/Zu2gomaDqnM?list=PLyQSN7X0ro2314mKyUiOILaOC2hk6Pc3j https://youtu.be/Zu2gomaDqnM?list=PLyQSN7X0ro2314mKyUiOILaOC2hk6Pc3j https://youtu.be/Zu2gomaDqnM?list=PLyQSN7X0ro2314mKyUiOILaOC2hk6Pc3j https://youtu.be/Zu2gomaDqnM?list=PLyQSN7X0ro2314mKyUiOILaOC2hk6Pc3j https	Section	n - 35.1 to 35.8, Worked Out Examples	
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COURSE OUTCOMES On successful completion of the course, the students will be able toK LevelC01:Explain Magnetic Field B, Bio-Savart Law, Permanent Magnets, Magnetic properties, Faraday's laws of Electromagnetic Induction - Lenz's LawK2C02:Solve the Motion of a Charged Particle in a Uniform Magnetic Field, Magnetic Field due to a Current in a straight wire, Magnetic field due to a Bar Magnet, Intensity of Magnetization, Growth and Decay of current in an LRK3C03:Calculate Torque on a current loop, Filed due to a Circular Current, Tangent Law of Perpendicular Fields, Eddy currentK3C04:Discuss about Torque on a current loop, Solenoid, Deflection Magnetic Field, Properties of Dia, Para and Ferromagnetic Substances, Mutual InductionK4C05:Illustrate Motion of a Charged Particle in a Uniform Magnetic Field, Magnetic Field at a point due to a Long, Straight Current, OscillationK4	2007/re	eadings/	
On successful completion of the course, the students will be able toK LevelCO1:Explain Magnetic Field B, Bio-Savart Law, Permanent Magnets, Magnetic properties, Faraday's laws of Electromagnetic Induction - Lenz's LawK2CO2:Solve the Motion of a Charged Particle in a Uniform Magnetic Field, Magnetic Field due to a Current in a straight wire, Magnetic field due to a Bar Magnet, Intensity of Magnetization, Growth and Decay of current in an LRK3CO3:Calculate Torque on a current loop, Filed due to a Circular Current, Tangent Law of Perpendicular Fields, Eddy currentK3CO4:Discuss about Torque on a current loop, Solenoid, Deflection Magnetic Field, Properties of Dia, Para and Ferromagnetic Substances, Mutual InductionK4CO5:Illustrate Motion of a Charged Particle in a Uniform Magnetic Field, Magnetic Field at a point due to a Long, Straight Current, OscillationK4	COUI	RSE OUTCOMES	
CO1:Explain Magnetic Field B, Bio-Savart Law, Permanent Magnets, Magnetic properties, Faraday's laws of Electromagnetic Induction - Lenz's LawK2CO2:Solve the Motion of a Charged Particle in a Uniform Magnetic Field, Magnetic Field due to a Current in a straight wire, Magnetic field due to a Bar Magnet, Intensity of Magnetization, Growth and Decay of current in an LRK3CO3:Calculate Torque on a current loop, Filed due to a Circular Current, Tangent Law of Perpendicular Fields, Eddy currentK3CO4:Discuss about Torque on a current loop, Solenoid, Deflection Magnetor Properties of Dia, Para and Ferromagnetic Substances, Mutual InductionK4CO5:Magnetic Field at a point due to a Long, Straight Current, OscillationK4	On suc	ccessful completion of the course, the students will be able to	K Level
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CO2:Solve the Motion of a Charged Particle in a Uniform Magnetic Field, Magnetic Field due to a Current in a straight wire, Magnetic field due to a Bar Magnet, Intensity of Magnetization, Growth and Decay of current in an LRK3CO3:Calculate Torque on a current loop, Filed due to a Circular Current, Tangent Law of Perpendicular Fields, Eddy currentK3CO4:Discuss about Torque on a current loop, Solenoid, Deflection Magnetic Field, Properties of Dia, Para and Ferromagnetic Substances, Mutual InductionK4CO5:Magnetic Field at a point due to a Long, Straight Current, OscillationK4	COI:	properties, Faraday's laws of Electromagnetic Induction - Lenz's Law	K 2
CO2:Magnetic Field due to a Current in a straight wire, Magnetic field due to a Bar Magnet, Intensity of Magnetization, Growth and Decay of current in an LRK3CO3:Calculate Torque on a current loop, Filed due to a Circular Current, Tangent Law of Perpendicular Fields, Eddy currentK3CO4:Discuss about Torque on a current loop, Solenoid, Deflection Magnetometer, Properties of Dia, Para and Ferromagnetic Substances, Mutual InductionK4CO5:Illustrate Motion of a Charged Particle in a Uniform Magnetic Field, Magnetic Field at a point due to a Long, Straight Current, OscillationK4		Solve the Motion of a Charged Particle in a Uniform Magnetic Field,	
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CO3:Calculate Torque on a current loop, Filed due to a Circular Current, Tangent Law of Perpendicular Fields, Eddy currentK3CO4:Discuss about Torque on a current loop, Solenoid, Deflection Magnetometer, Properties of Dia, Para and Ferromagnetic Substances, Mutual InductionK4CO5:Illustrate Motion of a Charged Particle in a Uniform Magnetic Field, Magnetic Field at a point due to a Long, Straight Current, OscillationK4		Magnet, Intensity of Magnetization, Growth and Decay of current in an LR	
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CO4:Discuss about Torque on a current loop, Solenoid, Deflection Magnetometer, Properties of Dia, Para and Ferromagnetic Substances, Mutual InductionK4CO5:Illustrate Motion of a Charged Particle in a Uniform Magnetic Field, Magnetic Field at a point due to a Long, Straight Current, OscillationK4	CO3:	Law of Perpendicular Fields. Eddy current	K3
CO4:Properties of Dia, Para and Ferromagnetic Substances, Mutual InductionK4IllustrateMotion of a Charged Particle in a Uniform Magnetic Field, Magnetic Field at a point due to a Long, Straight Current, OscillationK4	~ ~ .	Discuss about Torque on a current loop. Solenoid. Deflection Magnetometer.	
CO5:IllustrateMotion of a Charged Particle in a Uniform Magnetic Field, Magnetic Field at a point due to a Long, Straight Current, OscillationK4	CO4:	Properties of Dia, Para and Ferromagnetic Substances, Mutual Induction	K4
CO5: Magnetic Field at a point due to a Long, Straight Current, Oscillation K4		Illustrate Motion of a Charged Particle in a Uniform Magnetic Field	
Magnatemater Darmashilty Energy stored in an Industor	CO5:	Magnetic Field at a point due to a Long. Straight Current. Oscillation	K4
Wagnetometer, renneadinty, Energy stored in an inductor		Magnetometer, Permeability, Energy stored in an Inductor	

CO & PO Mapping:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	1	2	2	2
CO 2	3	3	2	3	2	2
CO 3	3	3	1	1	2	2
CO 4	3	3	1	1	2	1
CO5	3	3	2	1	2	2

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

UNIT	MAGNETISM	Hrs	Mode
I	<i>Magnetic Field</i> Definition of Magnetic Field B - Relation between Electric and Magnetic Fields - Motion of a Charged Particle in a Uniform Magnetic Field - Magnetic force on a current carrying Wire - Torque on a current loop	12	Chalk & Talk, Videos and PPT
Ш	Magnetic Field due to a Current Biot-Savart Law - Magnetic Field due to a Current in a straight wire - Force between Parallel Currents - Filed due to a Circular Current - Ampere's Law - Magnetic Field at a point due to a Long, Straight Current - Solenoid - Toroid.	12	Chalk & Talk, Videos and PPT
ш	Permanent Magnets Magnetic poles and Bar Magnets - Torque on a Bar Magnet placed in a Magnetic Field - Magnetic field due to a Bar Magnet - Magnetic Scalar Potential - Terrestrial Magnetism - Determination of Dip at a Place - Neutral point - Tangent Galvanometer - moving-oil Galvanometer - shunt - Tangent Law of Perpendicular Fields - Deflection Magnetometer - Oscillation Magnetometer - Determination of M+B _H	12	Chalk & Talk, Videos and PPT
IV	Magnetic properties of Matter Magnetization of Materials: Intensity of Magnetization - Paramagnetism, Ferromagnetism and Diamagnetism - Magnetic Intensity H - Magnetic Susceptibility - Permeability - Curie's Laws - Properties of Dia-, Para-, and Ferromagnetic Substances - Hysteresis - Soft Iron and Steel- Superconductivity.	12	Chalk & Talk, Videos and PPT
v	<i>Electromagnetic Induction</i> Faraday's laws of Electromagnetic Induction - Lenz's Law - The origin of Induced e.m.f Eddy current - Self-induction - Growth and Decay of current in an LR Circuit - Energy stored in an Inductor - Mutual Induction - Induction coil.	12	Chalk & Talk, Videos and PPT

Learning Outcome Based Education & Assessment (LOBE)									
Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)									
			Section	n A	Section	n B		Section	
Internal	Cos	K Level	MCQ)s	Short Ans	swers	Section C Either or	D	
Internur	Cub		No. of. Questions	K - Level	No. of. Questions	K – Level	Choice	Open Choice	
CI	CO1	Up to K3	2	K1,K2	1	K1	2(K2&K2)	1 K2	
AI	CO2	Up to K3	2	K1,K2	2	K2	2(K3&K3)	1 K3	
CI	CO3	Up to K4	2	K1,K2	1	K1	2(K3&K3)	1K3	
AII	CO4	Up to K4	2	K1,K2	2	K2	2(K4&K4)	1 K4	
	Que	No. of estions to e asked	4		3		4	2	
Question Pattern CIA I & II	Que be a	No. of estions to answered	4		3		2	1	
	Marl q	ks for each uestion	1		2		5	10	
	Tot fo	tal Marks or each section	4		6		10	10	

***Note:** It is the decision of the course teacher to ask 2 Questions in any unit under section-B (short answer questions)

Distribution of Marks with K Level CIA I & CIA II									
	K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either / Or Choice)	Section D (Open Choice)	Total Mark s	% of (Mark s withou t choice)	Consolidat e of %	
	K1	2	2			4	8	60	
	K2	2	4	10	10	26	52	00	
	K3			10	10	20	40	40	
CIA	K4								
Ι	K5								
	Marks	4	6	20	20	50	100	100	
	K1	2	2			4	8	20	
CIA	K2	2	4			6	12	20	
	K3			10	10	20	40	40	
	K4			10	10	20	40	40	
11	K5								
	Marks	4	6	20	20	50	100	100	

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

Academic Council Meeting Held On 17.05.2022

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course									
SI.N o	COs	K - Level		2s	Short An	swers	Section C	Section D (Open Choice)	
			No. of Questions	K – Level	No. of Question	K – Level	(Either / or Choice)		
1	CO1	K2	2	K1,K2	1	K2	2(K2,K2)	1(K2)	
2	CO2	K3	2	K1,K2	1	K2	2(K3,K3)	1(K3)	
3	CO3	K3	2	K1,K2	1	K2	2(K3,K3)	1(K3)	
4	CO4	K4	2	K1,K2	1	K2	2(K4,K4)	1(K4)	
5	CO5	K4	2	K1,K2	1	K2	2(K4,K4)	1(K4)	
No. of Questions to be Asked			10		5		10	5	
No.of Questions to be answered			10		5		5	3	
Marks for each question			1		2		5	10	
Total	Marks for	each section	10		10		25	30	
(Figures in parenthesis denotes, questions should be asked with the given K level)									

Distribution of Marks with K Level									
K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %		
K1	5		-	-	5	4	22		
K2	5	10	10	10	35	29	55		
K3	-	-	20	20	40	33.5	33		
K4	-	-	20	20	40	33.5	34		
Marks	10	10	50	50	120	100	100		
NB: Higher level of performance of the students is to be assessed by attempting higher level									
of K levels.									

Section A (Multiple Choice Questions)							
Answer All Questions (10x1=10 marks)							
Q.No	CO	K Level	Questions				
1	CO1	K1					
2	CO1	K2					
3	CO2	K1					
4	CO2	K2					
5	CO3	K1					
6	CO3	K2					
7	CO4	K1					
8	CO4	K2					
9	CO5	K1					
10	CO5	K2					
Section	B (Shor	t Answers)					
Answer	All Que	estions	(5x2=10 marks)				
Q.No	CO	K Level	Questions				
11	CO1	K2					
12	CO2	K2					
13	CO3	K2					
14	CO4	K2					
15	CO5	K2					
Section	C (Eith	er/Or Type)					
Answer	(5 x 5 = 25 marks)						
Q.No	CO	K Level	Questions				
16) a	CO1	K2					
16) b	CO1	K2					
17) a	CO2	K3					
17) b	CO2	K3					
18) a	CO3	K3					
18) b	CO3	K3					
19) a	CO4	K4					
19) b	CO4	K4					
20) a	CO5	K4					
20) b	CO5	K4					
NB: Hig	gher leve	el of perforr	nance of the students is to be assessed by attempting higher level of K				
levels							
Section D (Open Choice)							
Answer	Any Th	Iree questio	IIS (3x10=30 marks)				
Q.NO		K Level	Questions				
21		KZ V2					
22	CO2	KJ V2					
23	CO_{4}	KJ V4					
24	CO4	K4					
25	005	К4					

Summative Examinations - Question Paper – Format



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF PHYSICS (For those who joined in 2021-2022 and after)

Course Name	MAJOR PHYSICS PRACTICAL – II									
Course Code	21UPHCP2						Р	С		
Category	Core					-	2	-		
Nature of Cour	rse:	EMPLOYABILITY	√	SKILL ORIENTED	ENTREP	RENE	EURS	SHIP		
COURSE OBJ	ECTI	VES:								
The learners w	The learners will be able to									
1. Develop expe	erimer	tal knowledge by handl	ling	various apparatus						
2. know the variation	ious c	omponents and its impo	rtan	ce						
3. Know the circ	cuit co	onnections and function	ing o	of experiments						
4. Analyse vario	ous typ	bes of measuring instrum	ment	S			_			
5.Gain knowled	ge in	using of Spot Reflection	n Ga	lvanometer, Table Galv	vanometer,	Polar	imete	er		
and Grating										
LIST OF EXP	ERIM	IENTS								
Any Fourteen	Exper	iments								
1. Tan C P	ositio	n	- D	etermination of m and B	H (Pole St	rength	of E	B _H)		
2. Field along the axis of the coil			- De	etermination of M horizo	ontal intens	sity				
			of	earth's magnetic field (Magnetic r	nome	nt of	B _H)		
3. Laurent	's Hal	f Shade Polarimeter	- Sp	becific rotatory power	c '1					
4. Potentio	meter		- 16	emperature Coefficient of	of a coll					
5. Potentio	meter		- CC	Somparison of EMF's						
0. Table G	alvalle flootio	n Calvanamatar	- v	oltage & Current sensiti	lvity					
7. Spot Re	flactio	n Galvanometer	- v	onage & Current sensiti	lvity					
9 Spot Re	flectio	n Galvanometer	- Comparison of EMF's							
10 Spot Reflection Galvanometer - Comparison of capacities										
11 Owen's Bridge - Determination of L										
12. DeSauty's Bridge $-C_1/C_2$										
13. Spectron	neter	0	- Dispersive Power of a Prism							
14. Spectron	neter		- Grating N and λ (Normal Incidence)							
15. Spectron	15. Spectrometer - Refractive index of liquid using hollow prim									
16. Newton	16. Newton's Rings - Radius of curvature of a convex Lens									
					Total 1	Hours	s 12	20hrs		

Book for Study:

1.Srinivasan.M.N., Balasubramanian.S., Ranganathan.R., **A Text Book of Practical Physics**, 2017 Edition Sultan Chand & Sons

Books for Reference:

1. Ouseph.C., Practical Physics and Electronics, 2013.S. Viswanathan.P.Ltd.

2.Hamam Singh Hemne, B.Sc.Practical Physics, 4/e S. Chand and Co. New Delhi, 2017

3.Shukla.R.K., Practical Physics, Second Edition **New Age International,2nd Edition.,New Delhi 4.**Gupta.S.L.,Kumar.V., PRACTICAL PHYSICS (H/E) **Pragati Prakashan.M.,2016,New Delhi. Web Resources:**

1. https://nptel.ac.in/course.html/physics/experimental physics I, II and III
| 2. <u>http</u>
3. http | <u>s://nptel.ac.in/courses/115/105/115105110/</u>
ps://www.youtube.com/playlist?list=PLuiPz6iU5SO8-rZn_LgLofRX7n8z4tHY | K | | | |
|---------------------------|---|----|--|--|--|
| COUR | COURSE OUTCOMES K Level | | | | |
| On suc | ccessful completion of the course, the students will be able to | | | | |
| CO1 | Apply the concepts of Field along the axis of the coil. | K3 | | | |
| CO2 | Acquire the knowledge of Physical optics using Spectrometer | K4 | | | |
| CO3 | Gain Knowledge in principles and applications of Potentiometer, wheatstone's Bridge applications and Spot reflection Galvanometer . | K2 | | | |
| CO4 | Understand the principles of Specific rotatory power in liquids | K2 | | | |
| CO5 | Apply skill in the field of Interference and Diffraction of Light. | K3 | | | |

CO & PO Mapping:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	1	2	3	2	2
CO 2	2	2	2	2	2	2
CO 3	3	2	3	2	2	1
CO 4	2	2	2	2	1	1
CO5	3	3	3	2	2	2

*3 – Advanced Application; 2 – Intermediate Development; 1 – Introductory Level

LESSON PLAN

Semester	LIST OF EXPERIMENTS	Hrs	Mode
Ш	 Tan C Position - Determination of m and B_H Table Galvanometer - Voltage & Current sensitivity Spot Reflection Galvanometer - Voltage & Current sensitivity Owen's Bridge - Determination of L Potentiometer - Comparison of EMF's Spot Reflection Galvanometer - Comparison of capacities Spectrometer - Grating N and λ (Normal Incidence Method) Spectrometer- Refractive index of liquid using hollow prim 	60	Demonstration



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF PHYSICS (For those who joined in 2021-2022 and after)

Course Code 21UCHA31 L P C Category Allied 4 - 4 Nature of course: EMPLOYABILITY SKILL ORIENTED ✓ ENTREPRENEURSHIP Course Objectives: ✓ ENTREPRENEURSHIP Course Objectives: ✓ Entrepreneurs of various elements. To make the students to understand the concepts behind the properties of various elements. To enable the learners to determine the structure of various molecules. I To enable the learners to determine the structure of various molecules. I I To imake the students on various types interactions and reactions in compounds. I I To make learn about the bonding in molecules. I I Unit: I Periodic Table and Atomic Properties I I Modern periodic table – salient features –Periodicity- Periodic properties – Causes of recurrence of properties- classification of elements as s, p, d and f-block elements – definitions of atomic volume, atomic and ionic radii, ionization potential, electron affinity and electronegativity and their variations along periods and groups – variation of metallic characters - Factors affecting the periodic properties- Periodic table anomalies. I Unit: II Chemical Bonding I I I I						
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molecular formula from percentage composition - Detection of nitrogen and halogens in organic						
molecular formatia from percentage composition Detection of introgen and halogens in organic						
compounds –Nomenclature of straight chain – mono and poly functional organic compounds.						
Inductive effect, mesomeric effect, resonance effect and hyper conjugation. Stereoisomerism –						
Chiral centre, optical activity of compounds containing one or two chiral centres. R–S notation –						
diastereoisomerism – racemisation – resolution- Geometrical isomerism of Maleic and Fumaric						
acids $-E-Z$ notation of geometrical isomers.						
Unit: IV Thermodynamics 12						
Importance of thermodynamics – terms used in thermodynamics – open and closed						
systems, state functions and path functions, extensive and intensive properties, reversible and						
irreversible processes- Statement and mathematical form of first law of thermodynamics - heat						
capacity at constant volume and pressure, relation between Cp and Cv.						
Statement of second law of thermodynamics - entropy - entropy as a thermodynamic function -						
dependence of entropy on variables of the system (T and P alone)- Physical significance of entropy						
– Gibb's free energy and its significance.						
Unit: VElectrolytes and Electrochemistry12						
Arrhenius theory of electrolytes - strong electrolytes - weak electrolytes - Ostwald's dilution						
law and its applications – ionic product of water and its application - solubility product.						
pH – definition – simple calculation of pH from molarity of acids and bases – buffer solution –						

definition – theory of buffer action- application- Acid –base indicators – working range of indicators – choice of indicators.

Commercial cells – primary and secondary cells – Weston cadmium cell – Lead storage cell – Electroplating - applications.

Total Lecture Hours 60 Hrs

Books for Study:

- 1. B.R. Puri, L.R. Sharma and K.C. Kalia, Principles of Inorganic Chemistry Mile Stone Publisher 31st Edition, New Delhi.
- 2. P.L. Soni, Text Book of Organic Chemistry, New Delhi.

Books for References:

- 1. R.D. Madan, S Chand, Modern Inorganic Chemistry band Co-Ltd., New Delhi.
- 2. J.D. Lee, Wiley India, Concise Inorganic Chemistry 5th Edition, New Delhi.
- 3. B.S Bahl and Arun Bahl S. Chand, Advanced Organic Chemistry.
- 4. B. Mehta and M. Mehta, Organic Chemistry E.E. Edition, New Delhi.
- 5. P.L. Soni and HM Chawla, Organic Chemistry 29th Edition, Sultan and Chand sons, New Delhi.

Web Resources:

https://	nptel.ac.in/courses/104/103/104103071/	
https://	nptel.ac.in/courses/104/101/104101121/	
Course	e Outcomes	K Level
CO1:	Outline the concepts behind the properties of all the elements.	K2
CO2:	Describe the structure of many types of molecules.	K2
CO3:	Interpret numerous types of interactions in compounds.	K3
CO4:	Compare and contrast different types of reactions.	K4
CO5:	Demonstrate various types of properties of molecules.	K3

CO & PO Mapping:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	2	1	1	1
CO 2	3	3	2	1	1	-
CO 3	2	2	2	1	-	1
CO 4	3	2	2	2	-	-
CO5	2	3	2	1	1	1

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
	Modern periodic table – salient features –Periodicity- Periodic properties – Causes of recurrence of properties- classification of elements as s, p, d and f-block elements	3	Chalk & talk
I	Variation of atomic volume ,atomic and ionic radii, ionization potential, electron affinity and electronegativity along period and groups – variation of metallic characters Self Study Topic : Factors affecting the periodic properties- Periodic table anomalies	9	Chalk & talk , Ppt,
	Ionic bond- Covalent bond- Fajan's rule- V.B. Theory – Postulates of V.B Theory – Application to the formation of simple molecules like H_2 and O_2 – overlap of atomic orbitals – VSEPR theory	6	Chalk & talk, videos
	s-s, p-p and s-p overlap – principle of hybridization – sp, sp ² and sp ³ hybridization – examples and geometry. Molecular orbital theory –MO diagram of H ₂ , He ₂ , N ₂ , O ₂ & F ₂ molecules.	6	Chalk & talk
ш	Empirical formula – molecular formula – structural formula – calculation of empirical formula and molecular formula from percentage composition - Detection of nitrogen and halogens in organic compounds –Nomenclature of straight chain – mono and poly functional organic compounds. Inductive effect, mesomeric effect, resonance effect and hyper conjugation. Stereoisomerism – Chiral centre, optical activity of compounds containing one or two chiral centres, R–S notation – diastereoisomerism – racemisation – resolution– E–Z notation of geometrical isomers. Self Study topic : Geometrical isomerism of Maleic and Fumaric acids	12	Ppt, Chalk & talk
IV	Importance of thermodynamics – terms used in thermodynamics – open and closed systems, state functions and path functions, extensive and intensive properties, reversible and irreversible processes- Statement and mathematical form of first law of thermodynamics – heat capacity at constant volume and pressure, relation between Cp and Cv.	6	video, Chalk & talk,
	Statement of second law of thermodynamics – entropy - entropy as a thermodynamic function – dependence of entropy on variables of the system (T and P alone)- Physical significance of entropy – Gibb's free energy and its significance.	6	Ppt, video, demonstration with models
V	Arrhenius theory of electrolytes – strong electrolytes – weak electrolytes – Ostwald's dilution law and its applications – ionic product of water and its application - solubility product. pH – definition – simple calculation of pH from molarity of acids and bases – buffer solution – definition – theory of buffer action- application- Acid –base indicators – working range of indicators – choice of indicators. Commercial cells – primary and secondary cells – Weston cadmium cell – Lead storage cell – Electroplating - applications.	12	Assignments and Seminar

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)							
Into			Section A		Section B		Section C	Section D
Inte rnal Co	Cos	K Level	MCQ No. of. Questions	s K - Level	Short An No. of. Questions	swers K - Level	Either or Choice	Open Choice
CI	CO1	K2	2	K1,K2	2	K1,K2	2	2
AI	CO2	K2	2	K1,K2	1	K2	2	1
CI	CO3	K3	2	K1,K2	1	K2	2	2
AII	CO4	K4	2	K1,K2	2	K3,K4	2	1
Question Pattern CIA I & II		No. of Questions to be asked	4		3		4	2
		No. of Questions to be answered	4		3		2	1
		Marks for each question	1		2		5	10
		Total Marks for each section	4		6		10	10

Course Designed by: Ms. N. Lakshmi Kruthika, Assistant Professor of Chemistry

	Distribution of Marks with K Level CIA I & CIA II							
	K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either / Or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
	K1	2	2	10	10	24	48	100
	K2	2	4	10	10	26	52	100
CIA	K3							
I	K4							
-	Marks	4	6	20	20	50	100	100
	K1	2				2	4	12
	K2	2	2			4	8	12
CIA	K3		2	10	10	22	44	44
II	K4		2	10	10	22	44	44
	Marks	4	6	20	20	60	100	100

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

S	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)							
		V	MC	Qs	Short An	swers	Section C	Section D
S.No	COs	K - Lovol	No. of	K –	No. of	K –	(Either /	(Open
		Level	Questions	Level	Question	Level	or Choice)	Choice)
1	CO1	Upto K2	2	K1, K2	1	K1	2 (K1&K1)	1 (K2)
2	CO2	Upto K2	2	K1, K2	1	K2	2 (K2&K2)	1 (K2)
3	CO3	Upto K3	2	K1, K2	1	K2	2 (K3&K3)	1 (K3)
4	CO4	Upto K4	2	K1, K2	1	K3	2 (K3&K3)	1 (K4)
5	CO5	Upto K3	2	K1, K2	1	K2	2 (K2&K2)	1(K3)
No. of Questions to be Asked		10		5		10	5	
No.of Questions to be answered		10		5		5	3	
Marks for each question		1		2		5	10	
Total Marks for each section		10		10		25	30	
	(Figures in parenthesis denotes, questions should be asked with the given K level)							

	Distribution of Marks with K Level							
K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %	
K1	5	2	10		17	14.66	57	
K2	5	6	20	20	51	42.5	57	
K3		2	20	20	42	35	35	
K4				10	10	8.33	8	
Marks	10	10	50	50	120	100	100	
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.								

Section A (Multiple Choice Questions)					
Answei	r All Q	uestions	(10x1=10 marks)		
Q.No	CO	K Level	Questions		
1	CO1	K1			
2	CO1	K2			
3	CO2	K1			
4	CO2	K2			
5	CO3	K1			
6	CO3	K2			
7	CO4	K1			
8	CO4	K2			
9	CO5	K1			
10	CO5	K2			
Section	B (She	ort Answer	rs)		
Answei	r All Q	uestions	(5x2=10 marks)		
Q.No	CO	K Level	Questions		
11	CO1	K1			
12	CO2	K2			
13	CO3	K2			
14	CO4	K3			
15	CO5	K2			
Section	C (Eit	her/Or Ty	pe)		
Answei	r All Q	uestions	(5 x 5 = 25 marks)		
Q.No	CO	K Level	Questions		
16) a	CO1	K1			
16) b	CO1	K1			
17) a	CO2	K2			
17) b	CO2	K2			
18) a	CO3	K3			
18) b	CO3	K3			
19) a	CO4	K3			
19) b	CO4	K3			
20) a	CO5	K2			
20) b	CO5	K2			
NB: Hi	gher le	vel of perf	ormance of the students is to be assessed by attempting higher		
level of	K leve	ls			
Section	D (Op	en Choice)			
Answei	r Any T	Three ques	tions (3x10=30 marks)		
Q.No	<u>CO</u>	K Level	Questions		
21	COI	K2			
22	CO2	K2			
23	CO3	K3			
24	CO4	K4			
25	CO5	K3			

Summative Examinations - Question Paper – Format



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF PHYSICS (For those who joined in 2021-2022 and after)

Course Name ALLIED CHEMISTRY PRACTICAL - I								
Course Co	de	21UCHAP1			L	Р	С	
Category		Allied			-	2	-	
Nature of c	ourse	EMPLOYABILITY	SKILL ORIENTED	✓ ENTREP	REN	URS	HIP	
COURSE	OBJI	ECTIVES:						
The objecti	ve of	this course is to make stude	ents obtain skill in					
1. Titr	imetr	ic analysis.						
2. Qua	intitat	ive estimation of substance	S.					
3. Rep	roduc	tion of the functional group	a present in organic mole	oulos				
4. Iden	litati	uton of the functional group	ounds	cules.				
J. Qua	VO	UMETRIC ANALYSIS	ounus.					
	1. E	stimation of Sodium Hydr	roxide					
	(Na ₂	CO ₃ X HCl X NaOH)	UARC					
	2. Es	stimation of Hydrochloric A	Acid					
	(H2 C	C2O4 X NaOH X HCl)						
	3. Es	stimation of Oxalic Acid						
	(FeS	O4 X KMnO4 X H2C2O4)						
Dowt I	4. Es	stimation of FAS					20	
ran - I		U4 X MMMU4 A FAS) stimation of Ferrous Sulnh	ata				30	
	С. Ц. (Н2С	204 X KMnO4 X FeSO4)	alt					
	6. E	stimation of KMnO4						
	(K2C	Cr2O7 X FAS X KMnO4)						
	7. Es	stimation of Sodium Hydro	oxide					
	(KM	InO4 X H2C2O4 X NaOH)						
	8. Es	stimation of Iodine						
	(KM	nO4 x Thio x Iodine)						
	SYS	TEMATIC ORGANIC Q	UALITATIVE ANALY	SIS				
	A st	udy of reactions of the follo	wing organic compounds	:				
	1. C	arbohydrate						
	2. A	mide						
	3. A	ldehyde						
	4. K	etone						
Part - II	5. M	lonocarboxylic acid					30Hrs	
		mino						
	7. A 8. Pl	nenol						
	9. N	itro compound						
	The	students may be trained	to perform the specific	reaction like	test f	for		
	elem	ent (nitrogen only), Alipha	tic or aromatic, saturated	or unsaturated	, colo	our		
	reac	tion, functional group prese	ent and record their observ	ation.				
	reac	tion, functional group prese	ent and record their observ	ation.	,			

	Total Practical Hou	rs 60						
Books	Books for Study: Material Given							
Book	for Reference:							
1.	Practical Chemistry, Dr. O.P Pandey, D. N Bajpai, Dr. S. Giri, S Chand & Co Lto	1						
COUR	SE OUTCOME	K Level						
After	completion of this course, the students will be able to							
CO1:	Develop skill in titrimetric analysis.	K1						
CO2:	Interpret the redox reactions.	K2						
CO3:	identify the functional groups present	K3						
CO4:	distinguish properties of functional groups of same element	K4						
CO5:	defend their results using confirmatory test	K4						

CO & PO Mapping:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	2	1	2	1	1	1
CO 2	2	2	1	1	1	-
CO 3	2	2	1	1	1	-
CO 4	1	1	1	1	1	1
CO5	1	1	1	1	2	-

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

Unit	SUBJECT NAME	Hrs	Mode
Part - I	Volumertic analysis	30	Practical –
			lab
Part - II	Systematic organic Analysis	30	experiments
			practical

Course Designed by: Ms. N. Lakshmi Kruthika, Assistant Professor of Chemistry



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF PHYSICS (For those who joined in 2021-2022 and after)

Course Name PHYSICS APPLIANCES IN EVERYDAY LIFE																												
Course	e Cod	le 2	211	JP	HN	131																			L	P	•	С
Catego	ory]	No	n I	⁄Ia	jor	Ele	ecti	ve																2	-		2
Nature	e of co	ourse	:	El	ЛF	'LO	YA	BI	LIT	Y		S	KI	LL	0	RI	EN	T	D		✓	E	ENT	REF	REN	EUI	RS	HIP
COUR	SE O)BJE	C	II	Έ	5:																						
The learners will be able to:																												
1. Understand the basic concepts of direct and alternating current and transformer																												
2.Under	stand mber	the co	vori	ang ent	g pi		ipie lar i	s oi nane	nou 1 V	iseno Vacuu)IC	ia i m i	ipp. Mea	llai me	nce r ai	s nd V	Vac	hin	a m	naci	hin	6						
4.Under	stand	the P	rin	cin	es	of F	tar j ≷em	ote	cont	trolle	er	r.]	LE	D a	and	Sm	v ac art	TV	<u></u> в п	laci		C						
5.Analy	se the	work	c fu	nct	ior	of	Ele	ctric		oker,	Н	He	ater	r, R	Refr	ige	rato	or a	nd A	Air	cor	ndi	itior	ner				
Unit:	Ι	Direc	ct (Cur	rer	t-A	lter	nat	ing	Curi	re	ent	-Fi	use	e- (Circ	uit	bre	eak	ers	- I	nv	vert	er			6	hrs
TT 1 /	TT	Elect	ric	Co	ook	er -	- In	duc	tion	stov	ve	e -	М	icr	юw	ave	e or	ven	-]	Гоа	ste	er -	- M	ixer	and			
Unit:	11	Grino	der																								6	ohrs
Unit:]		Vacu Heate	iun er	ı cl	ea	ner	- W	ate	r pu	ırifie	er	r -	Wa	ash	ning	g m	ach	nine) — (Iro	n b	ЮХ	κ -	Elect	tric		6	hrs
Unit:	IV	Fan -	· Tı	ıbe	liş	ght	– L	ED	bul	b – \$	Sı	Sm	art	Te	elev	visio	on]	Pri	ncij	ole	- F	Rei	mot	e con	ntrolle	er.	6	hrs
T Inite	V	Speal	ker	s a	nd	Wo	oofe	ers-	Ref	frige	ra	ato	or -	A	ir c	cond	liti	one	er –	S	olaı	r P	ane	el - S	olar		4	hna
Umt:	V	light																									U	onrs
]	Гot	al	Le	ctur	e Hou	Irs	3	0hrs
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COUR	SE O)UT(CO	M	ES																					K	Le	evel
On suc	cessfi	ul con	mp	leti	on	of	the	co	urse	e, the	e s	sti	ıde	ents	s w	ill l	be a	abl	e to)							-	
CO1	Reca	alling	g ty	per	5 0	fele	ectr	icit	y, fi	ise, t	to	oas	stei	r ar	nd	Fan	l										K	2
CO2	Exp	olain	the	fu	nct	ion	of	fuse	e, el	ectri	ic	сс	ool	ker	:, re	emo	ote	cor	ntro	lle	r ai	nd	inv	verter	•		K	2
CO3	CO3Uses of Direct current, Alternating current, wet grinder, vacuum cleaner , L ED and Smart TVK3								3																			
	Dist	inoni	sh	ac	<u></u> an	$\frac{1}{1}$		rrei	nt m	nicro	ער	W2	Ve	01	/en	and	d to	nast	er	mi	Xei	r a	nd	orind	ler			
CO4	Tabl	le fan	ar	id (eil	ing	far	1	, 1		<i>, v</i>	** C		0.		un		<i>J</i> u31	,	1111		. u	110	51110	,		K.	3
CO5	Utili	izatio	n a	nd	in	flue	ence	e of	refr	iger	at	ato	r, v	vat	er	pur	ifie	er, s	ola	ır p	ane	el,	LE	D, A	ir		K	2
	cond	dition	er																									-

CO & PO Mappings:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	3	3	3	3
CO 2	3	2	3	3	2	2
CO 3	3	3	2	1	3	3
CO 4	1	2	3	3	1	3
CO 5	2	2	3	3	3	3

*3 –Advanced Application; 2 – Intermediate Development; 1 – Introductory Level

LESSON PLAN

UNIT	Physics Appliances in Everyday Life	Hrs	Mode
T	Direct Current-Alternating Current-Fuse- circuit	6	Lecture Demonstration
-	breakers - Inverter	U	Lecture, Demonstration
п	Electric Cooker - Induction stove - Microwave oven -	6	Lastura Domonstration
11	Toaster – Mixer and Grinder	U	Lecture, Demonstration
тт	Vacuum cleaner - Water purifier - Washing machine –	6	Lasture Demonstration
111	Iron box - Electric Heater	U	Lecture, Demonstration
137	Fan - Tube light – LED bulb – Smart Television	6	Lasture Demonstration
1 V	Principle - Remote controller	0	Lecture, Demonstration
N7	Speakers and Woofers- Refrigerator - Air conditioner -	6	Lecture, Demonstration
v	Solar Panel – Solar light	U	





Academic Council Meeting Held On 17.05.2022



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF PHYSICS

(For those who joined in 2021-2022 and after)

Course Name	OPTIC	S AND PHOTO)M	IETRY					
Course Code	21UPH	C41					L	Р	С
Category	Core						4	-	4
Nature of cours	e: <mark>EMP</mark> I	LOYABILITY	v	SKILL ORIENTED	\checkmark	ENTREPR	ENEU	JRSI	HIP
Course Objecti	ves:								
The learners wil	l be able	to							
1. Remember th	e basic co	oncepts of light	wa	ives and interference					
2. Recall the con	icepts of	diffraction							
3. Analyze abou	t dispersi	ion and spectra							
4. Understand th	ie basic c	oncepts of Photo	om	ietry					
5. Understand th	ne speed	of light and optic	cal	instruments				10	
Unit: I Ligh	t waves	and Interferen	<u>ce</u>					12	2
Waves-The natu	ire of ligh	it waves-Huyge	n's	Principle-Huygen's cons	truct	10n-Rect1 lin	ear		
propagation of I	ight -Ref	lection of light-l	kei	traction of light-Young's	Dou	ble Hole exp	erime	ent-	
Young's Double	e slit expe	eriment-Intensity	V V	ariation-Fringe-width and	d det	ermination o	of wav	eleng	gth-
Coherent and in	coherent	sources- Optical	I Pa	ath- Interference from the	in fili	ms-Fresnel E	31pris	m.	
Diff.	raction a	ind Polarization	1	1 1 1 1 1 1	<u>c 1</u>	· · · · · · · · · · · · · · · · · · ·		112	
Diffraction of In	ight- Frai	unnoter diffracti	on	by a single slit-Fraunno	ter di	intraction by	a circ	ular	ſ
aperture-Fresnel		on at a straight e	eag	ge-Limit of resolution-Ra	yleig	n criterion-S		ring (Л
Light-Polarizati	on of light	t-Polaroids-Pola	ar17	zation by reflection and r	efrac	tion-Polariza	ation	by	
scattering-Laure	nt s half	-shade polarimet	er.	•				10	
Unit: III Disp	ersion a	nd Spectra		•.1 • .•	1	1	• .•	12	
Dispersion-Disj	persive p	ower-Dispersion	1 W	Vithout average deviation	and	average dev	1ation	with	lout
Ultraviolat and	Iruiii-Pur Infrond d	e and impure sp		trum-Kinds of spectra-	+++0	oton Moogur	ina +1		~1o
of a priam Maas	uning the	spectrum-spectro		eter-Applications of spec		ieter-Measur	ing ti		gle
of a prism-meas	ar with y	e angle of minim	uII bo	in deviation for a prism to	r a g	iven waveler	igui-	varia	tion
Unit: IV Phot	tomotry	vavelengtii-Kain	00	W				12	,
Total radiant fly	unit	ogitz of modiant	flu	w I uminous flux, polotiv	. hur	ninggity I yr		12	
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Photomotors	nous inte	ensity- muminan	ice	- Inverse square law-Lan	ibert	s Cosine La	W-		
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telescope-refies		scope-Gamean I	e	escope-Resolving power	01 8	a microscope		a	
telescope.				Т	otol	Locture Ho	Inc	60 U	ma
Books for Stud	v •			1	Utal		u15	00 11	.1.5
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H.C. Verma, " C	oncepts o	of Physics - Vol	un	ne 1 ", Bharati Bhawan (F	rublis	sners & Disti	ributo	rs),	
New Delhi, 202	0								

Unit –	I: Chapter 17	
	Section – 17.1 - 17.9, Worked Out Examples	
Unit –	II: Chapter 17	
	Section – 17.10 - 17.16. Worked Out Examples	
Unit –	III: Chapter 20	
	Section – 20.1 - 20.8, Worked Out Examples	
Unit –	IV: Chapter 22	
	Section – 22.1 - 22.9, Worked Out Examples	
Unit –	V: Chapter 19 &21	
	Section – 19.3-19.6& 21.1, 21.4 and Worked Out Examples	
Books	for References:	
1. Ka	kani & Bhandari – Optics & Spectroscopy , Sultan Chand & Sons, NewDelhi.	
2. Br	ijlal & Subramanyam, (Reprint 2018)-A text book of optics, S.Chand & Co. New	Delhi.
Mu	urugeshan. R, KiruthigaSivaprasath - Optics and Spectroscopy, S.Chand & Com	pany Ltd.
9 th	Edition reprint 2020, New Delhi.	1 2
Web R	Resources:	
1. http	s://nptel.ac.in/courses/122/105/122105023/	
2. http	s://nptel.ac.in/courses/115/105/115105083/	
3. http	s://nptel.ac.in/courses/115/105/115105120/	
4. http	s://nptel.ac.in/courses/108/105/108105060/	
5. http	s://onlinecourses.nptel.ac.in/noc22_bt05/preview	
Course	e Outcomes	K Level
On suc	ccessful completion of the course, the students will be able to	
	Understand the basic concepts in light waves. Interference, Diffraction,	
CO1:	Polarisation, Dispersion and Spectra, Photometry, Speed of light and Optical	K2
	Instruments.	
	Apply the optical Path, interference from thin films, Fraunhofer Diffraction	
	by a single slit. Fraunhofer Diffraction by a circular aperture. Fresnel	
CO2:	Diffraction at a straight edge. Dispersion without average deviation and	К3
001	average deviation without dispersion luminosity of radiant flux-Luminous	
	flux Relative luminosity Luminous Efficiency Luminous Intensity	
	Illustrate Intensity variation fringe-width the angle of a prism the angle of	
	minimum deviation for a prism for a given wavelength variation of refractive	
CO3:	index with wavelength Inverse square law I ambert's Cosine law Scattering	K4
	of Light and Polarization of light	
	Discuss about Huygen's Principle Young's Double Hole experiment Young's	
	Double slit experiment Fresnel Binrism Scattering of light Polarisation of	
COA	light Spectrum kinds of spectra Ultraviolet and Infrared spectrum	K/
0.04.	Painbow Photometers Michelson method Spectrometer Pasolving nower of	124
	a microscope and a telescope	
	a meroscope and a telescope	
CO5.	Simple microscope and Compound microscope. Astronomical telescope	K/
005:	Torrestrial talescope and Calilean Talescope, Astronomical telescope,	N 4
	renestral telescope and Gamean relescope.	

CO & PO Mapping:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	2	2	1	3
CO 2	3	2	1	1	1	3
CO 3	3	3	2	1	2	2
CO 4	3	3	1	1	2	2
CO5	3	3	1	1	2	3

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
I	Light waves and Interference Waves-The nature of light waves-Huygens's Principle-Huygens's construction- Rectilinear propagation of light- Reflection of light- Refraction of light-Young's Double Hole experiment-Young's Double slit experiment-Intensity variation-Fringe-width and determination of wavelength- Coherent and incoherent sources- Optical Path- Interference from thin films-Fresnel Biprism.	12	Chalk and talk, ppt
п	Diffraction and Polarization Diffraction of light- Fraunhofer diffraction by single slit-Fraunhofer diffraction by circular aperture-Fresnel diffraction at a straight edge-	12	Chalk and talk, ppt
	Limit of resolution-Rayleigh criterion-Scattering of Light-Polarization of light-Polaroids-Polarization by reflection and refraction-Polarization by scattering- Laurent's half-shade polarimeter.		
ш	Dispersion and Spectra Dispersion-Dispersive power-Dispersion without average deviation and average deviation without dispersion-Spectrum-Pure and Impure spectrum-Kinds of spectra-Ultraviolet and Infrared spectrum- Spectrometer-Applications of spectrometer-Measuring the angle of a prism-Measuring the angle of minimum deviation for a prism for a given wavelength-Variation of refractive index with wavelength-Rainbow.	12	Chalk and talk, ppt
	Photometry	12	Chalk and talk ppt
IV	Total radiant flux-Luminosity of radiant flux-Luminous flux: relative luminosity-Luminous efficiency-Luminous intensity- Illuminance-Inverse square law-Lambert's Cosine Law-Photometers.		unit, ppr
V	Speed of light and Optical Instruments Michelson method -Simple microscope-Compound microscope- Telescopes-Astronomical telescope-Terrestrial telescope-Galilean Telescope-Resolving power of a microscope and a telescope.	12	Chalk and talk, ppt

Learning Outcome Based Education & Assessment (LOBE)										
Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)										
		K Level	Section	n A	Section	n B		Section D Open Choice		
Internal	Cos		MCQ)s	Short An	swers	Section C Either or			
mermu	000	II Level	No. of. Questions	K - Level	No. of. Questions	K – Level	Choice			
CI	CO1	Up to K3	2	K1,K2	1	K1	2(K2&K2)	1 K2		
AI	CO2	Up to K3	2	K1,K2	2	K2	2(K3&K3)	1 K3		
CI	CO3	Up to K4	2	K1,K2	1	K1	2(K3&K3)	1K3		
AII	CO4	Up to K4	2	K1,K2	2	K2	2(K4&K4)	1 K4		
	Que	No. of estions to e asked	4		3		4	2		
Question Pattern CIA I & II	Que be a	No. of estions to answered	4		3		2	1		
	Marl q	ks for each uestion	1		2		5	10		
	Tot fo	al Marks or each section	4		6		10	10		

***Note:** It is the decision of the course teacher to ask 2 Questions in any unit under section-B (short answer questions)

	Distribution of Marks with K Level CIA I & CIA II												
	K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either / Or Choice)	Section D (Open Choice)	Total Mark s	% of (Mark s withou t choice)	Consolidat e of %					
	K1	2	2			4	8	60					
	K2	2	4	10	10	26	52	00					
	K3			10	10	20	40	40					
CI	K4												
ΑI	K5												
	Marks	4	6	20	20	50	100	100					
	K1	2	2			4	8	20					
	K2	2	4			6	12	20					
CI	K3			10	10	20	40	40					
Α	K4			10	10	20	40	40					
II	K5												
	Marks	4	6	20	20	50	100	100					

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

S	Summative Examination – Blue Print Articulation Mapping – K Level with Course											
	Outcomes (COs)											
			MCC)s	Short An	swers	Section C	Ceeffer D				
S.	COs	K - Level	No. of	К –	No. of	К –	(Either /	Section D (Open				
No			Questions	Level	Question	Level	or Choice)	Choice)				
1	CO1	K2	2	K1,K2	1	K2	2(K2,K2)	1(K2)				
2	CO2	K3	2	K1,K2	1	K2	2(K3,K3)	1(K3)				
3	CO3	K4	2	K1,K2	1	K2	2(K3,K3)	1(K3)				
4	CO4	K4	2	K1,K2	1	K2	2(K4,K4)	1(K4)				
5	CO5	K4	2	K1,K2	1	K2	2(K4,K4)	1(K4)				
No	of Quest. Aske	ions to be ed	10		5		10	5				
No. of Questions to be answered			10		5		5	3				
Marks for each question			1		2		5	10				
Total I	Marks for	each section	10		10		25	30				
	(Figuros	in noronthosi	e donatos a	loctions s	hould be as	kod with	the given K	lovol)				

parenthesis denotes, questions should be asked with the given K level) (Figures in

	Distribution of Marks with K Level												
K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %						
K1	-	-	-	-	5	4	22						
K2	10	10	10	10	35	29	55						
K3	-	20	20	20	40	33.5	33						
K4	-	20	20	20	40	33.5	34						
Marks	10	50	50	50	120	100	100						
ND. III	han land of m	anfama an aa	f the standard	ia to ha aga	and here	tt ann atim a	high an land						

NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.

Section	A (Mul	tiple Choic	e Questions)					
Answer	All Qu	estions	(10x1=10 marks)					
Q. No	CO	K Level	Questions					
1	CO1	K1						
2	CO1	K2						
3	CO2	K1						
4	CO2	K2						
5	CO3	K1						
6	CO3	K2						
7	CO4	K1						
8	CO4	K2						
9	CO5	K1						
10	CO5	K2						
Section	B (Sho	rt Answers)						
Answer	All Qu	estions	(5x2=10 marks)					
Q. No	CO	K Level	Questions					
11	CO1	K1						
12	CO2	K1						
13	CO3	K2						
14	CO4	K2						
15	CO5	K2						
Section	C (Eith	er/Or Type						
Answer	All Qu	estions	(5 x 5 = 25 marks)					
Q. No	<u>CO</u>	K Level	Questions					
16) a	<u>COI</u>	K2						
16) b	<u>COI</u>	K2						
1/) a	<u>CO2</u>	K3						
1/) b	<u>CO2</u>	K3 K2						
18) a	<u>CO3</u>	K3 K2						
18) D	<u>CO3</u>	K3						
19) a	$\frac{C04}{C04}$	K4 K4						
19) 0	C04 C05	K4 K4						
20) a	$\frac{005}{005}$	K4 K4						
20)0 NB. Hi	tor lov	N4	mance of the students is to be assessed by attempting higher level of K					
levels	gner iev	er or per lor	mance of the students is to be assessed by attempting higher level of K					
Section	D (Ope	n Choice)						
Answer Any Three questions (3x10=30 marks)								
Q. No	CO	K Level	Questions					
21	CO1	K2						
22	CO2	K3						
23	CO3	K3						
24	CO4	K4						
25	CO5	K4						

Summative Examinations - Question Paper – Format



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF PHYSICS (For those who joined in 2021-2022 and after)

Course Name	M	[E]	DICA	L IN	STRUM	ENTA	Ŋ	ΓΙΟΝ					
Course Code	21	U	PHC	42							L	Р	С
Category	Co	ore	e								4	-	4
Nature of cours	se:]	EMP	LOY	ABILITY	✓		SKILL	ORIENTED	ENTREP	RENE	URS	HIP
COURSE OBJ	EC	T	IVES	:									
The learners will be able to													
 Understand the different types of electrodes. Remember the Bio-chemical and Non-Electrical parameter measurements 													
2. Remember in 2. Understand th		-10-	-cnem	ncal a	ind Non-E	Defi	Ci ih	al parame	ter measurem	ents.			
J. Understand th	re co	103 103	thorn	ov Sh	ortwaye M	Jierov	ID.	ranators a	and Dializers.	actro Surgio	al Die	othor	mu
4. Understand in and Bio	LC D		metry	пу 511 7	onwave, r	incro	w	ave, unia	some, and En	ectio Surgic		unen	illy
5 Analyze the R	ecei	nt	Tren	ds in	medical In	strum	าค	ntation					
Unit: I Ele	ctro	0 —]	Physi	iology	and Bio-	-Pote	n	tial Reco	rding Instru	nents		1	2hrs
Origin of Bio–F	ote	ent	ials–F	Prima	ry.Second	arv ac	ct	ive transp	ort-Bio-elect	ric potential	s-Bio)-pote	ential
Electrodes – Ty	pes	o	f Elec	ctrode	s – i) Met	allic I	El	lectrode ii) Micropipet	– Depth ele	ctrode	e - N	eedle
electrode – Surf	face	e e	lectro	ode –	Chemical	electr	ro	des – Bas	sic componen	ts of Bio M	edical	syst	em –
Types of amp	olifie	iers	s –	Elect	ro Cardio	ograp	h	y (ECG)	– Electro	Encephalog	graphy	y (E	EG)-
Electromyograp	hy ((E	MG)	– Ele	ctro Oculo	grapł	hy	, (EOG) –	- Electro Retin	nography (E	RG)		
Unit: II Bio	-che	en	nical	and I	Non-Elect	rical _]	p	arameter	· measureme	nt		1	.2hrs
Colorimeter an	d P	Pho	otome	eter -	- Auto ar	nalyze	er	– Blood	d flow measured	urement –	Cardi	ac o	utput
measurement -	Re	esp	pirato	ry ra	te measur	emen	t	– Blood	pressure me	easurement	– Te	mper	ature
measurement -	Puls	se	meas	urem	ent – Bloo	d cell	l c	counter.					
Unit: III Car	rdia	ac	Assis	t Dev	vices							1	2hrs
Pacemakers –	Тур	pes	s, Co	mpor	ents, met	hods	C	of stimula	ation, Differe	nce betwee	n Int	ernal	and
External – Defi	bral	lla	tors –	- AC	Defibrillat	ion, I	D	C Defibri	llation, Dual	peak and Sy	ynchro	onize	r DC
Defribriattor - I	Diali	lize	ers –	Haen	nodialysis,	Perit	0	neal Dialy	ysis - Differei	nce between	Extra	acorp	oreal
and Intracorpor	eal	D	ialysi	s – F	Ieart Lung	g Mac	ch	nine Mod	el, - Cardio y	vascular Cir	culati	on, E	Blood
pumps and oxyg	gena	ato	ors										
Unit: IV Dia	the	ern	ny an	d Bio	Telemetr	y						1	.2hrs
Diathermy – Sh	ortv	wa	ive, N	Aicrov	wave, Ultr	asonio	С	and Elec	tro Surgical I	Diathermy –	Bio	Teler	netry
– Design of Bio) Te	ele	emetry	y – R	adio Telei	netry	S	systems –	Single chan	nel, Multich	annel	teler	netry
system – Prob	lem	ns	in ii	mplar	t Teleme	try –		Advantag	ges of Bio	Felemetry -	- Phy	<i>siolo</i>	gical
monitoring syste	em i	in	space	e stati	<u>on – E He</u>	alth –	ŀ	Electrical	safety.				
Unit: V Rec	ent	t 'l	rend	s in N	Aedical In	strur	n	entation				1	.2hrs
Thermograph –	Enc	Ido	oscope	es - I	Lasers in I	Medic	cii	ne – Cryo	ogenics Appli	cations - N	luclea	r ima	aging
techniques – Computer Tomography – Principle, working, applications – Telemedicine- Ultrasound													
scanning-Magne	etic	R	esona	ince I	mage(MR) Sca	ın	•	m		TT	<u> </u>	
	1								To	tal Lecture	Hou	rs 6	ounrs
BOOKS IOF Stu	ay:	- - h		or:1-		incl	יה	laatmani	. Cushiers D-1	liootiona 9	0.007	1 17 45	tion

1.R.LakshmiRekha, C.Ravikumar, **Medical Electronics**, Suchitra Publications, Second Edition 2016.

Unit –l	Chapter 1.1.1, - 1.1.1.1, 1.1.1.2, 1.1.2.6, 1.2-1.9					
Unit –l	I Chapter 2.4 – 2.12					
Unit –l	II Chapter $3 - 3.1 - 3.4$.					
Unit –l	V Chapter: $4.1 - 4.3$					
Unit –	V Chapter: $5.1 - 5.5$.					
2. M.A	rumugam, Bio-Medical Instrumentation , Anuradha Publications, Reprint 2014.					
Unit-II	I Problems Page.No215-217					
Unit-V	Problems Chapter- 5 10.6,10.7(Page.No359-367)					
Books	for Reference:					
1.	R.S. Khandpur, Hand Book of Biomedical Instrumentation, Tata McGraw-	Hill, First				
	Edition, New Delhi, 1999.	,				
2.	L.Cromwell, F.J. Welbell, E.J. Pfeiffer, Biomedical Instrumentati	ons and				
	Measurements, PHI Ltd, New Delhi, Second Edition, 2006.					
3.	John G. Webster, Editor, Medical Instrumentation Application and Design. Jo	hn Willey				
	and Sons. INC, Third Edition, Singapore, 1998.	2				
Web R	Resources :					
1. M e	edical Image Analysis online course video lectures by IIT K	haragpur				
(fr	eevideolectures.com)					
2. Fr	ee Online Course: Medical Technology and Evaluation from Coursera Class	<u>Central</u>				
COUR		17 T				
COUR	SE OUTCOMES	K Level				
On succ	cessful completion of the course, the students will be able to					
CO1	Recalling and Understanding concepts of the basics of electrodes,	K2				
	Colorimeter, Shortwave, Microwave and Ultrasonic waves					
~~	Differentiate the Electrode types, Internal and External Defibrillators, Single					
CO2	channel and Multichannel telemetry system, Thermograph, Endoscopes	K3				
	,Lasers in Medicine and Computer Tomography					
	Build the knowledge in the field of Electro Cardiography,					
CO3	Electromyography, Respiratory Rate Measurement, Dializers, Nuclear	K3				
	imaging Techniques and Physiological monitoring system in space station					
CO4	Utilization of Micropipet, Blood cell counter, Pacemakers, Electro Surgical	К4				
0.04	Diathermy and Telemedicine	174				
CO5	Influence of Electro Oculography, oxygenators, Cryogenics Applications,	K4				
005	Design of Bio Telemetry and Pulse measurement					

CO & PO Mapping:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	2	2	2	3
CO 2	3	2	1	2	1	2
CO 3	3	2	2	2	2	2
CO 4	3	2	1	1	1	3
CO5	3	1	2	2	1	3

*3 –Advanced Application; 2 – Intermediate Development; 1 – Introductory Level

LESSON PLAN

UNIT	SUBJECT NAME	Hrs	Mode
I	Origin of Bio–Potentials–Primary, Secondary active transport– Bio-electric potentials–Bio-potential Electrodes – Types of Electrodes – i) Metallic Electrode ii) Micropipet – Depth electrode – Needle electrode – Surface electrode – Chemical electrodes – Basic components of Bio Medical system – Types of amplifiers – Electro Cardiography (ECG) – Electro Encephalography (EEG)-Electromyography (EMG) – Electro Oculography (EOG) – Electro Retinography (ERG)	12	PPT, Lecture, Chalk & Talk, Demonstration
II	Colorimeter and Photometer – Auto analyzer – Blood flow measurement – Cardiac output measurement – Respiratory rate measurement – Blood pressure measurement – Temperature measurement – Pulse measurement – Blood cell counter.	12	PPT, Lecture, Chalk & Talk, Demonstration
III	Pacemakers – Types, Components, Oxygenators, methods of stimulation, Difference between Internal and External – Defibrallators – AC Defibrillation, DC Defibrillation, Dual peak and Synchronizer DC Defribriattor - Dializers – Haemodialysis, Peritoneal Dialysis - Difference between Extracorporeal and Intracorporeal Dialysis – Heart Lung Machine Model, - Cardio vascular Circulation, Blood pumps and oxygenators	12	PPT, Lecture, Chalk & Talk, Demonstration
IV	Diathermy – Shortwave, Microwave, Ultrasonic and Electro Surgical Diathermy – Bio Telemetry – Design of Bio Telemetry – Radio Telemetry systems – Single channel, Multichannel telemetry system – Problems in implant Telemetry – Advantages of Bio Telemetry – Physiological monitoring system in space station – E Health – Electrical safety	12	PPT, Lecture, Chalk & Talk, Demonstration,
V	Thermograph – Endoscopes – Lasers in Medicine – Cryogenics Applications - Nuclear imaging techniques – Computer Tomography – Principle, working, applications – Telemedicine- Ultrasound scanning- Magnetic Resonance Image(MRI) Scan.	12	PPT, Lecture, Chalk & Talk, Demonstration and Field visit

Learning Outcome Based Education & Assessment (LOBE)												
Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)												
			Section	n A	Section	n B		Section				
Internal	Cos	K Level	MCQ)s	Short An	swers	Section C Either or	D				
	COS	K Level	No. of. Questions	K - Level	No. of. Questions	K – Level	Choice	Open Choice				
CI	CO1	Up to K3	2	K1,K2	1	K1	2(K2&K2)	1 K2				
AI	CO2	Up to K3	2	K1,K2	2	K2	2(K3&K3)	1 K3				
CI	CO3	Up to K4	2	K1,K2	1	K1	2(K3&K3)	1K3				
AII	CO4	Up to K4	2	K1,K2	2	K2	2(K4&K4)	1 K4				
	Que	No. of estions to e asked	4		3		4	2				
Question Pattern	No. of Questions to be answered		4		3		2	1				
	Marl q	ks for each uestion	1		2		5	10				
	Tot fo	al Marks or each section	4		6		10	10				

***Note:** It is the decision of the course teacher to ask 2 Questions in any unit under section-B (short answer questions)

		Distr	ibution of M	larks with	K Level	CIA I &	CIA II	
	K Level	Section ASection B(Multiple(ShortChoiceAnswerQuestions)))		Section C (Either / Or Choice)	Section D (Open Choice)	Total Mark s	% of (Mark s withou t choice)	Consolidat e of %
	K1	2	2			4	8	60
	K2	2	4	10	10	26	52	00
	K3			10	10	20	40	40
CI	K4							
ΑI	K5							
	Marks	4	6	20	20	50	100	100
	K1	2	2			4	8	20
	K2	2	4			6	12	20
CI	K3			10	10	20	40	40
Α	K4			10	10	20	40	40
II	K5							
	Marks	4	6	20	20	50	100	100

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

Academic Council Meeting Held On 17.05.2022

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

S	Summative Examination – Blue Print Articulation Mapping – K Level with Course											
~~~~	COs	K - Level		2s	Short An	swers	Section C	Section D				
SI.N 0			No. of Questions	K – Level	No. of Question	K – Level	(Either / or Choice)	(Open Choice)				
1	CO1	K2	2	K1,K2	1	K2	2(K2,K2)	1(K2)				
2	CO2	K3	2	K1,K2	1	K2	2(K3,K3)	1(K3)				
3	CO3	K3	2	K1,K2	1	K2	2(K3,K3)	1(K3)				
4	CO4	K4	2	K1,K2	1	K2	2(K4,K4)	1(K4)				
5	CO5	K4	2	K1,K2	1	K2	2(K4,K4)	1(K4)				
No	of Quest. Aske	tions to be	10		5		10	5				
No. of Questions to be answered			10		5		5	3				
Marks for each question			1		2		5	10				
Total	Marks for	each section	10		10		25	30				
	(Figures	in narenthesi	is denotes, a	estions s	hould be as	ked with	the given K	level)				

		Dis	tribution of	Marks with	n K Leve	l	
K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either/ or Choice)	Section D ( Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5		-	-	5	4	22
K2	5	10	10	10	35	29	33
K3	-	-	20	20	40	33.5	33
K4	-	-	20	20	40	33.5	34
Marks	10	10	50	50	120	100	100
NB: Hig	gher level of p	erformance o	of the students	s is to be asse	essed by a	attempting	higher level
of K lev	els.						

Section	A (Mu	Itiple Choi	ice Questions)			
Answei	r All Qu	uestions	(10x1=10 marks)			
Q. No	CO	K Level	Questions			
1	CO1	K1				
2	CO1	K2				
3	CO2	K1				
4	CO2	K2				
5	CO3	K1				
6	CO3	K2				
7	CO4	K1				
8	CO4	K2				
9	CO5	K1				
10	CO5	K2				
Section	B (Sho	ort Answer	s)			
Answei	r All Qu	uestions	(5x2=10 marks)			
Q. No	CO	K Level	Questions			
11	CO1	K2				
12	CO2	K2				
13	CO3	K2				
14	CO4	K2				
15	CO5	K2				
Section	C (Eit	her/Or Ty	pe)			
Answei	r All Qu	uestions	(5  x  5 = 25  marks)			
Q. No	CO	K Level	Questions			
16) a	CO1	<b>K</b> 2				
16) b	CO1	K2				
17) a	CO2	K3				
17) b	CO2	K3				
18) a	CO3	K3				
18) b	CO3	K3				
19) a	CO4	K4				
19) b	CO4	K4				
20) a	CO5	K4				
20) b	CO5	K4				
NB: Hi	gher le	vel of perfo	ormance of the students is to be assessed by attempting higher level			
ot K lev	vels					
Section D (Open Choice)						
Answei	$r \text{ Any } \mathbf{I}$	Inree quest	uons (3x10=30 marks)			
<b>V. INO</b>	$\frac{CO}{CO1}$	K Level	Questions			
21	$\frac{CO1}{CO2}$	K2				
22	$CO_2$	K3				
23 24	$CO_4$	KJ KA				
24 25	$\frac{C04}{C05}$	K4 K1				
23	COS	Ν4				

# **Summative Examinations - Question Paper – Format**



#### MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF PHYSICS (For those who joined in 2021-2022 and after)

 Srinivasan. M.N.,Balasubramanian.S.,Ranganathan.R., A Text Book of Practical Physics, 2017 Edition Sultan Chand & Sons

#### **Books for Reference:**

- 1. Ouseph.C., Practical Physics and Electronics, 2013.S. Viswanathan.P.Ltd.
- 2. Hamam Singh Hemne, B.Sc.Practical Physics, 4/e S.Chand and Co.New Delhi,2017
- 3. Shukla.R.K., Practical Physics, Second Edition, New Age International,2nd Edition.,New Delhi.
- 4. Gupta.S.L., Kumar.V., PRACTICAL PHYSICS (H/E) Pragati Prakashan.M., 2016, New Delhi.

#### Web Resources:

1. https://nptel.ac.in/course.html/physics/experimental physics I, II and III

- 2. https://nptel.ac.in/courses/115/105/115105110/
- 3. <u>https://www.youtube.com/playlist?list=PLuiPz6iU5SQ8-rZn_LgLofRX7n8z4tHYK</u>

COUR	SE OUTCOMES	K Level
<b>CO1:</b>	Apply the concepts of Field along the axial coil.	K3
<b>CO2:</b>	Acquire the knowledge of Physical optics using Spectrometer	K4
CO3:	Gain Knowledge in principles and applications of Potentiometer, wheatstone's Bridge and Spot Reflection Galvanometer.	K2
<b>CO4:</b>	Understand the principles of Specific rotatory power in liquids	K2
CO5:	Apply skill in the field of Interference and Diffraction of Light.	K3

#### CO & PO Mappings:

COS	<b>PO 1</b>	<b>PO 2</b>	<b>PO 3</b>	<b>PO 4</b>	<b>PO 5</b>	<b>PO 6</b>
CO 1	3	1	2	3	2	2
CO 2	2	2	2	2	2	2
CO 3	3	2	3	2	2	1
<b>CO 4</b>	2	2	2	2	1	1
CO5	3	3	3	2	2	2

#### *3 –Advanced Application; 2 – Intermediate Development; 1 – Introductory Level <u>LESSON PLAN</u>

SEMESTER	LIST OF EXPERIMENTS	Hrs	Mode
IV	<ol> <li>Laurent's Half Shade Polarimeter - Specific rotatory power</li> <li>Field along the axis of the coil - Determination of M of B_H</li> <li>Potentiometer - Temperature Coefficient of a coil</li> <li>Spot Reflection Galvanometer - Charge sensitiveness</li> <li>DeSauty's Bridge - C1/C2</li> <li>Spot Reflection Galvanometer - Comparison of EMF's</li> <li>Spectrometer- Dispersive Power of a Prism</li> <li>Newton's Rings - Radius of curvature of a convex Lens</li> </ol>	60	Demonstration



#### MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF PHYSICS (For those who joined in 2021-2022 and after)

Course Name	ALLIED CHEMISTRY – I	II								
Course Code	21UCHA41			L	Р	С				
Category	Allied			4	-	3				
Nature of cours	NEUF	RSHI	Р							
Course Objectives:										
The Objective of the course is										
• To make	students learn about the fea	easibility and rate of r	eactions occurrin	ng in	all th	iree				
medium										
• To mal	e learners understand the	e electrochemical, c	atalytic and th	nermo	dyna	mic				
transform	nations.									
• To impa	t knowledge on various chem	nical processes and thei	r applications in o	daily.	life.					
• To educe	te the students on significance	te of physical chemistry	/.							
• 10 enna	dination Compounds	ay to day applications of	or chemistry.		12	,				
Coordinatio	compounds -Coordination c	complexes and comple	x ions- Coordina	tion n	umbe	er _				
ligands- Werne	r's theory –Nomenclature-	Effective Atomic Nur	nber (EAN) – Fac	ctors	affect	ting				
stability of cor	plex ion- isomerism of coo	ordination complexes-	VB theory and	l crvs	tal f	ield				
theories of octal	edral, tetrahedral and square 1	planar complexes- mag	gnetic properties.	Chela	tion	and				
its industrial app	lications.	I I I I I I I I I I I I I I I I I I I								
Unit: II ORC	ANIC REACTIONS				12					
Nucleophile	s – Electrophiles: definition-	n- types and examples	- specific reacti	ons i	nvolv	/ing				
these species -	Substitution reactions- Mech	chanism of aliphatic su	bstitution S _N 1, S	_N 2 ill	ustra	tion				
with examples	- differences; Addition react	ctions – Markonikov's	and anti- Mark	oniko	v's r	ule;				
Elimination read	tions- Saytzeff and Hoffmann	n rule; rearrangement a	nd polymerizatio	n reac	tions	•				
	/• <b>T</b> 7• /•				10					
Unit: III   Rea	tion Kinetics	ware advantion and ab	a a mationa a da a mb		12					
Adsorption:	Definition – differences betw	deamation A deamation	sorption – ausort	bale, a	asort	sent				
- types of auso	atement only) adsorption of	f gases on solid surface	isotherin – Lang	IIIUII	isotii	21111				
Catalysis I	efinition = characteristics -	types – acid- base		face o	estalu	rsed				
reactions – defi	nition and examples – auto	catalyst – catalytic po	isoning – promo	oters-	Enzy	vme				
catalysis enzym	e catalysis.	eaalyse eaalyse pe	prome		<u>L</u> IIL)	, inc				
Chemical	Kinetics: Reaction rate -orde	ler and molecularity of	a reaction – zer	o ord	er – t	first				
order. First ord	er rate equation and half-life	e period – derivation-	units- Examples	of fi	rst oi	rder				
reactions - seco	nd order reactions – Carbon da	lating.	_							
Unit: IV Poly	mers				12					
Definition –	Classification of polymers -	- properties of polymer	rs – addition and	cond	lensat	tion				
polymerization	eactions with examples – nat	tural rubber – isoprene	unit –vulcanizat	ion of	f rubl	ber-				
preparation and	applications of polystyrene,	urea – formaldehyde r	esin, Teflon and	bu	na –	S -				
rubber.		0 (1 )	c · · · ·	יח		1				
Amino Acids a Proteins- structu	nu Proteins, Classification, N re- Classification and biologic	Synthesis, properties	oi amino acids-	Poly	pepti	ues,				

Unit: V	Photochemistry	12						
Comparison of thermal and photochemical reactions – definition of photochemical reactions								
- laws	- laws of photochemistry – Grotthus-Draper law- Quantum efficiency – reasons for low and high							
quantur	n yields with examples.	C						
-	Consequences of light absorption by atoms and molecules- Jablonski	diagram –						
fluorese	ence – phosphorescence – photosensitization- chemiluminescene-biolum	ninescence-						
Applica	tions of photochemistry.							
	Total Lecture Hours	60 Hrs						
<b>Books</b>	for Study:							
	1. Arun Bahl, B.S Bahl & G.D. Tuli, Essentials of Physical Chemistry, S.	Chand and						
	Co, New Delhi, 2014.							
	2. B.R. Puri, L.R. Sharma and S.Pathania, Principles of Physical Chemist	ry, Shoban						
	Lal Nagin chand and Co, 47 th edition, 2017.							
<b>Books</b> f	for References:							
1.	Polymer Science, Vasant R. Gowariker, N. V. Viswanathan, Jayadev Sreedhar	, New Age						
	International, 1986.							
2.	P.W. Atkins, Physical Chemistry, 7 th edition, Oxford university press, 2001.							
Web R	esources:							
https://i	nptel.ac.in/courses/104/106/104106107/							
Course	Outcomes	K Level						
CO1.	Describe the feasibility and rate of reactions occurring in solids, solutions and	K)						
COI.	gases.	<b>N</b> 2						
CO2.	Explain the electrochemical, catalytic and thermodynamic transformations and	к2						
CO2.	<b>CO2:</b> can illustrate their scope to wider areas.							
CO3:	Interpret various chemical processes taking place in all the three phases.	K3						
CO4:	Analyze the significances of various compounds in daily life.	K4						
CO5:	Implement the applications of physical chemistry	K3						

#### CO & PO Mapping:

COS	<b>PO 1</b>	<b>PO 2</b>	<b>PO 3</b>	<b>PO 4</b>	<b>PO 5</b>	<b>PO 6</b>
CO 1	3	3	2	1	-	1
CO 2	3	2	2	1	1	-
CO 3	2	2	2	2	-	1
CO 4	3	2	2	2	-	-
CO5	2	3	2	1	1	1

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

#### LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
I	Coordination compounds –Coordination complexes and complex ions- Coordination number – ligands- Werner's theory – Nomenclature- Effective Atomic Number (EAN) –Factors affecting stability of complex ion- isomerism of coordination complexes	6	Chalk & talk
	VB theory and crystal field theories of octahedral, tetrahedral and square planar complexes- magnetic properties. Chelation and its industrial applications.	6	Chalk & talk, powerpoint
II	$\label{eq:specific reactions} \begin{array}{l} Nucleophiles - Electrophiles: definition- types and examples - specific reactions involving these species - Substitution reactions-Mechanism of aliphatic substitution S_N1,\ S_N2 illustration with examples - differences; Addition reactions - Markonikov's and anti- Markonikov's rule; Elimination reactions- Saytzeff and Hoffmann rule; rearrangement and polymerization reactions. \\ \end{array}$	12	Chalk & talk
	Adsorption: Definition – differences between adsorption and absorption – adsorbate, adsorbent – types of adsorption – factors influencing adsorption- Adsorption isotherm – Langmuir isotherm (no derivation statement only) – adsorption of gases on solid surface.	4	Chalk & talk
ш	Catalysis: Definition – characteristics - types – acid- base catalysis – surface catalysed reactions – definition and examples – auto catalyst – catalytic poisoning – promoters- Enzyme catalysis enzyme catalysis Michaelis and Menton mechanism – Line weaver-Burk plot – Significance of Km.	4	Chalk & talk, ppt, videos
	Chemical Kinetics: Reaction rate –order and molecularity of a reaction – zero order – first order. First order rate equation and half-life period – derivation-units- Examples of first order reactions – second order reactions – <b>Self study Topic</b> : Carbon dating.	4	Chalk & talk
IV	Definition – Classification of polymers – properties of polymers – addition and condensation polymerization reactions with examples – natural rubber – isoprene unit –vulcanization of rubber- preparation and applications of polystyrene, urea – formaldehyde resin, Teflon and buna – S - rubber.	12	Chalk & talk, ppt
V	Comparison of thermal and photochemical reactions – definition of photochemical reactions – laws of photochemistry – Grotthus-Draper law- Quantum efficiency – reasons for low and high quantum yields with examples. Consequences of light absorption by atoms and molecules- Jablonski diagram – fluorescence – phosphorescence – photosensitization- chemiluminescene–bioluminescence- Applications of photochemistry.	12	Assignments and Seminar

Course Designed by: Ms. N. Lakshmi Kruthika, Assistant Professor of Chemistry

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)									
			Sectior	n A	Section	n B	Section C	Section D		
Inte	Cos	K Level	MCQ	)s	Short An	swers	Either or	Onen		
rnal	COS	I Lever	No. of. Questions	K - Level	No. of. Questions	K - Level	Choice	Choice		
CI	CO1	K2	2	K1, K2	2	K1,K2	2	2		
AI	CO2	К2	2	K1,K2	1	K2	2	1		
CI	CO3	K3	2	K1,K2	1	K2	2	2		
AII	CO4	K4	2	K1,K2	2	K3,K4	2	1		
Question Pattern		No. of Questions to be asked	4		3		4	2		
		No. of Questions to be answered	4		3		2	1		
CIA	I & II	Marks for each question	1		2		5	10		
		Total Marks for each section	4		6		10	10		

	Distribution of Marks with K Level CIA I & CIA II										
	K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either / Or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidate of %			
	K1	2	2	10	10	24	48	100			
	K2	2	4	10	10	26	52	100			
СІА	K3										
I	K4										
-	Marks	4	6	20	20	50	100	100			
	K1	2				2	4	12			
	K2	2	2			4	8	12			
CIA	K3		2	10	10	22	44	44			
II	K4		2	10	10	22	44	44			
	Marks	4	6	20	30	50	100	100			

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course									
G		17	MC	Qs	Short Answers		Section C	Section D	
S. No	COs	K -	No. of	K –	No. of	K –	(Either /	(Open	
No		Level	Questions	Level	Question	Level	or Choice)	Choice)	
1	CO1	Up to K2	2	K1, K2	1	K1	2 (K1&K1)	1 (K2)	
2	CO2	Up to K2	2	K1, K2	1	K2	2 (K2&K2)	1 (K2)	
3	CO3	Up to K3	2	K1, K2	1	K2	2 (K3&K3)	1 (K3)	
4	CO4	Up to K4	2	K1, K2	1	K3	2 (K3&K3)	1 (K4)	
5	CO5	Up to K3	2	K1, K2	1	K2	2 (K2&K2)	1(K3)	
No. of Questions to be Asked		10		5		10	5		
No. of Questions to be answered		10		5		5	3		
Marks for each question		1		2		5	10		
Total Marks for each section		10		10		25	30		
	(Figures	in parenthe	esis denotes,	questions s	hould be as	ked with	n the given K	level)	

Distribution of Marks with K Level									
K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either/ or Choice)	Section D ( Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %		
K1	5	2	10		17	11.66	54		
K2	5	6	20	20	51	42.5	54		
K3		2	20	20	42	35	35		
K4				10	10	8.33	8		
Marks	10	10	50	50	120	100	100		
NB: Hig of K lev	NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.								

Section A (Multiple Choice Questions)								
Answer	Answer All Questions(10x1=10 marks)							
Q. No	CO	K Level	Questions					
1	CO1	K1						
2	CO1	K2						
3	CO2	K1						
4	CO2	K2						
5	CO3	K1						
6	CO3	K2						
7	CO4	K1						
8	CO4	K2						
9	CO5	K1						
10	CO5	K2						
Section	B (Sho	rt Answer	s)					
Answer	All Qu	estions	(5x2=10 marks)					
Q. No	CO	K Level	Questions					
11	CO1	K1						
12	CO2	K2						
13	CO3	K2						
14	CO4	K3						
15	CO5	K2						
Section	C (Eitl	her/Or Typ	pe)					
Answer	· All Qu	iestions	(5  x  5 = 25  marks)					
Q. No	CO	K Level	Questions					
16) a	CO1	K1						
16) b	CO1	K1						
17) a	CO2	K2						
17) b	CO2	K2						
18) a	CO3	K3						
18) b	CO3	K3						
19) a	CO4	K3						
19) b	CO4	K3						
20) a	CO5	K2						
20) b	<u>CO5</u>	K2						
NB: Hi	gher lev	vel of perfo	ormance of the students is to be assessed by attempting higher					
level of	K level	<u>s</u>						
Section D (Open Choice)								
Answer	Any T	nree quest	ions (3x10=30 marks)					
<b>Q. No</b>		K Level	Questions					
21		K2 K2						
22	CO2	K2 K2						
25	CO3	K3						
24	CO4	K4 K2						
25	005	K.3						

# **Summative Examinations - Question Paper – Format**



#### MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF PHYSICS (For those who joined in 2021-2022 and after)

Course Name		e ALLIED CHEMISTRY PRACTICAL - I						
Course Co	de	21UCHAP1 L P						
Category		Allied	-	2	1			
Nature of c	ourse	EMPLOYABILITY SKILL ORIENTED 🖌 ENTRE	PRENI	JRS	HIP			
COURSE OBJECTIVES:								
The objecti	ve of	this course is to make students obtain skill in						
1. Titr	1. Titrimetric analysis.							
2. Qua	antitat	vible results						
3. Kep 4 Ider	ntifica	tion of the functional groups present in organic molecules						
5. Oua	alitativ	<i>ite analysis of organic compounds.</i>						
	VOI	LUMETRIC ANALYSIS						
	1. Es	stimation of Sodium Hydroxide						
	(Na2	CO ₃ X HCl X NaOH)						
	2. Es	stimation of Hydrochloric Acid						
	(H ₂ C	C2O4 X NaOH X HCl)						
	3. Es	. Estimation of Oxalic Acid						
	(FeS	(FeSO4 X KMnO4 X H2C2O4)						
Dowt I	4. Es	4. Estimation of FAS						
r ait - 1	(res	(FCSO4 X KMIIO4 A FAS) 5 Estimation of Ferrous Sulphate						
	(H2C2O4 X KMnO4 X FeSO4)							
	6. Es	6. Estimation of KMnO4						
	(K ₂ C	(K2Cr2O7 X FAS X KMnO4)						
	7. Estimation of Sodium Hydroxide							
	(KMnO4 X H2C2O4 X NaOH)							
	8. Estimation of lodine							
	(KMnO4 x Thio x lodine)							
	SYS	TEMATIC ORGANIC QUALITATIVE ANALYSIS						
	A Sti	udy of reactions of the following organic compounds:						
	1. Columnation	1. Carbohydrate						
	2. A	2. Amide						
	$\frac{1}{4}$ K	. Aldenyde Ketone						
	5. M	Monocarboxylic acid						
Part - II	6. Di	6. Dicarboxylic acid						
	7. A	7. Amine						
	8. Pł	nenol						
	9. Ni	itro compound						
	The	students may be trained to perform the specific reaction like	test f	or				
	elem	ent (nitrogen only), Aliphatic or aromatic, saturated or unsaturate	d, colo	ur				
	react	tion, functional group present and record their observation.						
		Total Practica	I Hou	rs	60			

### **Books for Study: Material Given**

#### **Book for Reference:**

1. Practical Chemistry , Dr. O.P Pandey, D. N Bajpai, Dr. S. Giri, S Chand & Co Ltd

COUR	COURSE OUTCOME				
After of	completion of this course, the students will be able to				
CO1: Develop skill in titrimetric analysis.					
<b>CO2:</b>	CO2: Interpret the redox reactions.				
<b>CO3:</b> identify the functional groups present					
CO4: distinguish properties of functional groups of same element					
CO5:	defend their results using confirmatory test	K4			

#### CO & PO Mapping:

COS	<b>PO 1</b>	<b>PO 2</b>	<b>PO 3</b>	PO 4	<b>PO 5</b>	<b>PO 6</b>
CO 1	2	1	2	1	1	1
CO 2	2	2	1	1	1	-
CO 3	2	2	1	1	1	-
<b>CO 4</b>	1	1	1	1	1	1
CO5	1	1	1	1	2	-

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

### LESSON PLAN

Unit	SUBJECT NAME	Hrs	Mode
Part - I	Volumetric analysis	30	Practical –
			lab
Part - II	Systematic organic Analysis	30	experiments
			practical

Course Designed by: Ms. N. Lakshmi Kruthika, Assistant Professor of Chemistry



#### MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF PHYSICS (For those who joined in 2021-2022 and after)

Course Na	me	NON CONVENTIONAL ENERGY RESOU	RCE	S				
Course Co	de	21UPHN41					С	
Category		Non Major Elective			2	-	2	
Nature of o	cours	e: EMPLOYABILITY SKILLORIENTE	D	ENTREPR	ENEU	ENEURSHIP		
COURSE	OBJI	ECTIVES:						
The learner	'S W1ll	be able to:						
1. Remember the common sources of energy.								
2. Understa	2. Understand the concepts of Solar radiation.							
3. Understa	ind an	d apply the solar heaters in different fields.						
4. Understa	and th	e functions of Ocean energy and Biomass energy	gy.					
5. Reveal th	ne Pro	duction and applications of wind energy.						
Unit: I	Fun	damentals of Energy				6	ihrs	
Energy ,Ec	onom	y and Social Development - Classification of	energ	gy sources-Co	mmon	forr	ns of	
energy- Ad	lvanta	ges and Disadvantages of conventional energy	v sou	rces- Salient	feature	s of	Non-	
convention	al ene	rgy sources -Environmental aspects of energy	5					
Unit: II	Basi	cs of Solar energy				6	ihrs	
The Sun as	s a so	ource of Energy- Sun Earth radiation- Extra	errest	rial and terre	strial r	adiat	ions-	
Spectral po	wer d	istribution of solar radiation-Measurements of	solar 1	radiation			10115	
Unit. III	Ann	lications of Solar Systems	<u>, , , , , , , , , , , , , , , , , , , </u>	adiation		6	hrc	
Solar Colle	ctors	Solar water heater - Solar industrial heating sys	eme_	Solar cookers	·		111.5	
Solar photo	volta	ic systems. Solar call fundamentals. Solar call	l clas	sification Sci	lar nh	otov	altaic	
application	s	ic systems -solar cen fundamentals- solar cen	i cias	sincation - Sc	nai pii	01000	Juan	
Unit: IV	Oce	an energy and Biomass energy				6	ihrs	
Tidal energ	v-W	ave energy -Photosynthesis process-Usable for	orms o	of biomass, th	neir co	mpos	sition	
and fuel pro	operti	es-Biomass resources- Biomass conversion tec	nolog	pies		<b>r</b>		
Unit: V	Win	d energy				6	ihrs	
Origin of w	vinde.	Global winds- Local winds-Eactors affecting	the d	listribution of	wind e	energ	w on	
the surface	of the	e earth- Major applications of wind power	the u	institution of	wind v		,y on	
				Total Lectur	e Hour	·s 3	Ohrs	
Book for S	tudv						01113	
DOOK IOI D	tuuy							
Khan B H	2017	Non conventional energy resources 3rd edition	n Ta	ta McGraw H	ill Edu	catio	n	
Drivete Lim	2017, nited	New Delhi	, 1a		III Luu	catio	11	
Unit I • 1 ?	11.00,							
Unit II. $1.2$	$\bigcup_{i=1}^{n} \bigcup_{i=1}^{n} \bigcup_{i$							
	Unit –11: 4.2, 4.4 - 4.0,4.8.							
Unit-III: 5.	Unit-III: 5.2, 5.3, 5.5,5.7,6.2,6.4,6.11.							
Unit-IV: I	0.2, 1	0.3,8.2-8.5.						
Unit-V: 7.2	2,/.3.							
Books for	Keter	ence :		<b>D</b> 11 1				
I.Alımuddi	n kha	n, 2009, Basics of Energy, Anmol publications	, New	Delhi.				
2.Rai G.D,	2010	Non – Conventional Energy Sources,4 th editi	on, K	HANNA Publ	1shers,	New	1	
Delhi.	Delhi.							

3.Singh M.K, 2009, Renewable Sources of Energy, ALP Books, New Delhi.						
Web R	Resources:					
1. <u>http</u>	s://www.askiitians.com/revision-notes/physics/heat-phenomena/					
2. http	s://www.askiitians.com/revision-notes/physics/thermodynamics/					
3. NPT	TEL :: General - NOC:Non-Conventional Energy Resources					
COUI	RSE OUTCOMES	K Level				
On suc	cessful completion of the course, the students will be able to					
CO1.	Define energy, Earth radiation, Solar radiation, Solar cell, Wind power,	V1 VA				
COI	Biomass					
COL	Classify energy resources, Extraterrestrial and terrestrial radiations, Solar cell-	V1V2				
CO2:	Solar photovoltaic, Biomass resources, Origin of winds	<b>N1,N2</b>				
	Apply conventional and non-conventional energy sources, Spectral energy					
CO3:	distribution, Solar industrial heating systems, Biomass conversion	K3				
	technologies, Wind power					
	Distinguish conventional and non-conventional energy sources, Earth radiation					
<b>CO4:</b>	and solar radiation, Solar air heater and solar water heater, tidal energy and	K3				
	biomass energy, global winds and local winds					
	Justify environmental aspects of energy, Sun as a source of Energy, Solar	1				
CO5:	photovoltaic systems, Usable forms of biomass, Factors affecting the					
	distribution of wind energy on the surface of the earth	1				

### CO & PO Mapping:

COS	<b>PO 1</b>	PO 2	<b>PO 3</b>	<b>PO 4</b>	<b>PO 5</b>	<b>PO 6</b>
CO 1	2	2	3	3	3	3
CO 2	2	3	2	3	2	3
CO 3	3	2	3	2	3	3
CO 4	3	2	3	2	2	3
CO5	2	3	3	3	2	2

*3 –Advanced Application; 2 – Intermediate Development; 1 – Introductory Level
## LESSON PLAN

UNIT	SUBJECT NAME	Hrs	Mode
I	Introduction- Energy consumption and standard of living- classification of energy resources-common forms of energy- merits and demerits of conventional and non-conventional energy sources-environmental aspects of energy.	6	PPT, Lecture, Chalk & Talk, Demonstration
Π	Introduction- The Sun as a source of Energy- Sun, Earth radiation- extraterrestrial and terrestrial radiations-spectral energy distribution of solar radiation-measurements of solar radiation	6	PPT, Lecture, Chalk & Talk, Demonstration
III	Solar air heater-solar air collector-solar water heater-solar industrial heating systems- box type solar cooker-Solar photovoltaic systems Introduction- solar cell fundamentals- classification of solar cell- solar photovoltaic applications	6	PPT, Lecture, Chalk& Talk, Demonstration
IV	Introduction of Tidal energy-Origin and nature of tidal energy- Limitations of tidal energy-Wave energy .Photosynthesis process- usable forms of biomass, their composition and fuel properties- biomass resources- biomass conversion technologies.	6	PPT, Lecture, Chalk & Talk, Demonstration
V	Introduction to origin of winds- Global winds- Local winds- Factors affecting the distribution of wind energy on the surface of the earth- Major applications of wind power	6	PPT, Lecture, Chalk & Talk, Demonstration Field visit





### MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF PHYSICS (For those who joined in 2021-2022 and after)

Course Na	ame	ne ATOMIC PHYSICS AND QUANTUM MECHANICS							
Course Code21UPHC51LF							Р	С	
Category		CORE					6	-	6
Nature of	course	EMPLOYABILITY	✓	SKILL ORIENTED		ENTREPREN	EURS	HIP	
<ul> <li>Course Objectives:</li> <li>The learners will be able to</li> <li>1. Describe the various theories of atomic model</li> <li>2. Explain Pauli's exclusion principle, Electronic Configurations and Zeeman Effect</li> <li>3. Gain knowledge about X - ray spectra and Compton effects</li> <li>4. Understand the basic concepts of Matter waves and dual nature of matter and radiation</li> <li>5. Utilize and solve Schrodinger equations to obtain wave function for some basic, physically important types of potential</li> </ul>						lly			
Unit: I	Atom ModelsIntroduction – Rutherford nuclear atom model - Bohr atom model (no derivation) – application of Bohr's theory (Spectral series of hydrogen atom) – critical potentials – atomic excitation – experimental determination of critical potentials-Frank and Hertz experiment - Drawbacks of Bohr atom model - Sommerfeld's relativistic atom model – elliptical orbits – Sommerfeld's relativistic theory – application to fine structure of the H $_{\alpha}$ line – vector atom model – spatial quantization – spinning electron hypothesis – quantum					1	18		
Unit: II	Image: Sector in the sector is a sector in the sector is exclusion principle - Electronic Configurations - Magnetic dipoleImage: Image: Sector is exclusion principle - Electronic Configurations - Magnetic dipoleImage: Image: Sector is exclusion principle - Electronic Configurations - Magnetic dipoleImage: Image: Image: Sector is exclusion principle - Electronic Configurations - Magnetic dipoleImage: Image:						18		
Unit: III	X-ray Produ spect spect exper	y <b>Diffraction</b> action of X rays – Abso rometer – X-ray spectra rum – Moseley's law ar timent.	orpt – ( nd it	ion of X-rays – Bragg Continuous spectra – C ts importance - Compt	's la Chara con e	w – Bragg's X- acteristics X-ray effect – Theory a	ray ys and	1	18

	Dual Nature of Matter Particles	
	Matter waves – De Broglie's hypothesis of matter waves - De Broglie's wave	e
	length – phase velocity (or wave velocity) of De Broglie's waves – Expressio	n
Unit: I	V for group velocity – relation between them – experimental study of matter	18
	waves G.P.Thomson Experiment – Heisenberg's uncertainty principle with th	e
	illustration of diffraction of electron through a single slit - Energy-time	
	uncertainty relation - Applications of uncertainty principle.	
	Basic of Quantum mechanics	
	Derivation of time dependent and time independent form of Schrodinger wave	e
TT	equation - its Eigen function and Eigen value - Properties of wave function -	
Unit:	Application of Schrodinger wave equation - The free particle - The particle i	n <b>18</b>
	a box: infinite square well potential - Finite square potential well – Linear	
	Harmonic oscillator.	
	Total Lecture Hours	90 Hrs
Books	for Study:	
1. Mur	ugesan.R, Er.Kiruthiga Sivaprasath, Modern Physics, S.Chand, 18th Edition, Repr	rint 2018,
New D	elhi.	
UNIT I	: Chapter 4 (4.1, 4.3, 4.7, 4.8, 4.9, 4.10, 4.11, 4.12, 4.13, 4.14)	
UNIT I	I: Chapter 4 (4.15, 4.17, 4.18, 4.19, 4.20, 4.21, 4.22, 4.23, 4.24, 4.27, 4.28)	
UNIT I	II: Chapter 5 (5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.9, 5.13)	
UNIT I	V: Chapter 7 (7.2, 7.2.1, 7.2.2, 7.2.3, 7.2.4, 7.2.5, 7.3, 7.5, 7.5.1, 7.5.2)	
Books	for References:	
1. Raja	m.J.B, Atomic Physics, S.Chand and Co, 2004, New Delhi.	
2. Segh	al Chopra and Seghal Sultan Modern Physics, S.Chand and Co, 1998, New Delh	i.
3. Saxe	na.A.K Principles of Modern Physics, Narosa Publishing House Pvt, Ltd., Fourt	h.
Web R	esources:	
1. 2	https://archive.nptel.ac.in/courses/115/105/115105100/#watch https://archive.nptel.ac.in/courses/115/105/115105100/#watch	
2. 3.	https://archive.nptel.ac.in/courses/115/105/115105100/#watch	
EXPE	CTED COURSE OUTCOME	K L ovol
On suc	cessful completion of the course, the learners should be able to	K Level
CO1:	Infer the relativistic corrections for the energy levels of the hydrogen atom and their effect on optical spectra	K2
CO2:	State and explain the key properties of many electron atoms, the importance of	КЗ
02.	the Pauli exclusion principle and quantum mechanical operators	
CO3:	applied electric and magnetic fields	K4
<b>CO4:</b>	Discuss and explain the key concepts and principles of quantum physics	K4
CO5:	Examine Schrodinger wave equation and find Eigen function and Eigen value for standard systems with both analytical and numerical methods, and then interpret the results.	К3

#### CO & PO Mapping:

COS	<b>PO 1</b>	PO 2	<b>PO 3</b>	PO 4	<b>PO 5</b>	<b>PO 6</b>
CO 1	3	3	3	3	3	3
CO 2	3	3	3	2	2	2
CO 3	3	3	2	2	2	1
CO 4	3	3	2	1	2	1
CO 5	3	2	2	2	2	1

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

### LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
I	Introduction – Rutherford nuclear atom model - Bohr atom model (no derivation) – application of Bohr's theory (Spectral series of hydrogen atom) – critical potentials – atomic excitation – experimental determination of critical potentials-Frank and Hertz experiment - Drawbacks of Bohr atom model - Sommerfeld's relativistic atom model – elliptical orbits – Sommerfeld's relativistic theory – application to fine structure of the $H_{\alpha}$ line – vector atom model – spatial quantization – spinning electron hypothesis – quantum numbers – coupling schemes.	18	Chalk & Talk, Videos and PPT
п	The Pauli's exclusion principle – Electronic Configurations - Magnetic dipole moment due to orbital and spin motion of the electron - Stern and Gerlach experiment - Optical Spectra - Fine structure $H_{\alpha}$ line - Zeeman effect – normal Zeeman effect – expression for Zeeman shift – Larmor's theorem - Paschen back effect - Stark effect	18	Chalk & Talk, Videos and PPT
III	Production of X rays – Absorption of X-rays – Bragg's law – Bragg's X-ray spectrometer – X-ray spectra – Continuous spectra – Characteristics X-rays spectrum – Moseley's law and its importance - Compton effect – Theory and experiment	18	Chalk & Talk, Videos and PPT
IV	Matter waves – De Broglie's hypothesis of matter waves - De Broglie's wave length – phase velocity (or wave velocity) of De Broglie's waves – Expression for group velocity – relation between them – experimental study of matter waves G.P.Thomson Experiment – Heisenberg's uncertainty principle with the illustration of diffraction of electron through a single slit - Energy-time uncertainty relation - Applications of uncertainty principle.	18	Chalk & Talk, Videos and PPT
V	Derivation of time dependent and time independent form of Schrodinger wave equation - its Eigen function and Eigen value - Properties of wave function - Application of Schrodinger wave equation - The free particle - The particle in a box: infinite square well potential - Finite square potential well – Linear Harmonic oscillator.	18	Chalk & Talk, Videos and PPT

### Course Designed by: Dr.P.Kavitha & Mrs.A.Lakshmi

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)							
			Section A		Section	B	Section C	Soction D
Inte	Cos	K Level	MCQ	S	Short Ans	swers	Either or	Onen
rnal	COS	II LOVA	No. of. Questions	K - Level	No. of. Questions	K - Level	Choice	Choice
CI	CO1	Up to K2	2	K1	1	K1	2	1
AI	CO2	Up to K3	2	K1	2	K2	2	1
CI	CO3	Up to K4	2	K2	1	K1	2	1
AII	<b>CO4</b>	Up to K4	2	K2	2	K2	2	1
		No. of Questions to be asked	4		3		4	2
Question Pattern		No. of Questions to be answered	4		3	2	2	1
	1 & 11	Marks for each question	1		2		5	10
		Total Marks for each section	4		6		10	10

		D	istribution of	f Marks with	K Level CI	A I & CI	AII	
	K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either / Or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
	K1	2	2			4	8	60
	K2	2	4	10	10	26	52	00
СТА	K3			10	10	20	40	40
I	K4							
•	Marks	4	6	20	20	50	100	100
	K1	2	2			4	8	20
	K2	2	4			6	12	20
CIA	K3			10	10	20	40	40
II	K4			10	10	20	40	40
	Marks	4	6	20	20	50	100	100

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summa	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes							
				(COs)				
			MCQs		Short Answers		Section C	Section
S No	COa	<b>K</b> Lovel	No. of	K	No. of	V	(Fithon / on	D
<b>5.</b> NU	COS	K - Level	NU. UI		Questi		(Entrier / Or Choice)	(Open
			Questions	Level	on	Level	Choice)	Choice)
1	CO1	Up to K2	2	K1 & K2	1	K1	2 (K1 & K1)	1(K2)
2	CO2	Up to K3	2	K1 & K2	1	K1	2 (K3 & K3)	1(K3)
3	CO3	Up to K4	2	K1 & K2	1	K2	2 (K3 & K3)	1(K4)
4	CO4	Up to K4	2	K1 & K2	1	K2	2 (K4 & K4)	1(K3)
5	CO5	Up to K3	2	K1 & K2	1	K2	2 (K2 & K2)	1(K3)
No.	of Questi	ions to be	10		5		10	5
	Aske	d	10		3		10	5
No.	of Questi	ions to be	10		5		5	3
answered		10		3		5	5	
Marks for each question		1		2		5	10	
Total Marks for each section			10		10		25	30
(	(Figures in parenthesis denotes, questions should be asked with the given K level)							

	Distribution of Marks with K Level						
K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either/ or Choice)	Section D ( Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5	4			9	7.5	17
K2	5	6			11	9.17	17
K3			25	20	45	37.5	37
K4			25	30	55	45.83	46
Marks	10	10	50	50	120	100	100
NB: Hig	gher level of p	erformance o	of the students	s is to be asso	essed by a	attempting	higher level

of K levels.

Section .	Section A (Multiple Choice Questions)					
Answer	All Ques	stions	(10x1=10 marks)			
Q. No	CO	K Level	Questions			
1	CO1	K1				
2	CO1	K2				
3	CO2	K1				
4	CO2	K2				
5	CO3	K1				
6	CO3	K2				
7	CO4	K1				
8	CO4	K2				
9	CO5	K1				
10	CO5	K2				
Section ]	B (Short	Answers)				
Answer	All Ques	stions	(5x2=10 marks)			
Q. No	CO	K Level	Questions			
11	CO1	K1				
12	CO2	K1				
13	CO3	K2				
14	CO4	K2				
15	CO5	K2				
Section	C (Eithe	r/Or Type	)			
Answer	All Ques	stions	(5  x  5 = 25  marks)			
Q. No	CO	K Level	Questions			
16) a	CO1	K3				
16) b	CO1	K3				
17) a	CO2	K3				
17) b	CO2	K3				
18) a	CO3	K3				
18) b	CO3	K3				
19) a	CO4	K3				
19) b	CO4	K3				
20) a	CO5	K4				
20) b	CO5	K4				
NB: Hig	her leve	l of perfor	mance of the students is to be assessed by attempting higher			
level of ]	K levels					
Section	D (Open	Choice)				
Answer	Any Th	ree questio	ns (3x10=30 marks)			
<b>Q. No</b>		K Level	Questions			
21		K2				
22	CO2	K3				
(1/2	000	1/ 1/				
25	CO3	K4 K2				
23 24	CO3 CO4	K4 K3				

## **Summative Examinations - Question Paper – Format**



### MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF PHYSICS (For those who joined in 2021-2022 and after)

Course Name ANALOG ELECTRONICS						
Course Code21UPHC52L						
Category		CORE	6	-	6	
Nature of	cours	e: EMPLOYABILITY 🖌 SKILL ORIENTED ENTREPRENE	EURS	HIP		
Course O The learne 1.Recol receiver	<b>bjecti</b> rs wil llect rs	<b>ves:</b> l be able to Semiconductors, diodes, transistors, amplifiers transmitters,				
3.Gain	know	ledge about different types of Oscillators				
4.Recal	l type	s of transistor connection and biasing				
5.Unde	rstand	types of modulation				
Unit: I	Sem Thev Netw diode Volta	iconductors enin's Theorem – Norton's Theorem – Thevenin – Norton Conversion - Tw york Analysis – 'h'Parameter only - Semiconductors – Types of semiconduc es – p-n junction diode – Biasing a p-n junction – Zener diode characteristics age regulator using Zener diode.	vo port tor s –	1	8	
Unit: II	Tran Junct Three AC) bias	<b>Insistor</b> tion transistor –Transistor action- Relation connecting $\alpha$ and $\beta$ of a transistor e modes of transistor connection – Relation between $\alpha$ , $\beta$ , $\gamma$ – Load line (DC and Operating Point (Q point) – Biasing circuits – Base bias - Emitter Feedb –Voltage divider bias – Collector feedback bias – Field effect transistor	 & back br.	1	8	
AmplifierPrinciple of amplification -Transistor amplifier CE mode –frequency responseof transistor amplifier – Analysis of transistor CE amplifier using h-parameter–Power amplifier –Classification of power amplifiers - Push Pull amplifier (class Bpower amplifier)- Operational Amplifier – characteristics of an ideal op-amp –Slewrate – Virtual ground – Summing amplifier, Subtracting amplifier – Op-amp asdifferentiator and Integrator.					8	
Unit: IV       Oscillator         Feedback principle – Positive and Negative feedback – Transistor oscillators-         Barkhausen criterion –Hartley, Colpitt and Phase Shift Oscillator with         mathematical analysis – Astable multivibrator using transistors with         mathematical derivation.					8	

TT *4 . X7	Modulation – Different kinds of modulation – Amplitude modulation –
Unit: V	Modulation index - Modulated power output - Frequency Modulation-18
	Expression for frequency modulated voltage - Block diagram of AM & FM
	transmitters - Block diagram of FM receivers.
	Total Lecture Hours         90 Hrs
Books Fo	or Study:
1.	G.Joserobin and A.Ubald Raj, <b>Analog Electronics and Digital</b> <b>Electronics</b> , Indira Publication, New Delhi, First edition, 2008.
Unit I	
Page No: :	5-29, 38- 45, 52-45
Unit II Page No: 9	88 02 03 05 07 101 128
Unit III	56, 72, 75, 75, 77, 101-126
Page No:	139 - 146, 150 - 158, 161-168,171, 72, 174, 177, 183-187, 189
Unit IV	
Page No: 2	207 - 241
Unit V	
3. Page N	lo: 250 - 262, 264-269, 279-282
Books Fo	or Reference:
1. V.K	Metha, Principles of Electronics, S.Chand and co., New Delhi, 2002.
2. B.L.	Theraja ,Basic Electronics, S.Chandand co., New Delhi, 2003
3. Saliv	vahanan, Sureshkumar, Vallavaraj, Electronics Devices and Circuits, Tata
Mc.	Graw Hill, New Delhi,2004
4. Amb	prose & Vincent Devaraj, Elements of Solid State Electronics, Indra
Publ	lications, New Delhi, 1994.
6. J.J.Boj	phy, Basic Electronics, Tata Mc Graw Hill, New Delhi, IV edition, 1983.
Web Reso	ources:
1. <u>httr</u>	os://nptel.ac.in/course.html/Electronics/Basic electronics
2. <u>http</u>	os://www.askiitians.com/revision-notes/physics/solid-and-electronic-
dev	vice/
3. <u>http</u>	os://nptel.ac.in/course.html/electronics/operational amplifier

1

EXPE	CTED COURSE OUTCOME	<b>V</b> Loval
On suc	cessful completion of the course, the learners should be able to	K Level
	Understand Thevenin's and Norton's Theorem, , N type and P type	
CO1:	semiconductors, NPN and PNP transistors, CE Amplifier, Hartley, Colpitt and	K2
	Phase Shift Oscillator, Multivibrator, Modulation	
	Apply twoport netwrk analysis, h parameter, Derive current ,voltage and	
<b>CO2:</b>	power gain, input and output impedance of CE amplifier 'Op-Amp for	K3
	making adder, subtractor, differentiator and integrator	
	Analyse biasing of diodes and transistors, Relation between current gains,	
CO3:	characteristics of various electronic devices like Zener diode, transistors and	K4
	FET, frequency response of amplifier	
<b>CO4:</b>	Apply feedback principle and Barkhausen criterion for oscillations	K4
COF	Construct Hartley, Colpitt oscillators and Astable multivibrator using	V2
	discrete components	КJ

### CO & PO Mapping:

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COS	<b>PO 1</b>	PO 2	<b>PO 3</b>	PO 4	PO 5	PO 6
CO 1	3	3	3	3	3	2
CO 2	3	3	3	2	3	1
CO 3	3	2	3	2	3	1
CO 4	3	2	2	2	3	1
CO 5	3	2	3	3	3	1

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

#### LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
I	Thevenin's Theorem – Norton's Theorem – Thevenin – Norton Conversion - Two port Network Analysis – 'h'Parameter only - Semiconductors – Types of semiconductor diodes – p-n junction diode – Biasing a p-n junction – Zener diode characteristics – Voltage regulator using Zener diode.	18	Lecture, PPT, Demonstration
п	Junction transistor –Transistor action- Relation connecting $\alpha$ and $\beta$ of a transistor-Three modes of transistor connection – Relation between $\alpha$ , $\beta$ , $\gamma$ – Load line (DC & AC) and Operating Point (Q point) – Biasing circuits – Base bias - Emitter Feedback bias –Voltage divider bias – Collector feedback bias – Field effect transistor.	18	Lecture, PPT, Demonstration
ш	Principle of amplification -Transistor amplifier CE mode – frequency response of transistor amplifier – Analysis of transistor CE amplifier using h-parameter– Power amplifier – Classification of power amplifiers - Push Pull amplifier (class B power amplifier)- Operational Amplifier – characteristics of an ideal op-amp –Slew rate – Virtual ground – Summing amplifier, Subtracting amplifier – Op-amp as differentiator and Integrator.	18	Lecture, PPT, Demonstration
IV	Feedback principle – Positive and Negative feedback – Transistor oscillators- Barkhausen criterion –Hartley, Colpitt and Phase Shift Oscillator with mathematical analysis – Astable multivibrator using transistors with mathematical derivation.	18	Lecture, PPT, Demonstration
V	Modulation – Different kinds of modulation – Amplitude modulation – Modulation index - Modulated power output – Frequency Modulation– Expression for frequency modulated voltage - Block diagram of AM & FM transmitters - Block diagram of FM receivers.	18	Lecture, PPT

### Course Designed by: Mrs.A.Lakshmi & Dr.P.Kavitha

	Learning Outcome Based Education & Assessment (LOBE)									
Formative Examination - Blue Print										
			Section	A	Section	B		~		
Inte	Cos	K Level	MCQ	S	Short Ans	swers	Section C Either or	Section D Open		
rnal	005	K Level	No. of. Questions	K - Level	No. of. Questions	K - Level	Choice	Choice		
CI	<b>CO1</b>	Up to K2	2	K1	1	K1	2	1		
AI	CO2	Up to K3	2	K1	2	K2	2	1		
CI	CO3	Up to K4	2	K2	1	K1	2	1		
AII	CO4	Up to K4	2	K2	2	K2	2	1		
		No. of Questions to be asked	4		3		4	2		
Question Pattern		No. of Questions to be answered	4		3		2	1		
CIA I	1 & 11	Marks for each question	1		2		5	10		
		Total Marks for each section	4		6		10	10		

	Distribution of Marks with K Level CIA I & CIA II									
	K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either / Or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidate of %		
	K1	2	2			4	8	60		
	K2	2	4	10	10	26	52	00		
СІА	K3			10	10	20	40	40		
I	K4									
-	Marks	4	6	20	20	50	100	100		
	K1	2	2			4	8	20		
	K2	2	4			6	12	20		
CIA	K3			10	10	20	40	40		
II	K4			10	10	20	40	40		
	Marks	4	6	20	20	50	100	100		

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

S	Summative Examination – Blue Print Articulation Mapping – K Level with Course							
			M	<u>Outcomes (</u> Os	COS) Short Ar	iswers	Section C	
S. No	COs	K - Level	No. of Question S	K – Level	No. of Questio n	K – Level	(Either / or Choice)	Section D (Open Choice)
1	CO1	Up to K2	2	K1& K2	1	K1	2(K1 & K1)	1(K2)
2	CO2	Up to K3	2	K& K2	1	K1	2(K3 & K3)	1(K3)
3	CO3	Up to K4	2	K& K2	1	K2	2(K3 & K3)	1(K4)
4	CO4	Up to K4	2	K1& K2	1	K2	2(K4 & K4)	1(K3)
5	CO5	Up to K3	2	K1 & K2	1	K2	2(K2 & K2)	1(K3)
No.	of Questi Aske	ions to be d	10		5		10	5
No. of Questions to be answered		10		5		5	3	
Marks for each question		1		2		5	10	
Total Marks for each section		10		10		25	30	
	(Figures	in parenthes	sis denotes,	questions sh	ould be as	ked with	the given K	level)

	Distribution of Marks with K Level								
K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either/ or Choice)	Section D ( Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %		
K1	5	4			9	7.5	17		
K2	5	6			11	9.17	17		
K3			25	20	45	37.5	37		
K4			25	30	55	45.83	46		
Marks	10	10	50	50	120	100	100		
NB: Hig	NB: Higher level of performance of the students is to be assessed by attempting higher level								
of K lev	els.				-				

Section A	. (Multip	ole Choice	Questions)
Answer A	All Quest	tions	(10x1=10 marks)
Q. No	CO	K Level	Questions
1	CO1	K1	
2	CO1	K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	
6	CO3	K2	
7	CO4	K1	
8	CO4	K2	
9	CO5	K1	
10	CO5	K2	
Section B	(Short )	Answers)	
Answer A	All Quest	tions	(5x2=10 marks)
Q. No	CO	K Level	Questions
11	CO1	K1	
12	CO2	K1	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
Section C	C (Either	/Or Type)	
Answer A	All Quest	tions	(5 x 5 = 25 marks)
Q. No	CO	K Level	Questions
16) a	CO1	K3	
16) b	CO1	K3	
17) a	CO2	K3	
17) b	CO2	K3	
18) a	CO3	K3	
18) b	CO3	K3	
19) a	CO4	K3	
19) b	CO4	K3	
20) a	CO5	K4	
20) b	CO5	K4	
NB: High	er level	of perform	ance of the students is to be assessed by attempting higher
level of K	levels		
Section D	Open (	Choice)	
Answer A	any Thre	ee question	s (3x10=30 marks)
Q. No	CO	K Level	Questions
21	CO1	K2	
22	CO2	K3	
23	CO3	K4	
24	CO4	K3	
25	CO5	K3	

# **Summative Examinations - Question Paper – Format**



### MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF PHYSICS (For those who joined in 2021-2022 and after)

Course Name	Course Name NON – ELECTRONICS PRACTICAL								
Course Code	21UPHCP3					L	Р	С	
Category	CORE					-	3	-	
Nature of course:	EMPLOYABILITY	SKILI	<b>ORIENTED</b>	$\checkmark$	ENTREPRENEU	RSHI	P		
Course Objectives	5:								
The learners will be	e able to	lika space	romator and an	ot a	lyonomotor				
2 Relate analyse an	and of incidence and e	mergence	fometer and sp	ot ga	arvanometer				
3.Find wavelength	of light and particle si	ze using l	aser						
4. Compare the imp	pedance and power fac	tor of LR	and CR circuit	s					
5. Justify, Bridge c	ircuits, Grating, LCR	circuits							
LIST OF EXPER	IMENTS								
1. Spectromet	er	-	i-d curve						
2. Spectromet	er	-	i-i'						
3. Grating		_	Minimum dev	viatio	on method				
4. Spectromet	er	-	Cauchy's Cor	nstar	nts				
5. Spectromet	er	-	Hartmann's In	nterp	polation formula				
6. L.C.R		-	Series resonat	nce o	circuit				
7. L.C.R		-	Parallel reson	ance	e circuit				
8. Spot Galvar	nometer	-	Determination	n of	(M) Mutual induc	tion			
9. Spot Galvar	nometer	-	Comparison of	of (N	<ol> <li>Mutual inductar</li> </ol>	nces			
10. Anderson's	Bridge (AC Method)	-	Self inductand	ce					
11. Maxwell's	Bridge (AC Method)	-	Self inductand	ce					
12. Light Intens	sity	-	Inverse Squar	e La	ıw				
13. Spot Galvar	nometer	-	- Absolute Capacity of a Condenser						
14. Potentiometer - Calibration of Ammeter									
15. Impedance	and Power factor	- L.R.circuit							
16. Laser		-	Determination	n of	wavelength of and	l parti	cle		
		size							
				,	Total Lecture Ho	urs	180 H	rs	

Books For Study:

1.Srinivasan.M.N.,Balasubramanian.S.,Ranganathan.R.,A Text Book of Practical

Physics,2017 Edition Sultan Chand & Sons	
Books For Reference:	
1. Ouseph.C., Practical Physics and Electronics, 2013.S. Viswanathan.P.Ltd.	
2.Hamam Singh Hemne, S.Chand and Co.New Delhi, 2017	
3.Shukla.R.K.,New Age International,2 nd Edition.,New Delhi	
4. Gupta.S.L. Kumar.V. Pragati Prakashan.M., 2016, New Delhi.	
Web Resources:	
1 https://www.slideshare.net/mobile/sunilrathore77398/basicanalogelectronics	
2 https://www.slideshare.net/mobile/PatruniChidanandaSas/basics-of-electronics-5396	2342
EXPECTED COURSE OUTCOME	K Level
On successful completion of the course, the learners should be able to	
<b>CO1:</b> Analyze the different types of spectra and its applications	K4
<b>CO2:</b> Realize the applications of LCR circuits.	K2
CO3: Update the knowledge of Spot Galvanometer	K2
CO4: Analyze the knowledge of Bridge circuits	K4

### CO & PO Mapping:

COS	PO 1	PO 2	<b>PO 3</b>	PO 4	PO 5	PO 6
CO 1	3	2	3	2	2	3
CO 2	2	3	2	3	3	2
CO 3	2	3	2	2	2	3
CO 4	3	3	2	2	2	3
CO 5	3	2	1	3	3	2

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

SEM	Name of the Experiments	Hrs	Mode
Ι	1.Spectrometer       -       i-d curve         2.Grating       -       Minimum deviation method         3.L.C.R       -       Series resonance circuit         4. Spot Galvanometer       -Determination of (M) Mutual induction.         5.Anderson's Bridge (AC Method)       -Self inductance         6.Potentiometer       -       Calibration of Ammeter         7.Laser-Determination of wavelength and particle       size         8.Spot Galvanometer       - Comparison of (M) Mutual inductances	45	Demonstration
п	<ol> <li>Spectrometer - i - i'curve</li> <li>Spectrometer - Cauchy's Constants</li> <li>Spectrometer - Hartmann's Interpolation formula</li> <li>Maxwell's Bridge (AC Method) - Self inductance</li> <li>Light Intensity - Inverse Square Law</li> <li>Spot Galvanometer - Absolute Capacity of a Condenser</li> <li>L.C.R - Parallel resonance circuits</li> <li>Impedance and Power factor - L.R.circuit</li> </ol>	45	Demonstration

#### LESSON PLAN

Course Designed by: Dr. P. Kavitha & Dr. S. S. Jayabalakrishnan



### MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF PHYSICS (For those who joined in 2021-2022 and after)

Course Name ELECTRONICS PRACTICAL										
Course Code	21UPHCP4	1UPHCP4 L P C								
Category	CORE						-	3	-	
Nature of cours	e: EMPLOYABILI	ΤY		SKILL ORIENTED	$\checkmark$	ENTREPREN	EURS	SHIP		
Course Objecti	ves:					1			1	
The learners wil	l be able to									
1.Understand the principles and applications of Digital Electronics										
2. Understand th	e principles and ap	plica	tio	ns of Analog Electronic	CS					
3. Gain knowled	dge about the devel	opme	ent	of the Microprocessor	s.					
4. Motivate the	students to apply the	e prii	ncij	oles of Digital Electror	nics	in their day-to-	day l	ife.		
5. Motivate the	students to apply the	e prii	ncij	oles of Analogl Electro	nics	in their day-to-	-day	life.		
LIST OF EXPL	ERIMENTS									
Any Fourteen I	experiments									
1 Determina	tion Band gan	_		Semiconductor						
2 Zeper Dio	de	_		Characteristics						
3 Transistor	de	_		Characteristics CF m	ode					
4 Zener Dio	de	_		Voltage Regulator	ioue					
5 Single Sta	ge Amplifier	_		Voltage Gain						
6 Hartley Os	scillator	_		Inductance of pair of	coil	s				
7 Astable M	ultivibrator	_		Discrete components						
8.Logic Gate	es	_		Discrete Component	, s (O	R.AND.NOT.N	OR a	nd		
NAND)					(0)		0111			
9.Logic Gate	es	_		IC(7432, 7408, 7404,	. 74(	02, 7400 and 743	86)			
10. Adder ar	nd Subtractor	_		OPAMP - IC 741	,	,	/			
11. Astable	Multivibrator	-		TIMER - IC 555						
12. NOR as	Universal Gate	_		IC 7402						
13. NAND a	13. NAND as Universal Gate - IC 7400									
14. Half Add	14. Half Adder, Full Adder - IC 7486, IC 7408 and IC 7432									
15. Four Bit	Binary Adder	-		IC 7483						
16. Four Bit	Binary Subtractor	-		IC 7483 and IC 740	)4					
					То	tal Lecture Ho	urs	180 I	Hrs	

## **Books For Study:**

1.Srinivasan.M.N.,Balasubramanian.S.,Ranganathan.R.,A Text Book of Practical Physics,2017 Edition Sultan Chand & Sons

**Books For Reference:** 

1. Ouseph.C., Practical Physics and Electronics, 2013. S. Viswanathan. P. Ltd.

2.Hamam Singh Hemne, S.Chand and Co.New Delhi, 2017

3.Shukla.R.K.,New Age International,2nd Edition.,New Delhi

4. Gupta.S.L. Kumar.V. Pragati Prakashan.M., 2016, New Delhi.

#### Web Resources:

1 <u>https://www.slideshare.net/mobile/sunilrathore77398/basicanalogelectronics</u>

2 <u>https://www.slideshare.net/mobile/PatruniChidanandaSas/basics-of-electronics-53962342</u>

3.http://www.sircrrengg.ac.in/images/Others/CSE/MP-LAB-MANUAL.pdf

EXPECTED COURSE OUTCOME				
On successful completion of the course, the learners should be able to				
<b>CO1:</b>	Analyze the different types of digital circuits and their applications	K4		
<b>CO2:</b>	Realize the applications of registers in computers	K3		
<b>CO3:</b>	Update the knowledge of Microprocessor programming	K2		
<b>CO4:</b>	Analyze the knowledge of Oscillators function	K4		
CO5:	Gain knowledge of applying various IC's	K2		

### CO & PO Mapping:

COS	PO 1	PO 2	<b>PO 3</b>	PO 4	<b>PO 5</b>	<b>PO 6</b>
CO 1	3	2	3	3	3	1
CO 2	2	1	3	2	2	2
CO 3	3	2	2	3	2	3
CO 4	2	2	2	2	3	2
CO 5	1	2	2	2	2	2

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

SEM	Name of the Experiments	Hrs	Mode
Ι	<ol> <li>Determination Band gap - Semiconductor</li> <li>Zener Diode - Characteristics</li> <li>Single Stage Amplifier - Voltage Gain</li> <li>Astable Muitivibrator - Discrete Components</li> <li>Logic Gates - Discrete Components (OR, AND, NOT, NOR and NAND)</li> <li>NAND as Universal Gate - IC 7400</li> <li>Half Adder, Full Adder - IC 7486, IC 7408 and IC 7432</li> <li>Four Bit Binary Adder - IC 7483</li> </ol>	90	Demonstration
Π	<ol> <li>Zener Diode - Voltage Regulator</li> <li>Transistor - Characteristics CE mode</li> <li>Hartley Oscillator - Inductance of pair of coils</li> <li>Logic Gates - IC(7432, 7408, 7404, 7402, 7400 and 7486)</li> <li>NOR as Universal Gate - IC 7402</li> <li>Adder and Subtractor - OPAMP - IC 741</li> <li>Astable Multivibrator - TIMER - IC 555</li> <li>Four Bit Binary Subtractor - IC 7483 and IC 7404</li> </ol>	90	Demonstration

Course Designed by: Dr.P.Kavitha & Dr.S.S.Jayabalakrishnan



### MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) **DEPARTMENT OF PHYSICS** (For those who joined in 2021-2022 and after)

Course Name CONCEPTS OF NUCLEAR PHYSICS							
Course C	ode	21UPHE51		L	Р	С	
Category		Elective		5	-	5	
Nature of	cours	e: EMPLOYABILITY ✓ SKILL ORIENTED	ENTREPREN	EURS	HIP		
Course O The learne Unit: I	bjecti ers wil 1. U 2. U 3.Re 4. U 5. A Nucl Gene stabi	ves: 1 be able to nderstand the structure of the nucleus and nuclear for nderstand working of particle accelerators and detect emember the laws and properties of radioactivity, Al nderstand the nuclear transmutations, photo disintegris pply the nuclear energy to the production of electrici lear Structure eral Properties of atomic nucleus – Nuclear Binding lity – Yukawa's theory (No. derivation) – Theories on Electron hypothesis – Nuclear forces - Models of	orces. ors. pha and Beta decay ration, nuclear fissio ty using different re- energy – Nuclear of nuclear composit nuclear structure –	n and actors. tion –	fusior	1.	
Liquid drop model – Binding energy formula – Shell model         Unit: II       Nuclear Accelerators and Detectors         Particle accelerators – Synchrocyclotron – Betatron–Detectors – Wilson cloud       15         chamber – Bubble chamber – Elementary particles – Particles and AntiParticles       15         – Conservation laws and symmetry.       15							
Unit: IIIRadioactivity Laws of radioactivity – Half life period – Mean life – Radio carbon dating – Alpha rays – Properties - Range – Geiger Nuttal law – Experimental determination of range – Alpha disintegration energy – Gamow's Theory of alpha decay – Beta rays – Neutrino theory of beta decay – Gamma rays – Origin – Internal conversion.15							
Unit: IV	Nucl Nucl – Pho Expl	<b>lear Reactions</b> ear transmutations by alpha particles, protons, deuteron toto disintegration – Q value calculation in Photo disinte anation for release of energy - Nuclear fusion – (C- N	ns, neutrons and elec gration – Nuclear fis cycle and P-P Cycle	trons sion – ).	15		
Unit: VNuclear Energy Production of electricity from Nuclear energy – Nuclear reactors – General features of nuclear reactor – Different types of nuclear reactors – Pressurized water reactors – Boiling water reactors – Fast Breeder reactors – Radiation hazards- Radio isotopes and their applications.1							
Total Lecture Hours 75 Hrs							
	R.M New Unit Unit	<ul> <li>urugesan and Kiruthiga Sivaprasath, Modern Physic Delhi Sixteenth Edition, 2012.</li> <li>I : Chapter: 27 (Section: 27.1 - 27.12)</li> <li>II: Chapter: 29 (Section: 29.7, 29.9 and 29.11) Chapter: 30 (Section: 30.5, 30.6, 30.8)</li> </ul>	es, S.Chand and Co.	,			

	Chapter: 38 (Section 38.1, 38.2 and 38.6)	
	Unit III: Chapter: 31 (Section: 31.4, 31.10 - 31.12, 31.16, 31.22 - 31.25, 31.3	0, 31.31
	and 31.35)	
	Unit IV: Chapter: 34 (Section: 34.7)	
	Chapter 35 (Section 35.2 - 35.4, 35.7 - 35.9)	
	Chapter 37 (Section 37.1, 37.5, 37.6 and 37.10)	
	Unit V: Chapter 35 (Section: 35.5 and 35.6)	
	Chapter 36 (Section 36.1 - 36.3)	
4. Cha	apter 32 (Section 32.1 - 32.5)	
Books	For References :	
1. D.C.7	Thayal, Nuclear Physics, Himalaya Publishing House, NewDelhi, 2004.	
2. I. Kaj	plan, Nuclear Physics, Tata McGraw Hill, NewDelhi, 1995.	
3. Arthe	rBeiser, Perspective of Modern Physics, Tata McGraw Hill, NewDelhi, 1997.	
4. D.I.S	ehgal, K.I.Chopra, and N.K.Sehgal, Modern Physics, Sultan Chand and Sons Publica	ations, 7 th
Editio	on, New Delhi, 1993.	
Web F	Resources:	
https:	<u>//nptel.ac.in/courses/115/104/115104043/</u>	
https:	//nptel.ac.in/courses/115/104/115104043/	
https:	//nptel.ac.in/content/syllabus_pdf/115103101.pdf	
EXPE	CTED COURSE OUTCOME	
On suc	cessful completion of the course, the learners should be able to	K Level
011044	Understand the nuclear forces models of nuclear structure elementary	
COl·	particles and laws of radio activity fission and fusion reactions. Types of	k2
	nuclear reactors	112
	Application of nuclear hinding energy Synchrotron synchrocyclotron	
<b>CO2</b> :	wavelength of crystal spectrometer. Thermo nuclear reaction, Radio isotopes	K3
	Analyze nuclear models chamber internal conversion of energy C-N cycle	
CO3:	and P-P cycle nuclear reactor	K4
	Evaluate liquid drop model photographic emulsion technique neutrino theory	
CO4·	and	K4
	ß decay van Allen belts, electricity from nuclear energy	174
	Determine the particle accelerators disintegration energy nuclear	
CO5:	transmutations varies types radio isotopes	<b>K4</b>
1	uansinaanons, vanos types, radio 15010pes.	

## CO & PO Mapping:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	<b>PO 6</b>
CO 1	3	3	3	3	3	2
CO 2	3	2	2	2	3	3
CO 3	3	3	3	2	3	2
<b>CO 4</b>	3	2	2	3	3	3
CO 5	3	3	1	3	3	2

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

#### LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
I	General Properties of atomic nucleus – Nuclear Binding energy – Nuclear stability – Yukawa's theory (No. derivation) – Theories of nuclear composition – Proton Electron hypothesis – Nuclear forces - Models of nuclear structure – Liquid drop model – Binding energy formula – Shell model	15	PPT, Lecture, Chalk & Talk
II	Particle accelerators – Synchrocyclotron – Betatron–Detectors – Wilson cloud chamber – Bubble chamber – Elementary particles – Particles and AntiParticles – Conservation laws and symmetry.	15	PPT, Lecture, Chalk & Talk
ш	Laws of radioactivity – Half life period – Mean life – Radio carbon dating – Alpha rays – Properties - Range – Geiger Nuttal law – Experimental determination of range – Alpha disintegration energy – Gamow's Theory of alpha decay – Beta rays – Neutrino theory of beta decay – Gamma rays – Origin – Internal conversion.	15	PPT, Lecture, Chalk & Talk
IV	Nuclear transmutations by alpha particles, protons, deuterons, neutrons and electrons – Photo disintegration – Nuclear fission – Explanation for release of energy - Nuclear fusion – (C- N cycle and P-P Cycle) - Thermo nuclear reactions – Controlled thermo nuclear reactions.	15	PPT, Lecture, Chalk & Talk
V	Production of electricity from Nuclear energy – Nuclear reactors – General features of nuclear reactor – Different types of nuclear reactors – Pressurized water reactors – Boiling water reactors – Fast Breeder reactors – Radiation hazards- Radio isotopes and their applications.	15	PPT, Lecture, Chalk & Talk

Course Designed by: Dr. R. Sangeetha & Mrs. A. Lakshmi

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)								
			Section	h A	Section	B	Castian C	Section D
Inte	Cos	K Level	MCQ	S	Short Ans	swers	Either or	Onen
rnal	005	K Lever	No. of. Questions	K - Level	No. of. Questions	K - Level	Choice	Choice
CI	CO1	Up to K2	2	K1	1	K1	2	1
AI	CO2	Up to K3	2	K1	2	K2	2	1
CI	CO3	Up to K4	2	K2	1	K1	2	1
AII	<b>CO4</b>	Up to K4	2	K2	2	K2	2	1
Question Pattern CIA I & II		No. of Questions to be asked	4		3		4	2
		No. of Questions to be answered	4		3		2	1
		Marks for each question	1		2		5	10
		Total Marks for each section	4		6		10	10

		D	istribution of	f Marks with	K Level CI	A I & CI	AII	
	K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either / Or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
	K1	2	2			4	8	60
	K2	2	4	10	10	26	52	00
СТА	K3			10	10	20	40	40
I	K4							
•	Marks	4	6	20	20	50	100	100
	K1	2	2			4	8	20
	K2	2	4			6	12	20
CIA	K3			10	10	20	40	40
II	K4			10	10	20	40	40
	Marks	4	6	20	20	50	100	100

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

S	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)							
			MCC	)s	Short Answers		Section C	C D
S.No	COs	K - Level	No. of Questions	K – Level	No. of Question	K – Level	(Either / or Choice)	(Open Choice)
1	CO1	Upto K2	2	K1& K2	1	K1	2(K1 & K1)	1(K2)
2	CO2	Upto K3	2	K& K2	1	K1	2(K3 & K3)	1(K3)
3	CO3	Upto K4	2	K& K2	1	K2	2(K3 & K3)	1(K4)
4	CO4	Upto K4	2	K1& K2	1	K2	2(K4 & K4)	1(K3)
5	CO5	Upto K4	2	K1 & K2	1	К2	2(K2 & K2)	1(K3)
No. of Questions to be Asked		10		5		10	5	
No.of Questions to be answered		10		5		5	3	
Marks for each question			1		2		5	10
Total Marks for each section			10		10		25	30
	(Figures	in parenthesi	s denotes, qu	estions s	hould be as	ked with	the given K	level)

	Distribution of Marks with K Level							
K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either/ or Choice)	Section D ( Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %	
K1	5	4			9	7.5	17	
K2	5	6			11	9.17	17	
K3			25	20	45	37.5	37	
K4			25	30	55	45.83	46	
Marks	10	10	50	50	120	100	100	
NB: Hig of K lev	NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.							

Section A	Section A (Multiple Choice Questions)					
Answer	All Ques	stions	(10x1=10 marks)			
Q. No	CO	K Level	Questions			
1	CO1	K1				
2	CO1	K2				
3	CO2	K1				
4	CO2	K2				
5	CO3	K1				
6	CO3	K2				
7	CO4	K1				
8	CO4	K2				
9	CO5	K1				
10	CO5	K2				
Section 1	B (Short	Answers)				
Answer	All Ques	stions	(5x2=10 marks)			
Q. No	CO	K Level	Questions			
11	CO1	K1				
12	CO2	K1				
13	CO3	K2				
14	CO4	K2				
15	CO5	K2				
Section	C (Eithe	r/Or Type)				
Answer	All Ques	stions	(5  x  5 = 25  marks)			
Q. No	CO	K Level	Questions			
16) a	COI	K3				
16) b	COI	K3				
17) a	CO2	K3				
17) b	CO2	K3				
18) a	CO3	K3				
18) b	CO3	K3				
19) a	CO4	K3				
19) b	CO4	K3				
20) a	C05	K4				
20) b		K4				
NB: Hig	her level	of perform	nance of the students is to be assessed by attempting higher			
level of l	<u>A levels</u>					
Section D (Open Choice)						
Answer		V L aval	us (3X10=30 marKs)			
21	C01	K2	Questions			
<i>∠</i> 1		IX2				
$\gamma\gamma$	$CO^2$	K3				
22	CO2	К3 КЛ				
$\begin{array}{r} 22\\ 23\\ 24 \end{array}$	CO2 CO3	K3 K4 K3				
22 23 24 25	CO2 CO3 CO4	K3 K4 K3				

# **Summative Examinations - Question Paper – Format**



### MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF PHYSICS (For those who joined in 2021-2022 and after)

Course Na	ame (	CONDENSED MATTER PHYSICS						
Course Co	ode 2	21UPHE52	L	Р	С			
Category	F	Elective	5	-	5			
Nature of	course:	EMPLOYABILITY ✓ SKILL ORIENTED ENTREPREN	EURS	HIP				
Course Objectives:         The learners will be able to         1.Understand the arrangements of atoms in the crystalline materials and specific heat theories of solids.         2Understand the electrical and thermal conductivities of metal, properties and applications superconductors.         3.Remember the different types of magnetism, properties and applications of magnetimaterials.         4.Understand the different types of polarization, dielectric loss, dielectric strength and breakdown         5.Understand the general properties of semiconductors, carrier concentration for								
	intr	rinsic and extrinsic semiconductors.						
Unit: I	Crystal Structures Crystal lattice – Unit cell – Bravais lattice –Miller indices– Crystal structures and calculation of packing factor (SC,BCC,FCC) –Structure of diamond and Zinc blende – Einstein's theory of specific heat– Debye's theory of specific heat							
Unit: II	<b>Condu</b> Free electrime, electrime, electriconduce	ucting and Superconducting Materials lectron theory of metals – Electron drift, mobility, mean free path, relaxat electrical and thermal conductivities of metals – Widemann Franz law – S ctivity – Properties of Superconductors - BCS theory – Applications of su ctors (Squids Magnetic levitation)	ion uper per	1	5			
Unit: III	conductors (Squids, Magnetic levitation)         Magnetic Materials         Different types of magnetism – Dia, Para, Ferro, Anti ferro and Ferrimagnetisms –         Langevin's theory of dia and para magnetism – Weiss theory of ferro magnetism –         Magnetic materials – Properties and applications – Hard and soft magnetic materials –							
Unit: IV	Dielect Dielect Polaris electro polariz breakd	ctrics trics – Polarization – Polar and non polar dielectrics – Dielectric constant sability – Clausius - Mosotti relation - Different types of polarization – onic, ionic, orientational, space charge polarizations – Dependence of cation on frequency and temperature – Dielectric loss – Dielectric strengt lown.	– h and	1	5			
Unit: V	Semico semico semico concen	conducting materials onducting materials-General properties of the semiconductors-Classification onductors-Intrinsic semiconductor-Carrier concentration -derivation-Extri onductor-Carrier concentration in n-type and p-type semiconductor and in intration-Direct and Indirect band gap semiconductors Total Lecture He	on of nsic purity	1 75 Hi	5 rs			

L	<b>Books for Study:</b> 1. Dr. M. Arumugam, <b>Material Science, Anuradha</b> Publications, III Revised Edition, Reprint 2016.	
	Unit –I : Page No., 3.1 – 3.2, 3.4-3.5, 3.7-3.8, 3.18-3.21, 3.24, 3.26, 4.41-4.4	7
	Unit – II: Page No., 4.2, 5.5 – 5.9, 5.16 – 5.20, 8.1- 8.5, 8.12, 8.15.	
	Unit – III: Page No., $7.1 - 7.14$ , $7.23 - 7.29$	
	Unit – IV: Page No., $6.1 - 6.14$ , $6.17 - 6.20$	
	2 Dr. M. Arumugam, Solid State Physics, Anuradha Publication, First Edition Unit – V: Page No., 9.1 - 9.17	n,2004.
	Books For Reference:	
	1. R. K. Puriand V.K. Babbar, Solid state physics, S.Chandand Co, I Edition, 1997	7.
	<ol> <li>HallidayResnick, Jearl Walker, Principles of physics (9th Edition), Wiley India Pvt. Ltd., New Delhi,2012.</li> </ol>	
	3 Dr. P. Mani, Engineering Physics II. Dhanam Publications, Nineth Edition, R	enrint
	3. Dr. P. Mani, Engineering Physics– II, Dhanam Publications, Nineth Edition, R November20	eprint
Veb I	3. Dr. P. Mani, Engineering Physics– II, Dhanam Publications, Nineth Edition, R November20 Resources:	eprint
Veb I <mark>ttps:</mark>	<ul> <li>3. Dr. P. Mani, Engineering Physics– II, Dhanam Publications, Nineth Edition, R November20</li> <li>Resources: //www.youtube.com/channel/UCcW7z2pE37Z4I1koTwahBfA</li> </ul>	eprint
Veb H ttps: ttps:	<ul> <li>3. Dr. P. Mani, Engineering Physics– II, Dhanam Publications, Nineth Edition, R November20</li> <li>Resources: //www.youtube.com/channel/UCcW7z2pE37Z4I1koTwahBfA //www.britannica.com/science/condensed-matter-physics</li> </ul>	eprint
Veb I <u>ttps:</u> ttps: ttps:	<ul> <li>3. Dr. P. Mani, Engineering Physics– II, Dhanam Publications, Nineth Edition, R November20</li> <li>Resources: //www.youtube.com/channel/UCcW7z2pE37Z4I1koTwahBfA //www.britannica.com/science/condensed-matter-physics</li> <li>//sciencesprings.wordpress.com/tag/condensed-matter-physics/</li> </ul>	eprint
Veb I ttps: ttps: ttps: XPE	<ul> <li>3. Dr. P. Mani, Engineering Physics– II, Dhanam Publications, Nineth Edition, R November20</li> <li>Resources: //www.youtube.com/channel/UCcW7z2pE37Z4I1koTwahBfA //www.britannica.com/science/condensed-matter-physics //sciencesprings.wordpress.com/tag/condensed-matter-physics/</li> <li>CTED COURSE OUTCOME</li> </ul>	
/eb I ttps: ttps: ttps: ttps: XPE n suc	<ul> <li>3. Dr. P. Mani, Engineering Physics– II, Dhanam Publications, Nineth Edition, R November20</li> <li>Resources: //www.youtube.com/channel/UCcW7z2pE37Z4I1koTwahBfA //www.britannica.com/science/condensed-matter-physics //sciencesprings.wordpress.com/tag/condensed-matter-physics/</li> <li>CTED COURSE OUTCOME eccessful completion of the course, the learners should be able to</li> </ul>	K Leve
/eb I ttps: ttps: ttps: ttps: XPE n suc O1:	<ul> <li>3. Dr. P. Mani, Engineering Physics– II, Dhanam Publications, Nineth Edition, R November20</li> <li>Resources: //www.youtube.com/channel/UCcW7z2pE37Z4I1koTwahBfA //www.britannica.com/science/condensed-matter-physics //sciencesprings.wordpress.com/tag/condensed-matter-physics/</li> <li>CTED COURSE OUTCOME scessful completion of the course, the learners should be able to Understand crystal structure, free electron theory of metals, types of magnetism, polar and non polar dielectrics, properties of semiconductor.</li> </ul>	K Leve K2
Veb F ttps: ttps: ttps: ttps: TPE n suc O1: O2:	<ul> <li>3. Dr. P. Mani, Engineering Physics- II, Dhanam Publications, Nineth Edition, R November20</li> <li>Resources: //www.youtube.com/channel/UCcW7z2pE37Z4I1koTwahBfA //www.britannica.com/science/condensed-matter-physics //sciencesprings.wordpress.com/tag/condensed-matter-physics/</li> <li>CTED COURSE OUTCOME eccessful completion of the course, the learners should be able to</li> <li>Understand crystal structure, free electron theory of metals, types of magnetism, polar and non polar dielectrics, properties of semiconductor.</li> <li>Application of Miller indices, conductivities of metals, Langevin's theory of dia and pera magnetism. Intrinsic and Extrinsic semiconductor.</li> </ul>	K Leve K2 K3
Veb I ttps: ttps: ttps: ttps: XPE n suc O1: O2:	<ul> <li>3. Dr. P. Mani, Engineering Physics- II, Dhanam Publications, Nineth Edition, R November20</li> <li>Resources: //www.youtube.com/channel/UCcW7z2pE37Z4I1koTwahBfA //www.britannica.com/science/condensed-matter-physics //sciencesprings.wordpress.com/tag/condensed-matter-physics/</li> <li>CTED COURSE OUTCOME rcessful completion of the course, the learners should be able to Understand crystal structure, free electron theory of metals, types of magnetism, polar and non polar dielectrics, properties of semiconductor.</li> <li>Application of Miller indices, conductivities of metals, Langevin's theory of dia and para magnetism, Intrinsic and Extrinsic semiconductor</li> </ul>	K Leve K2 K3
7eb I 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11ps: 11	<ul> <li>3. Dr. P. Mani, Engineering Physics– II, Dhanam Publications, Nineth Edition, R November20</li> <li>Resources: //www.youtube.com/channel/UCcW7z2pE37Z4I1koTwahBfA //www.britannica.com/science/condensed-matter-physics //sciencesprings.wordpress.com/tag/condensed-matter-physics/</li> <li>CTED COURSE OUTCOME recessful completion of the course, the learners should be able to Understand crystal structure, free electron theory of metals, types of magnetism, polar and non polar dielectrics, properties of semiconductor.</li> <li>Application of Miller indices, conductivities of metals, Langevin's theory of dia and para magnetism, Intrinsic and Extrinsic semiconductor</li> <li>Analyse the structure of diamond and zinc blende, Widemannfranz law, magnetic materials, types of polarization, carrier concentration.</li> </ul>	K Leve K2 K3 K4
Veb I ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttps: ttp: ttp	<ul> <li>3. Dr. P. Mani, Engineering Physics– II, Dhanam Publications, Nineth Edition, R November20</li> <li>Resources: //www.youtube.com/channel/UCcW7z2pE37Z4I1koTwahBfA //www.britannica.com/science/condensed-matter-physics</li> <li>//sciencesprings.wordpress.com/tag/condensed-matter-physics/</li> <li>CTED COURSE OUTCOME ccessful completion of the course, the learners should be able to Understand crystal structure, free electron theory of metals, types of magnetism, polar and non polar dielectrics, properties of semiconductor.</li> <li>Application of Miller indices, conductivities of metals, Langevin's theory of dia and para magnetism, Intrinsic and Extrinsic semiconductor</li> <li>Analyse the structure of diamond and zinc blende, Widemannfranz law, magnetic materials, types of polarization, carrier concentration.</li> <li>Analyse specific heat theories of solids, BCS theory, hard and soft magnetic</li> </ul>	K Leve K2 K3 K4
/eb I ttps: ttps: ttps: 01: 02: 03: 03:	<ul> <li>3. Dr. P. Mani, Engineering Physics– II, Dhanam Publications, Nineth Edition, R November20</li> <li>Resources:</li> <li>//www.youtube.com/channel/UCcW7z2pE37Z4I1koTwahBfA</li> <li>//www.britannica.com/science/condensed-matter-physics</li> <li>//sciencesprings.wordpress.com/tag/condensed-matter-physics/</li> <li>CTED COURSE OUTCOME</li> <li>ccessful completion of the course, the learners should be able to</li> <li>Understand crystal structure, free electron theory of metals, types of magnetism, polar and non polar dielectrics, properties of semiconductor.</li> <li>Application of Miller indices, conductivities of metals, Langevin's theory of dia and para magnetism, Intrinsic and Extrinsic semiconductor</li> <li>Analyse the structure of diamond and zinc blende, Widemannfranz law, magnetic materials, types of polarization, carrier concentration.</li> <li>Analyse specific heat theories of solids, BCS theory, hard and soft magnetic materials, frequency and temperature dependence, variation of Femi level.</li> </ul>	K Leve K2 K3 K4 K4
Veb I ttps: ttps: ttps: ttps: 01: 02: 03: 04: 05:	<ul> <li>3. Dr. P. Mani, Engineering Physics- II, Dhanam Publications, Nineth Edition, R November20</li> <li>Resources:</li> <li>//www.youtube.com/channel/UCcW7z2pE37Z4I1koTwahBfA</li> <li>//www.britannica.com/science/condensed-matter-physics</li> <li>//sciencesprings.wordpress.com/tag/condensed-matter-physics/</li> <li>CTED COURSE OUTCOME</li> <li>ccessful completion of the course, the learners should be able to</li> <li>Understand crystal structure, free electron theory of metals, types of magnetism, polar and non polar dielectrics, properties of semiconductor.</li> <li>Application of Miller indices, conductivities of metals, Langevin's theory of dia and para magnetism, Intrinsic and Extrinsic semiconductor</li> <li>Analyse the structure of diamond and zinc blende, Widemannfranz law, magnetic materials, types of polarization, carrier concentration.</li> <li>Analyse specific heat theories of solids, BCS theory, hard and soft magnetic materials, frequency and temperature dependence, variation of Femi level.</li> <li>Determine the crystal structure, Application of superconductors, Magnetic</li> </ul>	K Leve K2 K3 K4 K4

### CO & PO Mapping:

COS	<b>PO 1</b>	PO 2	<b>PO 3</b>	PO 4	PO 5	<b>PO 6</b>
CO 1	3	3	3	3	3	3
CO 2	3	3	3	2	3	3
CO 3	3	2	2	3	3	3
CO 4	3	3	1	2	3	1
CO 5	3	3	2	2	3	2

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

#### LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
I	Crystal lattice – Unit cell – Bravais lattice –Miller indices– Crystal structures and calculation of packing factor (SC,BCC,FCC) –Structure of diamond and Zinc blende – Specific heat theories of solids – Einstein's theory of specific heat– Debye's theory of specific heat	15	Lecture, Chalk & Talk, Demonstration
п	Free electron theory of metals – Electron drift, mobility, mean free path, relaxation time, electrical and thermal conductivities of metals – Widemann Franz law – Super conductivity – Properties of Superconductors - BCS theory – Applications of super conductors (Squids, Magneticlevitaion)	15	Lecture, Chalk & Talk, Demonstration
ш	Different types of magnetism – Dia, para, ferro, anti ferro and ferimagnetism – Langevin's theory of dia and para magnetism – Weiss theory of ferro magnetism – Magnetic materials – Properties and applications – Hard and soft magnetic materials – Ferrites.	15	Lecture, Chalk & Talk, Demonstration
IV	Dielectrics – Polarization – Polar and non polar dielectrics – Dielectric constant – Polarisability – Clausius - Mosotti relation - Different types of polarization –electronic, ionic, orientational, space charge polarizations – Dependence of polarization on frequency and temperature – Dielectric loss – Dielectric strength and breakdown.	15	Lecture, Chalk & Talk, Demonstration
V	Semiconducting materials-General properties of the semiconductors-Classification of semiconductors-Intrinsic semiconductor-Carrier concentration derivation-Variation of Fermi level with temperature-Extrinsic semiconductor-Carrier concentration in n-type and p-type semiconductor-Variation of Fermi level with temperature and impurity concentration-Direct and Indirect band gap semiconductors	15	Lecture, Chalk & Talk, Demonstration

## Course Designed by: Dr. R. Sangeetha & Mrs. A. Lakshmi

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)							
			Section	h A	Section	B	Section C	Section D
Inte	Cos	K Level	MCQ	S	Short Ans	swers	Either or	Onen
rnal	COS	K Lever	No. of. Questions	K - Level	No. of. Questions	K - Level	Choice	Choice
CI	CO1	Up to K2	2	K1	1	K1	2	1
AI	CO2	Up to K3	2	K1	2	K2	2	1
CI	CO3	Up to K4	2	K2	1	K1	2	1
AII	<b>CO4</b>	Up to K4	2	K2	2	K2	2	1
Question Pattern CIA I & II		No. of Questions to be asked	4		3		4	2
		No. of Questions to be answered	4		3		2	1
		Marks for each question	1		2		5	10
		Total Marks for each section	4		6		10	10

		D	istribution of	f Marks with	K Level CI	A I & CI	AII	
	K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either / Or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
	K1	2	2			4	8	60
	K2	2	4	10	10	26	52	00
СТА	K3			10	10	20	40	40
I	K4							
•	Marks	4	6	20	20	50	100	100
	K1	2	2			4	8	20
	K2	2	4			6	12	20
CIA	K3			10	10	20	40	40
II	K4			10	10	20	40	40
	Marks	4	6	20	20	50	100	100

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

S	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)							
			MCC	)s	Short Answers		Section C	Seation D
S.No	COs	K - Level	No. of Questions	K – Level	No. of Question	K – Level	(Either / or Choice)	(Open Choice)
1	CO1	Upto K2	2	K1& K2	1	K1	2(K1 & K1)	1(K2)
2	CO2	Upto K3	2	K& K2	1	K1	2(K3 & K3)	1(K3)
3	CO3	Upto K4	2	K& K2	1	К2	2(K3 & K3)	1(K4)
4	CO4	Upto K4	2	K1& K2	1	К2	2(K4 & K4)	1(K3)
5	CO5	Upto K4	2	K1 & K2	1	K2	2(K2 & K2)	1(K3)
No. of Questions to be Asked		10		5		10	5	
No.of Questions to be answered			10		5		5	3
Marks for each question			1		2		5	10
Total Marks for each section			10		10		25	30
	(Figures	in parenthesi	s denotes, qu	estions s	hould be as	ked with	the given K	level)

	Distribution of Marks with K Level							
K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either/ or Choice)	Section D ( Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %	
K1	5	4			9	7.5	17	
K2	5	6			11	9.17	17	
K3			25	20	45	37.5	37	
K4			25	30	55	45.83	46	
Marks	10	10	50	50	120	100	100	
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.								

Section A	Section A (Multiple Choice Questions)					
Answer A	ll Quest	tions	(10x1=10 marks)			
Q. No	CO	K Level	Questions			
1	CO1	K1				
2	CO1	K2				
3	CO2	K1				
4	CO2	K2				
5	CO3	K1				
6	CO3	K2				
7	CO4	K1				
8	CO4	K2				
9	CO5	K1				
10	CO5	K2				
Section B	(Short A	Answers)				
Answer A	all Quest	tions	(5x2=10 marks)			
Q. No	CO	K Level	Questions			
11	CO1	K1				
12	CO2	K1				
13	CO3	K2				
14	CO4	K2				
15	CO5	K2				
Section C	(Either	/Or Type)				
Answer A	all Quest	tions	(5 x 5 = 25 marks)			
Q. No	CO	K Level	Questions			
16) a	CO1	K3				
16) b	CO1	K3				
17) a	CO2	K3				
17) b	CO2	K3				
18) a	CO3	K3				
18) b	CO3	K3				
19) a	CO4	K3				
19) b	CO4	K3				
20) a	CO5	K4				
20) b	CO5	K4				
NB: High	er level	of perform	ance of the students is to be assessed by attempting higher			
level of K	levels					
Section D (Open Choice)						
Answer A	ny Thre	ee question	s (3x10=30 marks)			
Q. No	CO	K Level	Questions			
21	CO1	K2				
22	CO2	K3				
23	CO3	K4				
24	CO4	K3				
25	CO5	K3				

# **Summative Examinations - Question Paper – Format**



### MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF PHYSICS (For those who joined in 2021-2022 and after)

Course Name BASICS OF ASTROPHYSICS																		
Course Code		21UPHE53								L	Р	C						
Category		Elective							5	-	5							
Nature of	course	e: EMPLOYABILITY 🗸 SKILL ORIENTED 🖌 ENTREPRENEURS								JRS	HIP							
<ul> <li>Course Objectives:</li> <li>The learners will be able to</li> <li>1. Understand the Understanding the Sky and Constellation.</li> <li>2. Understand the Special Theory of Relativity and Telescopes.</li> <li>3. Remember the Planets, Kepler's Laws, Comets and Asteroids.</li> <li>4. Understand the sun structure and nuclear fusion.</li> <li>5. Apply the concepts of astrophysics to the Astronomy and cosmology.</li> </ul>																		
Unit: I	Sky Understanding the Sky-Constellation – Birth of Modern Astronomy – Geocentric Theory– Heliocentric Theory.								1	15								
Unit: II	Light and TelescopesThe Speed of Light – The Constancy of the Speed of Light – TheSpecial Theory of Relativity – Telescopes – Aperture – Focal length– Magnification or Power – Radio Telescopes – Infrared Telescopes– Ultraviolet, X- Ray and Gamma Telescopes.							1	15									
Unit: III	Our Solar system Planets – Terrestrial Planets – The Jovian Planets – Mercury – Venus – Earth and the Moon – Mars – Jupiter – Saturn – Uranus – Neptune – Dwarf Planets and Kuiper Belt – Kepler's Laws – Comets – Asteroids – Meteoroids – Meteoros – PHOs. Stars: Star Formation – The Hertzsprung – Russell (HR) Diagram – Chandrasekhar's Limit – Distance Determination. Parallax Method of Stars – Limitation of Distance Measurement Using Stellar Parallax – Absolute and Apparent Magnitude – Star Death							1	15									
Unit: IV	SUN         Sun Structure – Temperature at Various Zones – Sunspots, Solar         Flares and Evershed Effect – Differential Rotation of Sun –         Prominences – Granules – Nuclear Fusion – Seasons – Moon –         Lunar eclipse – Solar Eclipse – Binary Stars.							]	15									
Unit: V	CosmologyAstronomy and cosmology – Expansion of the Universe – CosmicRay Background – The Steady State alternative – Dark Matterand Dark Energy – Big Bang and Big Crunch– Pulsating Theory –Galaxies – Closed, Open and Flat universe – Future of Universe –Cosmology, Philosophy and Theology.								15									
												T	ota	al Lecture I	Hou	rs   '	75 Hi	S

Books for Study:									
Dr. S. Stephen Rajkumar Inbanathan, Introduction to Astronomy for Beginners, 2019.									
UNIT -	-I : Chapter-1 & 2								
UNIT-	II : Chapter –3								
UNIT-	<b>III</b> : Chapter –4 & 5 (5.1 to 5.5)								
UNIT-	<b>IV</b> : Chapter –5 (5.6 to 5.10)								
UNIT-	V : Chapter –6								
Deelva	for Deferences								
BOOKS		11							
1.	Jay M. Pasachoff, ASTRONOMY From the earth to the universe, saunders co	llege							
	publishing, 2006.								
2.D	ianahL. Moche, ASTRONOMY A self- teaching guide, John Wiley & sons, Inc	, 2015							
Web R	lesources:								
1. http://map.gsfc.nasa.gov/universe/WMAP_Universe.pdf									
or http://map.gsfc.nasa.gov/universe/									
2.https://archive.nptel.ac.in/courses/115/105/115105046/#watch									
3. https://www.youtube.com/watch?v=6zUsYkRfhiM									
EVDECTED COUDSE OUTCOME									
On successful completion, of the course, the learners should be able to									
On successful completion of the course, the learners should be able to									
	Understand basic concepts of positional astronomy like astronomical								
	coordinate system astronomical techniques, various types of optical								
CO1:	talassonas and talassona mountings, various types of detactors and their use								
	relescopes and relescope mountings, various types of detectors and their use								
with telescopes and Physics of sun and our solar system.									
<b>CO2:</b>	Measure distances, time, temperature and radius of star	K3							
CO3·	Analysis of speed of light, Chandrasekhar's Limit and differential Rotation of								
	Sun								
<b>CO4</b> :	Evaluate aperture, focal length and magnification or power of telescopes.	K4							
CO5:	Develop ideas on Future of Universe	K4							

### CO & PO Mapping:

COS	<b>PO 1</b>	<b>PO 2</b>	<b>PO 3</b>	PO 4	<b>PO 5</b>	<b>PO 6</b>
CO 1	3	2	3	2	3	2
CO 2	2	3	2	1	3	2
CO 3	2	1	2	2	2	2
<b>CO 4</b>	3	2	2	3	2	3
CO 5	3	3	1	2	3	2

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

#### LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
Ι	Understanding the Sky-Constellation – Birth of Modern Astronomy – Geocentric Theory– Heliocentric Theory.	15	Lecture, Chalk & Talk, Demonstration
Π	The Speed of Light – The Constancy of the Speed of Light – The Special Theory of Relativity – Telescopes – Aperture – Focal length – Magnification or Power – Radio Telescopes – Infrared Telescopes – Ultraviolet, X- Ray and Gamma Telescopes.	15	Lecture, Chalk & Talk, Demonstration
ш	Planets – Terrestrial Planets – The Jovian Planets – Mercury – Venus – Earth and the Moon – Mars – Jupiter – Saturn – Uranus – Neptune – Dwarf Planets and Kuiper Belt – Kepler's Laws – Comets – Asteroids – Meteoroids – Meteors – PHOs. Stars: Star Formation – The Hertzsprung – Russell (HR) Diagram – Chandrasekhar's Limit – Distance Determination. Parallax Method of Stars – Limitation of Distance Measurement Using Stellar Parallax – Absolute and Apparent Magnitude – Star Death.	15	Lecture, Chalk & Talk, Demonstration
IV	Sun Structure – Temperature at Various Zones – Sunspots, Solar Flares and Evershed Effect – Differential Rotation of Sun – Prominences – Granules – Nuclear Fusion – Seasons – Moon – Lunar eclipse – Solar Eclipse – Binary Stars.	15	Lecture, Chalk & Talk, Demonstration
V	Astronomy and cosmology – Expansion of the Universe – Cosmic Ray Background – The Steady State alternative – Dark Matter and Dark Energy – Big Bang and Big Crunch– Pulsating Theory – Galaxies – Closed, Open and Flat universe – Future of Universe – Cosmology, Philosophy and Theology.	15	Lecture, Chalk & Talk, Demonstration

Course Designed by: Dr.G.Dhanalakshmi & Mrs.A.Lakshmi
Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)									
			Section	h A	Section	B	Section C	Section D	
Inte	Cos	K Level	MCQ	S	Short Ans	swers	Either or	Onen	
rnal		K Lever	No. of. Questions	K - Level	No. of. Questions	K - Level	Choice	Choice	
CI	CO1	Up to K2	2	K1	1	K1	2	1	
AI	CO2	Up to K3	2	K1	2	K2	2	1	
CI	CO3	Up to K4	2	K2	1	K1	2	1	
AII	<b>CO4</b>	Up to K4	2	K2	2	K2	2	1	
		No. of Questions to be asked	4		3		4	2	
Question Pattern CIA I & II		No. of Questions to be answered	4		3		2	1	
		Marks for each question	1		2		5	10	
		Total Marks for each section	4		6		10	10	

	Distribution of Marks with K Level CIA I & CIA II											
	K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either / Or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidate of %				
	K1	2	2			4	8	60				
	K2	2	4	10	10	26	52	00				
СТА	K3			10	10	20	40	40				
	K4											
-	Marks	4	6	20	20	50	100	100				
	K1	2	2			4	8	20				
	K2	2	4			6	12	20				
CIA	K3			10	10	20	40	40				
II	K4			10	10	$\overline{20}$	40	40				
	Marks	4	6	20	20	50	100	100				

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

S	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)										
			MCOs		Short An	Short Answers		C. d' D			
S.No	COs	K - Level	No. of Questions	K – Level	No. of Question	K – Level	(Either / or Choice)	(Open Choice)			
1	CO1	Upto K2	2	K1& K2	1	K1	2(K1 & K1)	1(K2)			
2	CO2	Upto K3	2	K& K2	1	K1	2(K3 & K3)	1(K3)			
3	CO3	Upto K4	2	K& K2	1	K2	2(K3 & K3)	1(K4)			
4	CO4	Upto K4	2	K1& K2	1	K2	2(K4 & K4)	1(K3)			
5	CO5	Upto K4	2	K1 & K2	1	K2	2(K2 & K2)	1(K3)			
No.	of Quest. Aske	tions to be	10		5		10	5			
No.of Questions to be answered		10		5		5	3				
Marks for each question			1		2		5	10			
Total I	Marks for	each section	10		10		25	30			
	(Figures	in parenthesi	is denotes. at	estions s	hould be as	ked with	the given K	level)			

	Distribution of Marks with K Level										
K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either/ or Choice)	Section D ( Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %				
K1	5	4			9	7.5	17				
K2	5	6			11	9.17	17				
K3			25	20	45	37.5	37				
K4			25	30	55	45.83	46				
Marks	10	10	50	50	120	100	100				
NB: Hig of K lev	NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.										

Section	Section A (Multiple Choice Questions)								
Answei	r All Qu	estions	(10x1=10 marks)						
Q.No	CO	K Level	Questions						
1	CO1	K1							
2	CO1	K2							
3	CO2	K1							
4	CO2	K2							
5	CO3	K1							
6	CO3	K2							
7	CO4	K1							
8	CO4	K2							
9	CO5	K1							
10	CO5	K2							
Section	B (Sho	rt Answers							
Answei	r All Qu	estions	(5x2=10 marks)						
Q.No	CO	K Level	Questions						
11	CO1	K1							
12	CO2	K1							
13	CO3	K2							
14	CO4	K2							
15	CO5	K2							
Section	C (Eith	er/Or Typ	e)						
Answei	r All Qu	estions	(5  x  5 = 25  marks)						
Q.No	CO	K Level	Questions						
16) a	CO1	K3							
16) b	CO1	K3							
17) a	CO2	K3							
17) b	CO2	K3							
18) a	CO3	K3							
18) b	CO3	K3							
19) a	CO4	K3							
19) b	CO4	K3							
20) a	CO5	K4							
20) b	CO5	K4							
NB: Hi	gher lev	el of perfo	rmance of the students is to be assessed by attempting higher						
level of	K levels	8							
Section	Section D (Open Choice)								
Answei	r Any Tl	hree questi	ons (3x10=30 marks)						
		K Level	Questions						
Q.NO		77.0							
<b>Q.No</b> 21	C01	K2							
21 22	CO1 CO2	K2 K3							
21 22 23	CO1 CO2 CO3	K2 K3 K4							
21 22 23 24	CO1 CO2 CO3 CO4	K2 K3 K4 K3							

## **Summative Examinations - Question Paper – Format**



### MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF PHYSICS (For those who joined in 2021-2022 and after)

Course Name FUNDAMENTALS OF MOLECULAR SPECTROSCOPY									
Course Co	ode	21UPHE54	L	Р	С				
Category		Elective	5	-	5				
Nature of	course	e: EMPLOYABILITY 🗸 SKILL ORIENTED ENTREPRENE	EURS	HIP					
Course O The learne 1. The 2. The 3. The 4. The 5.Strue	<b>bjecti</b> ers will e gene e prind e instru e intera ctural a	ives: Il be able to eral features of spectroscopy. ciple and applications of spectroscopy. umentation of spectrophotometers action of radiation with molecules analysis of organic compounds using spectroscopy							
Unit: I	Gend Units radia elect reflec natur elect IR S Vibra	General Features of Spectroscopy         Units and conversion factors - Introduction to spectroscopy- Nature of         radiation- Energies corresponding to various kinds of radiation- interaction of         electromagnetic radiation with matter- absorption, emission, transmission,         reflection, dispersion, polarization and scattering. Uncertainty relation &         natural line width and natural line broadening, rotational, vibrational &         electronic energy levels.         IR Spectroscopy         Vibrational energy of diatomic molecule – Selection rules –							
Unit: II	vibra asym mole Inter samp appli	Vibrational energy of diatomic molecule – Selection rules – vibrating diatomic molecule- diatomic vibrating rotator – asymmetry of rotation – vibration band – vibrations of polyatomic molecules – Rotation – vibration spectra of poly atomic molecules – Interpretation of vibrational spectra – IR spectrophotometer – sample handling techniques – Fourier transform IR spectrometer – applications							
Unit: III	UV a The Instru- organ trans ® un	and Visible Spectroscopy Nature of Electronic Excitations - Principles of Absorption Spectrosco rumentation- Chromosomes and Auxochromes – Electronic transition anic molecules – types; Solvent effect; selection rule for electronic sition, Frank condon principle- Woodward-Fieser rule for polyenes and nsaturated carbonyl compounds, application of UV-visible spectroscop	opy - in d (- oy.	1	5				
Unit: IV	Mass Samj & C :FAE Anal predi ion p aldeb	s Spectrometry ple Introduction, Ionization methods: Electronic Ionisation (EI) Chemical Ionisation (CI), Desorption Ionization Techniques B, SIMS, MALDI. Mass Analysis- The Magnetic Sector Mass lyzer- Double-Focusing Mass Analyzers- Quadrupole Mass lyzers, isotope abundance, Metastable ions, general rules licting the fragmentation patterns-determination of molecular peak, fragmentation patterns for aliphatic compounds, amines, hydes, Ketones alone.		1	.5				

Unit: V	Nuclear Spin States- Nuclear Magnetic Moments- The Mechanism of Absorption (Resonance) - Population Densities of Nuclear Spin States- The Chemical Shift and Shielding- The Nuclear Magnetic Resonance Spectrometer- The Continuous-Wave (CW) Instrument- The Pulsed Fourier Transform (FT) Instrument- Chemical Equivalence—A Brief Overview-Chemical Environment and Chemical Shift-Magnetic Anisotropy-Spin–Spin Splitting (n +1) Rule- Pascal's Triangle- Proton NMR spectrum of ethanol.Total Lecture Hours75						
	Total Lecture Hours	75 Hrs					
<ul> <li>Books for Study:</li> <li>1. Unit - I - study material given</li> <li>2. Pavia, Lampman &amp; Kriz, Introduction to Spectroscopy.5th edition, Cengage Learning. Unit II - chapter 2 Unit - III - chapter 10 Unit - IV - chapter 3 &amp; 4 Unit - V - chapter 5</li> </ul>							
Books for Reference:							
1. C.	N Banwell "Fundamentals of Molecular Spectroscopy", 4th edition ,McGraw	Hill					
Ec	lucation						
2. R.	M. Silverstein, G.C.Bassler, T.C. Morrill, "Spectrometic Identification	of Organic					
C	ompounds.6 th edition, wiley						
3.W. 1	Kemp, " <b>Organic Spectroscopy</b> " 3 rd edition, Red Globe Press						
Web Res	ources:						
https://ar	<u>conve.nptel.ac.in/courses/104/106/104106122</u>						
https://w	ww.pritannica.com/science/spectroscopy/Wiolecular-spectroscopy						
<u>nups://II</u>	<u>JICI.aC.III/CUUISCS/104101077</u>						
EXPECT	TED COURSE OUTCOME	K Level					
On succes	ssful completion of the course, the learners should be able to	K Level					
CO1: st	ate the general features of spectroscopy	K2					
CO2: de	emonstrate the principle and applications of vibrational spectroscopy	K3					
CO3: m	hake use of the theory of electronic spectroscopy in analyzing compounds	К4					
$\begin{array}{ c c } \mathbf{CO4:} & a_{te} \\ te \end{array}$	echniques	K4					
<b>CO5:</b> $\begin{bmatrix} E \\ m \end{bmatrix}$	xplain the applications of mass spectrometry in identifying various types of nolecules	К4					

### CO & PO Mapping:

COS	<b>PO 1</b>	PO 2	<b>PO 3</b>	PO 4	<b>PO 5</b>	<b>PO 6</b>
CO 1	2	2	2	3	1	2
CO 2	1	2	2	1	1	1
CO 3	2	2	2	3	1	1
<b>CO 4</b>	2	2	2	2	1	1
CO 5	3	2	2	2	2	1

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

#### LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
Ι	Units and conversion factors - Introduction to spectroscopy- Nature of radiation- Energies corresponding to various kinds of radiation- interaction of electromagnetic radiation with matter- absorption, emission, transmission, reflection, dispersion, polarization and scattering. Uncertainty relation & natural line width and natural line broadening, rotational, vibrational & electronic energy levels.	15	Ppt,Lecture, Chalk & Talk, Demonstration
П	Vibrational energy of diatomic molecule – Selection rules – vibrating diatomic molecule– diatomic vibrating rotator – asymmetry of rotation – vibration band – vibrations of polyatomic molecules – Rotation – vibration spectra of poly atomic molecules Interpretation of vibrational spectra – IR spectrophotometer – sample handling techniques – Fourier transform IR spectrometer – applications- problems (simple hydrocarbons-alcohols, aldehydes, ketones, carboxylic acids)	15	Ppt,Lecture, Chalk & Talk, Demonstration
ш	The Nature of Electronic Excitations - Principles of Absorption Spectroscopy - Instrumentation- Chromosomes and Auxochromes – Electronic transition in organic molecules – types; Solvent effect; selection rule for electronic transition, Frank condon principle- Woodward-Fieser rule for polyenes and <-	15	Ppt,Lecture, Chalk & Talk, Demonstration
IV	Sample Introduction, Ionization methods : Electronic Ionisation (EI) & Chemical Ionisation (CI), Desorption Ionization Techniques :FAB, SIMS, MALDI. Mass Analysis- The Magnetic Sector Mass Analyzer- Double-Focusing Mass Analyzers- Quadrupole Mass Analyzers- Time-of-Flight Mass Analyzers isotope abundance, Metastable ions, general rules predicting the fragmentation patterns-determination of molecular ion peak, fragmentation patterns for aliphatic compounds, amines, aldehydes, Ketones alone	15	Ppt,Lecture, Chalk & Talk, Demonstration
V	Nuclear Spin States- Nuclear Magnetic Moments- The Mechanism of Absorption (Resonance) - Population Densities of	15	Ppt,Lecture,

Nuclear Spin States- The Chemical Shift and Shielding- The Nuclear Magnetic Resonance Spectrometer- The Continuous- Wave (CW) Instrument- The Pulsed Fourier Transform (FT) Instrument	Chalk & Talk, Demonstration
Chemical Equivalence—A Brief Overview-Chemical Environment and Chemical Shift-Magnetic Anisotropy-Spin–Spin Splitting $(n + 1)$ Rule-Pascal's Triangle- Proton NMR spectrum of ethanol.	

## Course Designed by: Ms. N. Lakshmi Kruthika & Mrs.A.Lakshmi

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)									
			Section	A	Section	n B	Section C	Section D		
Inte	Cos	K Level	MCQ	S	Short Ans	swers	Either or	Open		
rnal			No. of. Questions	K - Level	No. of. Questions	K - Level	Choice	Choice		
CI	CO1	Up to K2	2	K1	1	K1	2	1		
AI	CO2	Up to K3	2	K1	2	K2	2	1		
CI	CO3	Up to K4	2	K2	1	K1	2	1		
AII	CO4	Up to K4	2	K2	2	K2	2	1		
		No. of Questions to be asked	4		3		4	2		
Question Pattern CIA I & II		No. of Questions to be answered	4		3		2	1		
		Marks for each question	1		2		5	10		
		Total Marks for each section	4		6		10	10		

	Distribution of Marks with K Level CIA I & CIA II											
	K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either / Or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidate of %				
	K1	2	2			4	8	60				
	K2	2	4	10	10	26	52	00				
СІА	K3			10	10	20	40	40				
I	K4											
•	Marks	4	6	20	20	50	100	100				
	K1	2	2			4	8	20				
	K2	2	4			6	12	20				
CIA	K3			10	10	20	40	40				
II	K4			10	10	20	40	40				
	Marks	4	6	20	20	50	100	100				

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

S	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)							
			MCC	)s	Short An	swers	Section C	Section D
S.No	COs	K - Level	No. of Questions	K – Level	No. of Question	K – Level	(Either / or Choice)	(Open Choice)
1	CO1	Upto K2	2	K1& K2	1	K1	2(K1 & K1)	1(K2)
2	CO2	Upto K3	2	K& K2	1	K1	2(K3 & K3)	1(K3)
3	CO3	Upto K4	2	K& K2	1	K2	2(K3 & K3)	1(K4)
4	CO4	Upto K4	2	K1& K2	1	K2	2(K4 & K4)	1(K3)
5	CO5	Upto K4	2	K1 & K2	1	K2	2(K2 & K2)	1(K3)
No. of Questions to be Asked		10		5		10	5	
No.of Questions to be answered		10		5		5	3	
Marks for each question			1		2		5	10
Total Marks for each section			10		10		25	30
	(Figures	in parenthesi	is denotes, qu	estions s	hould be as	ked with	the given K	level)

	Distribution of Marks with K Level							
K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either/ or Choice)	Section D ( Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %	
K1	5	4			9	7.5	17	
K2	5	6			11	9.17	17	
K3			25	20	45	37.5	37	
K4			25	30	55	45.83	46	
Marks	10	10	50	50	120	100	100	
NB: Hig of K lev	NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.							

Section	Section A (Multiple Choice Questions)					
Answei	r All Qu	estions	(10x1=10 marks)			
Q.No	CO	K Level	Questions			
1	CO1	K1				
2	CO1	K2				
3	CO2	K1				
4	CO2	K2				
5	CO3	K1				
6	CO3	K2				
7	CO4	K1				
8	CO4	K2				
9	CO5	K1				
10	CO5	K2				
Section	B (Sho	rt Answers				
Answei	r All Qu	estions	(5x2=10 marks)			
Q.No	CO	K Level	Questions			
11	CO1	K1				
12	CO2	K1				
13	CO3	K2				
14	CO4	K2				
15	CO5	K2				
Section	C (Eith	er/Or Typ	e)			
Answei	r All Qu	estions	(5 x 5 = 25 marks)			
Q.No	CO	K Level	Questions			
16) a	CO1	K3				
16) b	CO1	K3				
17) a	CO2	K3				
17) b	CO2	K3				
18) a	CO3	K3				
18) b	CO3	K3				
19) a	CO4	K3				
19) b	CO4	K3				
20) a	CO5	K4				
20) b	CO5	K4				
NB: Hi	gher lev	el of perfo	rmance of the students is to be assessed by attempting higher			
level of	K levels	6				
Section D (Open Choice)						
Answei	r Any Tl	hree questi	ons (3x10=30 marks)			
Q.No	CO	K Level	Questions			
21	CO1	K2				
	<i>a</i> :					
22	CO2	K3				
22 23	CO2 CO3	K3 K4				
22 23 24	CO2 CO3 CO4	K3 K4 K3				

## **Summative Examinations - Question Paper – Format**



### MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF PHYSICS (For those who joined in 2021-2022 and after)

Course Na	ame	e SENSORS AND ORGANIC ELECTRONICS						
Course C	ode	21UPHE55			L	Р	С	
Category		Elective			5	-	5	
Nature of	cours	e: EMPLOYABILITY	✓ SKILL ORIENTED	ENTREPRENI	EURS	HIP		
<ul> <li>Course Objectives:</li> <li>The learners will be able to <ol> <li>Fundamentals and types of sensors.</li> <li>The principles of electromagnetic sensors.</li> <li>Remember the theory of temperature sensors</li> <li>Understand the components and working of OLEDs</li> <li>Apply the novel organic electronic materials</li> </ol> </li> </ul>								
Unit: I	Unit: ISensor based measurement systems General concepts - principles and terminology - sensor classification - Parameters - static characteristics - dynamic characteristics - Environmental parameters - characterisation- electrical - mechanical and thermal- optical - chemical or biological characterization15						15	
Unit: II	Mechanical and Electromechanical Sensors         Potentiometers - Strain Gages - Inductive Sensors : Ferromagnetic         plunger type transducers, Electromagnetic transducer,         magnetostrictive transducer - Capacitive sensors: the parallel plate         capacitive sensor, Electrostatic transducer, Piezoelectric elements,							
Unit: III	Force sensors, Onrasonic sensors         UV and Visible Spectroscopy         Acoustic Temperature Sensors - Nuclear Thermometer - Magnetic         Thermometer- Semiconductor Types - Thermal Radiation sensors - Quartz         Crystal thermoelectric sensors - Spectroscopic Thermometry - Noise         Thermometry - Heat Flux Sensors Magnetoresistive sensors - Inductance and         Eddy current sensors- stitching magnetic sensors						15	
Unit: IV	Organic Light emitting Diodes         Luminescence in organic Semiconductors - HOMO and LUMO -         charge transport - organic vs inorganic luminescent materials-         artificial lighting- electrically powered incandescent and         luminescent lamps- solid state lighting - CSL ith OLEDs - LEDs Vs         OLEDs						15	
Unit: V	Nov Orga Bulk in P othe devi	el Organic electronic m anic Photovoltaic Devic c heterojunction thin filr olymer Solar Cells (PS r advanced concepts viz. ces, multiphoton abso	aterials ces (OPDs) using Polymus. Interface effects and SCs) efficiency. Introduc Organic electro chromic orbing materials and	mer-Fullerene improvement tion to some materials and devices and		1	15	

Name let'le Our anie Thin Eiler Manzam Derries	
Nonvolatile Organic Thin Film Memory Device	
Total Lecture Hou	irs 75 Hrs
Books for Study:	
1. Patranabis D., "Sensors and Transducers", Prentice-Hall India, 2nd Ed., 200	4.
Unit I - chapter - 1	
Unit II - chapter 2	
Unit III - chapter 3 & 4	
2. Thejo kalyani, "Principles and applications of OLEDs" oodhead Publishing	
Unit IV - chapter 2, 4, 5	
Rooks for Deferences	
1 Down Dallas & John G. Wahster "Songars and Signal Conditioning" John	Wilow & Song
2nd Ed 2001	whey & Sons
2 K. Mariaski, <b>Dhysics of amounhous semiconductors</b> , Imperial Callese Dres	a 1000 ISDN
2. K. Mongaki, Flysics of amorphous semiconductors, imperial Conege Fles	s, 1999, ISBN
Physics and Engineering, Wiley Interscience, 2007	ers. Chemistry
3 Christof Woll <b>Physical and Chamical aspects of Organic electronics</b> wiley r	ublications
Woh Pasources:	uoncations
https://pptel.ac.in/courses/108108147	
https://nptcl.ac.nl/courses/10010014/	
$\frac{\text{https://archive.nptel.ac.m/courses/113/10//11310/012/}{\text{https://archive.nptel.ac.m/courses/113/10//11310/012/}{\text{https://archive.nptel.ac.m/courses/113/10//11310/012/}{\text{https://archive.nptel.ac.m/courses/113/10//11310/012/}{\text{https://archive.nptel.ac.m/courses/113/10//11310/012/}{\text{https://archive.nptel.ac.m/courses/113/10//11310/012/}{\text{https://archive.nptel.ac.m/courses/113/10//11310/012/}{\text{https://archive.nptel.ac.m/courses/113/10//11310/012/}{\text{https://archive.nptel.ac.m/courses/113/10//11310/012/}{\text{https://archive.nptel.ac.m/courses/113/10//11310/012/}{\text{https://archive.nptel.ac.m/courses/113/10//11310/012/}{\text{https://archive.nptel.ac.m/courses/113/10//11310/012/}{\text{https://archive.nptel.ac.m/courses/113/10//11310/012/}{\text{https://archive.nptel.ac.m/courses/113/10//11310/012/}{\text{https://archive.nptel.ac.m/courses/113/10//11310/012/}{\text{https://archive.nptel.ac.m/courses/113/10//11310/012/}{\text{https://archive.nptel.ac.m/courses/113/10//11310/012/}{\text{https://archive.nptel.ac.m/courses/113/10//11310/012/}{\text{https://archive.nptel.ac.m/courses/113/10//11310/012/}{\text{https://archive.nptel.ac.m/courses/113/10//11310/012/}{\text{https://archive.nptel.ac.m/courses/113/10//11310/012/}{\text{https://archive.nptel.ac.m/courses/113/10//11310/012/}{\text{https://archive.nptel.ac.m/courses/113/10//11310/012/}{\text{https://archive.nptel.ac.m/courses/113/10//11310/012/}{\text{https://archive.nptel.ac.m/courses/113/10//11310/012/}{\text{https://archive.nptel.ac.m/courses/113/10//11310/012/}{\text{https://archive.nptel.ac.m/courses/113/10//11310/012/}{\text{https://archive.nptel.ac.m/courses/113/10//11310/012/}{\text{https://archive.nptel.ac.m/courses/113/10//11310/012/}{\text{https://archive.nptel.ac.m/courses/113/10//11310/012/}{\text{https://archive.nptel.ac.m/courses/113/10//11310/012/}{\text{https://archive.nptel.ac.m/courses/113/10//11310/012/}{\text{https://archive.nptel.ac.m/courses/113/10//11310/012/}{\text{https://archive.nptel.ac.m/courses/113/10//1130/012/}{https://archive.nptel.ac.m/courses/113/10//113/10//113/10//113/10//113/10//113/10//113/10//113/10//113/$	
<u>https://arcmve.nptei.ac.m/courses/115/104/115104012/</u>	
EXPECTED COURSE OUTCOME	<b>V</b> L aval
On successful completion of the course, the learners should be able to	K Level
<b>CO1:</b> define theterms and characteristics of sensors.	K2
CO2: compare and contrastvarious types of sensors.	K3
<b>CO3:</b> outline the principles of temperature sensors.	K4
<b>CO4:</b> interpret and relate the structure and properties of OLEDs.	K4
CO5: construct various organic electronic materials.	K3

#### CO & PO Mapping:

COS	PO 1	PO 2	<b>PO 3</b>	<b>PO 4</b>	<b>PO 5</b>	<b>PO 6</b>
CO 1	3	1	2	2	1	1
CO 2	2	2	1	2	1	1
CO 3	2	2	2	2	1	1
<b>CO 4</b>	2	1	2	2	1	1
CO 5	2	2	1	2	1	1

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

#### LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
I	General concepts and terminology, sensor classification, general input- output configuration, static characteristics of measurement systems, Dynamic characteristics, primary sensor, materials for sensor, Microsensor Technology.	15	Ppt,Lecture, Chalk & Talk, Demonstration
п	Potentiometers, Strain Gages, Resistive Temperature Detectors (RTDs), Thermistors, Magnetoresistors, Light-Dependent Resistors (LDRs), Resistive Hygrometers, Resistive Gas Sensors, Liquid Conductivity Sensors, Signal Conditioning for Resistive Sensors: Resistance Measurement, Voltage Dividers, Dynamic Measurements, Capacitive Sensors, Inductive Sensors, Electromagnetic Sensors.	15	Ppt,Lecture, Chalk & Talk, Demonstration
ш	Thermoelectric Sensors: Thermocouples, Piezoelectric Sensors, Pyroelectric Sensors, Electrochemical Sensors, Acoustic Temperature Sensors, Nuclear Thermometer, Magnetic Thermometer, Semiconductor Types, Thermal Radiation, Quartz Crystal, NQR, Spectroscopic Noise Thermometry, Heat Flux Sensors.	15	Ppt,Lecture, Chalk & Talk, Demonstration
IV	Materials and Interface Engineering in Organic Light Emitting Diodes (OLEDs). OLED materials and device architecture for full colour displays and solid state lighting. Theory and operation principle of Organic Field Effect Transistors (OFETs). Interface Characterization, Threshold Voltage and subthreshold swing and charge carrier mobility in OFETs. Application of OFETs in Displays.	15	Ppt,Lecture, Chalk & Talk, Demonstration
v	Organic Photovoltaic Devices (OPDs) using Polymer-Fullerene Bulk heterojunction thin films. Interface effects and improvement in Polymer Solar Cells (PSCs) efficiency. Introduction to some other advanced concepts viz. Organic electrochromic materials and devices, multiphoton absorbing materials and devices and Nonvolatile Organic Thin Film Memory Device.	15	Ppt,Lecture, Chalk & Talk, Demonstration

#### Course Designed by: Ms. N. Lakshmi Kruthika & Mrs.A.Lakshmi

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)							
			Section	Α	Section	B	a ( <b>•</b> a	
Inte	Cos	K Level	MCQ	S	Short Ans	swers	Section C Either or	Section D Open
rnal			No. of. Questions	K - Level	No. of. Questions	K - Level	Choice	Choice
CI	CO1	Up to K2	2	K1	1	K1	2	1
AI	CO2	Up to K3	2	K1	2	K2	2	1
CI	<b>CO3</b>	Up to K4	2	K2	1	K1	2	1
AII	<b>CO4</b>	Up to K4	2	K2	2	K2	2	1
Question Pattern		No. of Questions to be asked	4		3		4	2
		No. of Questions to be answered	4		3		2	1
	1 & 11	Marks for each question	1		2		5	10
		Total Marks for each section	4		6		10	10

		D	istribution of	f Marks with	K Level CI	A I & CI	AII	
	K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either / Or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
	K1	2	2			4	8	60
	K2	2	4	10	10	26	52	00
СТА	K3			10	10	20	40	40
	K4							
•	Marks	4	6	20	20	50	100	100
	K1	2	2			4	8	20
	K2	2	4			6	12	20
CIA	K3			10	10	20	40	40
II	K4			10	10	20	40	40
	Marks	4	6	20	20	50	100	100

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

S	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)							
			MCC	)s	Short An	swers	Section C	Geodier D
S.No	COs	K - Level	No. of Questions	K – Level	No. of Question	K – Level	(Either / or Choice)	(Open Choice)
1	CO1	Upto K2	2	K1& K2	1	K1	2(K1 & K1)	1(K2)
2	CO2	Upto K3	2	K& K2	1	K1	2(K3 & K3)	1(K3)
3	CO3	Upto K4	2	K& K2	1	К2	2(K3 & K3)	1(K4)
4	CO4	Upto K4	2	K1& K2	1	К2	2(K4 & K4)	1(K3)
5	CO5	Upto K4	2	K1 & K2	1	K2	2(K2 & K2)	1(K3)
No. of Questions to be Asked		10		5		10	5	
No.of Questions to be answered		10		5		5	3	
Marks for each question			1		2		5	10
Total Marks for each section			10		10		25	30
	(Figures	in parenthesi	s denotes, qu	estions s	hould be as	ked with	the given K	level)

	Distribution of Marks with K Level								
K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either/ or Choice)	Section D ( Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %		
K1	5	4			9	7.5	17		
K2	5	6			11	9.17	17		
K3			25	20	45	37.5	37		
K4			25	30	55	45.83	46		
Marks	10	10	50	50	120	100	100		
NB: Hig of K lev	NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.								

Section	Section A (Multiple Choice Questions)					
Answei	: All Qu	estions	(10x1=10 marks)			
Q.No	CO	K Level	Questions			
1	CO1	K1				
2	CO1	K2				
3	CO2	K1				
4	CO2	K2				
5	CO3	K1				
6	CO3	K2				
7	CO4	K1				
8	CO4	K2				
9	CO5	K1				
10	CO5	K2				
Section	B (Sho	rt Answers	8)			
Answei	: All Qu	estions	(5x2=10 marks)			
Q.No	CO	K Level	Questions			
11	CO1	K1				
12	CO2	K1				
13	CO3	K2				
14	CO4	K2				
15	CO5	K2				
Section	C (Eith	er/Or Typ	e)			
Answei	: All Qu	estions	(5  x 5 = 25  marks)			
Q.No	CO	K Level	Questions			
16) a	CO1	K3				
16) b	CO1	K3				
17) a	CO2	K3				
17) b	CO2	K3				
18) a	CO3	K3				
18) b	CO3	K3				
19) a	CO4	K3				
19) b	CO4	K3				
20) a	CO5	K4				
20) b	CO5	K4				
NB: Hi	gher lev	el of perfo	rmance of the students is to be assessed by attempting higher			
level of	K levels	8				
Section	D (Ope	en Choice)				
Answei	· Any Tl	hree questi	ions (3x10=30 marks)			
Q.No	CO	K Level	Questions			
21	CO1	K2				
22	CO2	K3				
23	CO3	K4				
24	CO4	K3				
25	CO5	K3				

## **Summative Examinations - Question Paper – Format**



### MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF PHYSICS (For those who joined in 2021-2022 and after)

Course Na	ame	PARTICLE PHYSICS			
Course Co	ode	21UPHE56	L	Р	С
Category		Elective	5	-	5
Nature of	course	EMPLOYABILITY ✓ SKILL ORIENTED ENTREPRENE	URS	HIP	
Course O The learner 1. Ba 2. Dis 3. Ilh 4. Sys 5.Cate	bjecti ers will sics of screte ustration mmetr goriza	ves: I be able to Fundamental particles. symmetries of particles. on of Gauge Symmetries and Quantum chromodynamics. by breaking. tion of Standard Model electroweak interactions.			
Unit: I	Insig Fund intera mom	<b>th on Particles</b> amental particles and their searches- Accelerators and colliders- Basic actions- Relativity, antiparticles- Rotation, Isospin, Addition of Angu entum- Conservation laws in decays and scattering.	c llar	1	5
Discrete Symmetries Charge Conjugation (C ) , Parity (P) and Time reversal (T) - Transformation of spinor bilinears under C, P, T - CP Violation in Kaon system - CPT invariance and its consequences- Feynman Diagrams ,Cross-section and decay widths .					
Unit: III	Gau U(1) Prod - Par	ge Symmetries and Quantum chromo dynamics , SU(2) and SU(3) local gauge invariance - Yang Mills Lagrangian - uction of hadrons in electron positron scattering - Deep inelastic scatter ton Model and Bjorken scaling.	ering	1	5
Unit: IV	Sym Expl	metry Breaking icit and spontaneous - Goldstone Theorem - Higgs Mechanism		1	5
Unit: V	Stan Gaug break mass neutr	dard Model of electroweak interactions ge, Fermion and Higgs interactions - Spontaneous symmetry king and masses of particles - Yukawa interactions, Fermion es, CKM Matrix - Physical processes involving charged and ral current.		1	5
		Total Lecture Hou	irs	75 Hr	S
Books fo D. Griffith Unit I - ch Unit II - cl Unit III - c Unit III - c Unit IV & Books for	r Stud ns, Intra apter hapter chapter V- ch Refer Eidolp	ly: roduction to Particle Physics, J. Wiley and Sons I IV r 11 apter 10 rence: can et al. The Poview of Particle Physics. Phys. Lett. P502, 1 (20)	04) ~	c und	ated
1. S. for	editio	nan, et al., The Keview of Particle Physics, Phys. Lett. B592, 1 (20 n 2006.	04), a	s upa	

2.	2. R. A Dunlap, Introduction to physics of nuclei and particles (Thomson Asia, 2004)					
3.	Surinder Kaur, Textbook on Particle Physics, Med tech publication					
Web R	esources:					
1.https	://nptel.ac.in/courses/115103101					
2.https	://www.damtp.cam.ac.uk/user/tong/particle.html					
3.https://ocw.mit.edu/courses/8-701-introduction-to-nuclear-and-particle-physics-fall-						
2020/p	2020/pages/video-lectures/					
EXPE	CTED COURSE OUTCOME	K L ovol				
On suce	cessful completion of the course, the learners should be able to	K Level				
<b>CO1:</b>	List the fundamental particles	K2				
<b>CO2:</b>	Explain the discrete symmetries	K3				
CO3:	Illustrate the Gauge Symmetries and Quantum chromodynamicsK4					
<b>CO4:</b>	<b>O4:</b> Categorize the Symmetry BreakingK4					
CO5:	Identify the Standard Model of electroweak interactions	K3				

## CO & PO Mapping:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	1	2	2	1	1	2
CO 2	2	2	2	2	1	1
CO 3	2	1	2	1	2	1
<b>CO 4</b>	2	2	1	2	1	2
CO 5	2	1	1	2	1	2

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level <u>LESSON PLAN</u>

Unit	Course Name	Hrs	Pedagogy
I	Fundamental particles and their searches- Accelerators and colliders- Basic interactions- Relativity, antiparticles- Rotation, Isospin, Addition of Angular momentum- Conservation laws in decays and scattering.	15	Chalk & talk
П	Charge Conjugation (C), Parity (P) and Time reversal (T) - Transformation of spinor bilinears under C, P, T - CP Violation in Kaon system - CPT invariance and its consequences- Feynman Diagrams, Cross-section and decay widths.	15	Chalk & talk
III	U(1), SU(2) and SU(3) local gauge invariance - Yang Mills Lagrangian - Production of hadrons in electron positron scattering - Deep inelastic scattering - Parton Model and Bjorken scaling.	15	Chalk & talk
IV	Explicit and spontaneous - Goldstone Theorem - Higgs Mechanism.	15	Chalk & talk
V	Gauge, Fermion and Higgs interactions - Spontaneous symmetry breaking and masses of particles - Yukawa interactions, Fermion masses, CKM Matrix - Physical processes involving charged and neutral current.	15	Chalk & talk

Course Designed by: Ms. N. Lakshmi Kruthika & Mrs.A.Lakshmi

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)								
			Section A Section B		ı B	Section C	Section D		
Inte	Cos	K Level	MCQ	S	Short Ans	swers	Either or	Onen	
rnal	COS		No. of. Questions	K - Level	No. of. Questions	K - Level	Choice	Choice	
CI	CO1	Up to K2	2	K1	1	K1	2	1	
AI	CO2	Up to K3	2	K1	2	K2	2	1	
CI	CO3	Up to K4	2	K2	1	K1	2	1	
AII	<b>CO4</b>	Up to K4	2	K2	2	K2	2	1	
		No. of Questions to be asked	4		3		4	2	
Question Pattern CIA I & II	No. of Questions to be answered	4		3		2	1		
	1 & 11	Marks for each question	1		2		5	10	
		Total Marks for each section	4		6		10	10	

		D	istribution of	f Marks with	K Level CI	A I & CI	AII	
	K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either / Or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
	K1	2	2			4	8	60
	K2	2	4	10	10	26	52	00
СТА	K3			10	10	20	40	40
	K4							
-	Marks	4	6	20	20	50	100	100
	K1	2	2			4	8	20
	K2	2	4			6	12	20
CIA	K3			10	10	20	40	40
II	K4			10	10	20	40	40
	Marks	4	6	20	20	50	100	100

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

S	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)								
			MCC	)s	Short Answers		Section C	G. d. D	
S.No	COs	K - Level	No. of Questions	K – Level	No. of Question	K – Level	(Either / or Choice)	(Open Choice)	
1	CO1	Upto K2	2	K1& K2	1	K1	2(K1 & K1)	1(K2)	
2	CO2	Upto K3	2	K& K2	1	K1	2(K3 & K3)	1(K3)	
3	CO3	Upto K4	2	K& K2	1	K2	2(K3 & K3)	1(K4)	
4	CO4	Upto K4	2	K1& K2	1	K2	2(K4 & K4)	1(K3)	
5	CO5	Upto K4	2	K1 & K2	1	K2	2(K2 & K2)	1(K3)	
No.	of Quest. Aske	tions to be	10		5		10	5	
No.of Questions to be answered		10		5		5	3		
Mar	ks for eac	ch question	1		2		5	10	
Total N	Marks for	each section	10		10		25	30	
	(Figures	in parenthesi	s denotes, qu	estions s	hould be as	ked with	the given K	level)	

	Distribution of Marks with K Level										
K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either/ or Choice)	Section D ( Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %				
K1	5	4			9	7.5	17				
K2	5	6			11	9.17	17				
K3			25	20	45	37.5	37				
K4			25	30	55	45.83	46				
Marks	10	10	50	50	120	100	100				
NB: Hig	NB: Higher level of performance of the students is to be assessed by attempting higher level										
OI K lev	eis.										

Section	Section A (Multiple Choice Questions)						
Answei	r All Qu	estions	(10x1=10 marks)				
Q.No	CO	K Level	Questions				
1	CO1	K1					
2	CO1	K2					
3	CO2	K1					
4	CO2	K2					
5	CO3	K1					
6	CO3	K2					
7	CO4	K1					
8	CO4	K2					
9	CO5	K1					
10	CO5	K2					
Section	B (Sho	rt Answers					
Answei	r All Qu	estions	(5x2=10 marks)				
Q.No	CO	K Level	Questions				
11	CO1	K1					
12	CO2	K1					
13	CO3	K2					
14	CO4	K2					
15	CO5	K2					
Section	C (Eith	er/Or Typ	e)				
Answei	r All Qu	estions	(5 x 5 = 25 marks)				
Q.No	CO	K Level	Questions				
16) a	CO1	K3					
16) b	CO1	K3					
17) a	CO2	K3					
17) b	CO2	K3					
18) a	CO3	K3					
18) b	CO3	K3					
19) a	CO4	K3					
19) b	CO4	K3					
20) a	CO5	K4					
20) b	CO5	K4					
NB: Hi	gher lev	el of perfo	rmance of the students is to be assessed by attempting higher				
level of	K levels	6					
Section	D (Ope	n Choice)					
Answei	r Any Tl	hree questi	ons (3x10=30 marks)				
Q.No	CO	K Level	Questions				
21	CO1	K2					
22	CO2	K3					
	002						
23	CO2 CO3	K4					
23 24	CO3 CO4	K4 K3					

## **Summative Examinations - Question Paper – Format**



### MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF PHYSICS (For those who joined in 2021-2022 and after)

Course Na	ame	GEMOLOGY							
Course Co	ode	21UPHS51					L	Р	С
Category		Skill					2	-	2
Nature of	cours	e: EMPLOYABILITY		SKILL ORIENTED	$\checkmark$	ENTREPREN	EURS	HIP	
Course O The learne 1. Rec 2. Det 3. Rec 4. An 5.Appli	<b>bjecti</b> ers wil call the termin membe alysing ication	<b>ves:</b> l be able to e basic concepts, types , pl e the formation of Gems. er the classification of Ger g the different cuts in Gem s of gems in Laser and van	nysic ns ai is rious	cal properties and Identi nd minerals.	ficat	ion of Gems.			
Unit: I	Iden Defi qual spec hard worr	tification of Gems,Har nitions - gemology, gen ity scratch test, acid test ific gravity (definition a ness, Moh scale for diffe n of crystals, hardness ar	rdne mole -Pol and t eren nd so	ess and wearability ogist, Gem– different ariscope-Dichroscope formula), Hardness d t crystals, durability o cratching (with quartz	type -Ret efini f cry as e	of tests on gem fractive index- tion, Moh scale vstals, wearing a example), cleava	of nd ge.		6
Unit: II	World of crystals, hardness and scratching (with quartz as example), cleavage.Gem formationDefinition of gem, pearl, amber, opal, emerald Making of crystals-five requirements of crystallization-Mineral crystallization-IIigneous, metamorphic, and sedimentary- rock formation(rock cycle)- Magma crystallization-Gas crystallization-Environmental Changes-Contact Metamorphism-Regional Metamorphism-Surface						6		
Unit: III	Clas Prec Mad Aggr Grou	sification of Gems ious and Semiprecious-I e- Organics and Inorgan regates, Rocks, Minerals ips.	Dian nics- s-Sp	nonds and Colored St Crystalline and Amor ecies and Varieties-Se	ones phot eries	- Natural and M 1s Materials- and Blends-Mi	lan neral		6
Unit: IV	Type Tum nom cut-	Types of gem cuttingTumbling-Cabochoncutting-Faceting-Carving-cleavage-Gemnomenclature,Shapes-Facetingstyles-roundcut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut-cut- <t< td=""><td></td><td>6</td></t<>							6
Unit: V	Phys Chal struc Med body	sical Properties and Macedony-Diamond- Pearl eture chart-standard gem ical applications of va	edic l-cho size triou ng g	cal applications of gen bosing a diamond-wei es- gem stone size cha is gems-seven Chaki ems.	<b>ms</b> ghts irt- la cas o	and measure-G ap materials of human	em		6
					То	tal Lecture Ho	urs	<b>30</b> I	Irs

<b>Books for Study:</b> 1.Jayabalakrishnan.S.S. <b>Gemology</b> , Shanlax Publications, Madurai, 1st Edi	tion June 2020.
<b>Books for Deferences:</b> E Books from Library N. List	
<b>DOURS IOI REIEI EICES:</b> E-BOOKS IIOIII LIDIAI Y N -LISI	
1. Anderson, Basil W. (1990) Gem Testing. Rev. by E. A. Jobbins. 10th	n ed., Butterworth,
London.	
<ol> <li>Anderson, Basil W., and James Payne. (1998) <i>The Spectroscope an</i> Press, Woodstock, VT.</li> </ol>	<b>d Gemmology.</b> GemStone
Field, J.E., ed. (1992) Properties of natural and synthetic diamond. Ac	cademic Press, London,
New York.	
Web Resources:	
1.https://www.udemy.com/course/easygemology/?utm_source=adwords	&utm medium=udemya
ds&utm_campaign	
2. Online Gemology Classes - International Gem Society	
3. Optical Properties of Gemstones (bwsmigel.info)	
EXPECTED COURSE OUTCOME	
On successful completion of the course, the learners should be able to	K Level
Define Scratch test, Hardness, Gem, crystalline and Amorphous ma	terials,
corving, lap materials	K2
Explain Polariscope, Dichroscope, mineral crystallization, Mineral	groups,
Gem nomenclature, gem structure chart	,K2
Apply Moh scale for crystals, Gas crystallization, natural and mann	nade gems, <b>K</b> a
Faceting style, medical field	K2
Distinguish types of tests on gems ,pearl, emerald, diamond and col	oured K2
stones, round cut and step cut, weights and measure	K3
Justify acid test, durability of crystal, rock formation, organic and in	norganic KA
cushion shapes, standard gem sizes	<b>N4</b>

## CO & PO Mapping:

COS	<b>PO 1</b>	<b>PO 2</b>	<b>PO 3</b>	<b>PO 4</b>	<b>PO 5</b>	<b>PO 6</b>
CO 1	3	2	3	3	3	3
CO 2	2	2	3	3	2	2
CO 3	2	1	3	3	2	3
CO 4	2	1	2	3	3	3
CO 5	2	2	3	2	3	3

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

#### LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
I	Definitions - gemology, gemologist, Gem– different type of tests on gems- quality scratch test, acid test.Polariscope Dichroscope, Refractive index, specific gravity (definition and formula), Hardness definition, Moh scale of hardness, Moh scale for different crystals, durability of crystals, wearing and worn of crystals, hardness and scratching (with quartz as example), cleavage.	6	Ppt,Lecture, Chalk & Talk, Demonstration
п	Definition of gem, pearl, amber, opal,emerald Making of crystals-five requirements of crystallization-Mineral crystallization- igneous, metamorphic, and sedimentary- rock formation(rock cycle)- Magma crystallization-Gas crystallization- Environmental Changes-ContactMetamorphism-Regional Metamorphism-Surface Water-Gems Formed in the Earth's Mantle	6	Ppt,Lecture, Chalk & Talk, Demonstration
ш	Precious and Semiprecious, Diamonds and Colored Stones, Natural and Man Made, Organics and Inorganics, Crystalline and Amorphous Materials, Aggregates, Rocks, Minerals, Species and Varieties, Series and Blends, Mineral Groups.	6	Ppt,Lecture, Chalk & Talk, Demonstration
IV	Tumbling, Cabochon cutting, Faceting, Carving, cleavage, Gem nomenclature,Shapes, Faceting styles- round cut, Brilliant cut, step cut, cushion shaped , barion cut, Portugese cut, Fantasy cut.	6	Ppt,Lecture, Chalk & Talk, Demonstration
V	Chalcedony, Diamond, Pearl, choosing a diamond, weights and measure, Gem structure chart, standard gem sizes,gem stone size chart,lap materials Medical applications of various gems, seven Chakras of human body and chakra healing using gems.	6	Ppt,Lecture, Chalk & Talk, Demonstration

## Course Designed by: Dr.S.S.Jayabalakrishnan & Mrs.A.Lakshmi







### MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF PHYSICS (For those who joined in 2021-2022 and after)

Course Na	se Name PRINCIPLES OF CLASSICAL AND STATISTICAL MECHANICS							
Course Co	Code 21UPHC61 L F							
Category	CORE 6							
Nature of	DURSE: EMPLOYABILITY - SKILL ORIENTED - ENTREPRENEU	JRSI	ΗP					
COURSE 0 1.Study th constra 2.Underst 3.Apply t 4.Remem 5.Understa Statistics	<b>BJECTIVES:</b> The Learner will be able to : a fundamental concepts in Classical Mechanics and apply the conservation la nts for a system of particles nd the Lagrangian Formulation for a mechanical system a Hamiltonian Formulation for a mechanical system er the importance of statistical Mechanics d the postulates of wave mechanics, Maxwell–Boltzmann Statistics and Qua	aws a	and m					
Unit: I	Space and Time (Frame of reference)-Newton's Laws of motion- Inertial frames- Gravitational Mass – Mechanics of particle- Conservation Laws- Conservation of linear momentum- Conservation of angular momentum- Conservation of energy – work, kinetic energy and work energy theorem- Conservative force and potential energy. Mechanics of a System of particles External and internal forces- Centre of mass- Conservation of linear momentum- Centre of mass of frame of reference- Conservation of angular momentum- Conservation of energy –Kinetic energy- Potential energy- Conservation theorem.	5 -	18	hrs				
Unit: II	Lagrange's Formulation of Mechanics Basic concepts, coordinate systems-Degrees of freedom—configuration space.Constraints- Holonomic constraints- Non holonomic constraints, Examples.Forces of constraints.Genaralised coordinates – Principle of virtua work – D'Alembert's principle- Langrangian's equations from D'Alembert's principle- Procedure for formation of Langrangian's equation.	al 's	18	hrs				
Unit: III	Hamiltonian Mechanics Generalised momentum and cyclic coordinates- significance of translation as rotation cyclic coordinates – symmetry properties – Hamilton's Equations - Hamilton's Equations in different Coordinate systems. Examples of Hamiltonian dynamics – (Harmonic oscillator, motion of a particle in centra Force field)	and	18	hrs				
Unit: IV	Some Universal laws in Statistical Mechanics Macrostate and microstate systems-Ensembles- phase space - Probability- Thermo dynamic probability-Boltzmann's theorem on entropy and probabili Fundamental postulates of statistical mechanics-Statistical equilibrium- Quantum statistics - Maxwell-Boltzmann statistics-Maxwell-Boltzmann ene distribution law.	ity- ergy	18	hrs				
Unit: V	Maxwell–Boltzmann Statistics & Quantum Statistics Bose-Einstein statistics- Fermi-Dirac statistics - 'h'as a natural constant-Bo Einstein distribution lawPhoton gas ,Fermi-Dirac distribution l	ose- law-	18	hrs				

	comparison of the three distribution laws	
	comparison of the three distribution laws.	
	Total Lecture Hours	s 90 Hrs
Books	for Study: 1. Upadhyaya, ClassicalMechanics, Himalaya Publishing H	Iouse, Delhi
Edition	, 2005	
Unit 1- Unit 2- Unit 3 <b>Text B</b> 1.	Chapter 1.1- 1.63, 1.7.1- 1.7.5, 1.7.7, 1.7.8 Chapter 2.1,2.2, 2.3.1-2.3.4, 2.4, 2.5,2.6,2.7,2.8,2.12 – Chapter 3.1, 3.2, 3.3.3, 3.5, 3.6, 3.7 <b>ook-2:</b> Brijlal, N.Subrahmanyam, P.S.Hemne, <b>Heat Thermodynamics and statistical p</b> S.Chand and Co, New Delhi, Revised Edition, 2014.	ohysics
5 Un ³	Unit 4- Chapter – 9.7, 10.10.1-10.10.3, 10.4, 9.8, 10.15, 10.8, 11.2, 11.3, t 5-Chapter – 12 1 12 2 12 3 12 5 12 6 12 8 12 15	
Books	for References:	
1. G. 2. S.	Aruldhas, Classical Mechanics, PHI Pvt.Ltd, New Delhi, Fourth Edition, 2013 P.Kuila, Fundamentals of Quantum mechanics statistical mechanics &	solid state
ph	ysics, Books and Allied (P) Ltd, Kolkatta, First Edition, 2013.	
7. R.T	Takwle and P.S.Puranik, Introduction to Classical mechanics, TMH Publishers,	New Delhi,
2"	Edition, 20.	
Web R	esources:	
$\frac{1.111}{2}$	s://www.moog.list.com/course/statistical.thermodynamics-molecules.machin	06
$\frac{2}{3} \frac{\mathrm{mup}}{\mathrm{Clas}}$	sical Mechanics Free Online Courses and MOOCs	
4.NPT	EL :: Physics - NOC:Classical mechanics: from newtonian to lagrangian for	nulation
EXPE	CTED COURSE OUTCOME	
On suc	cessful completion of the course, the learners should be able to	K Level
CO1:	Define Frame of reference, Degrees of freedom, coordinate systems, Phase space and energy distribution	K2
C02.	Elaborate conservation laws, constraints, cyclic coordinates ensembles,	K3
CO2.	Velocity distribution law.	K3
CO3:	Understand the concepts of microstate, macrostate, ensemble, phase space thermodynamic probability and Fermi-Dirac statistics.	K4
	Examine centre of mass of frame of reference, Langrangians'sequations from	
<b>CO4:</b>	D'Alembert's principle, Hamilton's equations in coordinate systems,	<b>K4</b>
	Boltzmann theorem on entropy and probability, three distribution laws.	
C05.	Importance of conservation of energy, principle of virtual work, momentum	К3
	and cyclic coordinates, quantum statistics, Bose-Einstein statistics.	13

#### CO & PO Mapping:

COS	<b>PO 1</b>	PO 2	<b>PO 3</b>	PO 4	PO 5	<b>PO 6</b>
CO 1	3	3	3	3	2	3
CO 2	2	2	2	2	3	2
CO 3	3	3	1	3	1	3
CO 4	3	2	2	1	2	1
CO 5	3	3	2	1	2	2

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

#### **LESSON PLAN**

Unit	Course Name	Hrs	Pedagogy
I	Space and Time (Frame of reference)-Newton's Laws of motion- Inertial frames- Gravitational Mass – Mechanics of particle- Conservation Laws-Conservation of linear momentum- Conservation of angular momentum- Conservation of energy – work, kinetic energy and work energy theorem- Conservative force and potential energy. Mechanics of a System of particles - External and internal forces- Centre of mass- Conservation of linear momentum- Centre of mass of frame of reference- Conservation of angular momentum- Conservation of energy –Kinetic energy- Potential energy- Conservation theorem.	18	Chalk & Talk, Videos and PPT
п	Basic concepts, coordinate systems-Degrees of freedom—configuration space.Constraints- Holonomic constraints- Non holonomic constraints, Examples.Forces of constraints.Genaralised coordinates – Principle of virtual work – D'Alembert's principle- Langrangian's equations from D'Alembert's principle- Procedure for formation of Langrangian's equation.	18	Chalk & Talk, Videos and PPT
ш	Generalised momentum and cyclic coordinates- significance of translation and rotation cyclic coordinates – symmetry properties – Hamilton's Equations - Hamilton's Equations in different Coordinate systems. Examples of Hamiltonian dynamics – (Harmonic oscillator, motion of a particle in central force field)	18	Chalk & Talk, Videos and PPT
IV	Macrostate and microstate systems-Ensembles- phase space - Probability-Thermo dynamic probability-Boltzmann's theorem on entropy and probability-Fundamental postulates of statistical mechanics- Statistical equilibrium-Quantum statistics - Maxwell-Boltzmann statistics-Maxwell-Boltzmann energy distribution law.	18	Chalk & Talk, Videos and PPT
V	Bose-Einstein statistics-Bose-Einstein distribution law- Fermi-Dirac statistics-Fermi-Dirac distribution lawcomparison of the three distribution laws.	18	Chalk & Talk, Videos and PPT

Course Designed by: Dr.S.S.Jayabalakrishnan & Mrs.A.Lakshmi

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)										
			Section	A A	Section	ı B	Section C	Section D			
Inte	Cos	K Level	MCQ	S	Short Ans	swers	Either or	Onen			
rnal	COS	II LUU	No. of. Questions	K - Level	No. of. Questions	K - Level	Choice	Choice			
CI	CO1	Up to K2	2	K1	1	K1	2	1			
AI	CO2	Up to K3	2	K1	2	K2	2	1			
CI	CO3	Up to K4	2	K2	1	K1	2	1			
AII	<b>CO4</b>	Up to K4	2	K2	2	K2	2	1			
		No. of Questions to be asked	4		3		4	2			
Question Pattern		No. of Questions to be answered	4		3	2	2	1			
	1 & 11	Marks for each question	1		2		5	10			
		Total Marks for each section	4		6		10	10			

	Distribution of Marks with K Level CIA I & CIA II												
	K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either / Or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidate of %					
	K1	2	2			4	8	60					
	K2	2	4	10	10	26	52	00					
СТА	K3			10	10	20	40	40					
I	K4												
-	Marks	4	6	20	20	50	100	100					
	K1	2	2			4	8	20					
	K2	2	4			6	12	20					
CIA	K3			10	10	20	40	40					
II	K4			10	10	20	40	40					
	Marks	4	6	20	20	50	100	100					

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)										
			MCC	)s	Short An	swers	Section C			
S.No	COs	K - Level	No. of Questions	No. of K – No. Questions Level Ques		K – Level	(Either / or Choice)	(Open Choice)		
1	CO1	Upto K2	2	K1& K2	1	K1	2(K1 & K1)	1(K2)		
2	CO2	Upto K3	2	K& K2	1	K1	2(K3 & K3)	1(K3)		
3	CO3	Upto K4	2	K& K2	1	K2	2(K3 & K3)	1(K4)		
4	CO4	Upto K4	2	K1& K2	1	K2	2(K4 & K4)	1(K3)		
5	CO5	Upto K3	2	K1 & K2	1	K2	2(K2 & K2)	1(K3)		
No. of Questions to be Asked		10		5		10	5			
No.of Questions to be answered		10		5		5	3			
Mar	ks for eac	ch question	1		2		5	10		
Total Marks for each section		each section	10		10		25	30		
	(Figures	in parenthesi	s denotes, qu	estions s	hould be as	ked with	the given K	level)		

Distribution of Marks with K Level												
K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either/ or Choice)	Section D ( Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %					
K1	5	4			9	7.5	17					
K2	5	6			11	9.17	17					
K3			25	20	45	37.5	37					
K4			25	30	55	45.83	46					
Marks	10	10	50	50	120	100	100					
NB: Hig of K lev	NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.											

Section	A (Mul	tiple Choio	ce Questions)
Answei	r All Qu	estions	(10x1=10 marks)
Q.No	CO	K Level	Questions
1	CO1	K1	
2	CO1	K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	
6	CO3	K2	
7	CO4	K1	
8	CO4	K2	
9	CO5	K1	
10	CO5	K2	
Section	B (Sho	rt Answers	
Answei	r All Qu	estions	(5x2=10 marks)
Q.No	CO	K Level	Questions
11	CO1	K1	
12	CO2	K1	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
Section	C (Eith	er/Or Typ	e)
Answei	r All Qu	estions	(5 x 5 = 25 marks)
Q.No	CO	K Level	Questions
16) a	CO1	K3	
16) b	CO1	K3	
17) a	CO2	K3	
17) b	CO2	K3	
18) a	CO3	K3	
18) b	CO3	K3	
19) a	CO4	K3	
19) b	CO4	K3	
20) a	CO5	K4	
20) b	CO5	K4	
NB: Hi	gher lev	el of perfo	rmance of the students is to be assessed by attempting higher
level of	K levels	6	
Section	D (Ope	n Choice)	
Answei	r Any Tl	hree questi	ons (3x10=30 marks)
Q.No	CO	K Level	Questions
21	CO1	K2	
		K3	
22	CO2	113	
22 23	CO2 CO3	K4	
22 23 24	CO2 CO3 CO4	K3 K3	

## **Summative Examinations - Question Paper – Format**



### MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF PHYSICS (For those who joined in 2021-2022 and after)

Course Name	NON – ELECTRONICS PRACTICAL									
Course Code	21UPHCP3					L	Р	С		
Category	CORE				-	3	4			
Nature of cours	Nature of course:EMPLOYABILITYSKILL ORIENTED✓ENTREPRENE									
Course Objectives:										
The learners will 1 Understand th	The learners will be able to									
2.Relate analyse	e angle of incidence and e	emergence	e e e e e e e e e e e e e e e e e e e	iot g	arvanometer					
3.Find waveleng	gth of light and particle si	ize using l	aser							
4. Compare the	impedance and power fac	ctor of LR	and CR circuit	s						
5. Justify, Bridg	e circuits, Grating, LCR	circuits								
Any Fourteen l	Experiments									
1 Spectro	matan		i d avera							
1. Spectro	meter	-	1-d curve							
2. Spectror	neter	-	1-1							
3. Grating		-	Minimum deviation method							
4. Spectror	neter	-	Cauchy's Co	nsta	nts					
5. Spectror	neter	-	Hartmann's I	nter	polation formula	a				
6. L.C.R		-	Series resona	nce	circuit					
7. L.C.R		-	Parallel reson	nanc	e circuit					
8. Spot Ga	lvanometer	-	Determinatio	n of	(M) Mutual ind	uction	n			
9. Spot Ga	lvanometer	-	Comparison of	of (N	M) Mutual induc	tance	s			
10. Anderso	n's Bridge (AC Method)	-	Self inductan	ce						
11. Maxwel	l's Bridge (AC Method)	-	Self inductance							
12. Light Int	tensity	-	Inverse Square Law							
13. Spot Ga	lvanometer	-	Absolute Car	oacit	y of a Condense	er				
14 Potentio	meter	_	Calibration of	fAn	meter					
15. Impedan	15. Impedance and Power factor - L.R.circuit									
16. Laser		-	Determinatio size	n of	wavelength of a	and pa	article			
				To	tal Lecture Ho	urs	180 H	rs		

#### **Books For Study:**

1. Srinivasan.M.N.,Balasubramanian.S.,Ranganathan.R.,A Text Book of Practical Physics,2017 Edition Sultan Chand & Sons

### **Books For Reference:**

1. Ouseph.C., Practical Physics and Electronics, 2013. S. Viswanathan. P. Ltd.

2.Hamam Singh Hemne, S.Chand and Co.New Delhi, 2017

**3.**Shukla.R.K.,New Age International,2nd Edition.,New Delhi

4. Gupta.S.L., Kumar.V., Pragati Prakashan.M., 2016, New Delhi.

### Web Resources:

1. https://www.slideshare.net/mobile/sunilrathore77398/basicanalogelectronics

2. https://www.slideshare.net/mobile/PatruniChidanandaSas/basics-of-electronics-53962342

EXPEC	CTED COURSE OUTCOME	<b>V</b> Lovel				
On succ	On successful completion of the course, the learners should be able to					
<b>CO1:</b>	Analyze the different types of spectra and its applications	K4				
<b>CO2:</b>	Realize the applications of LCR circuits.	K2				
CO3:	Update the knowledge of Spot Galvanometer	K2				
CO4:	Analyze the knowledge of Bridge circuits	K4				
CO5:	Gain knowledge of applying Laser Beam	K3				

#### CO & PO Mapping:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	2	3	2	2	3
CO 2	2	3	2	3	3	2
CO 3	2	3	2	2	2	3
<b>CO 4</b>	3	3	2	2	2	3
CO 5	3	2	1	3	3	2

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LEBBONILLAN
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SEM	Name of the Experiments	Hrs	Mode
I	1.Spectrometer       -       i-d curve         2.Grating       -       Minimum deviation method         3.L.C.R       -       Series resonance circuit         4.Spot Galvanometer       -Determination of (M) Mutual induction.         5.Anderson's Bridge (AC Method)       -Self inductance         6.Potentiometer       -       Calibration of Ammeter         7.Laser-Determination of wavelength and particle size       size         8.Spot Galvanometer       - Comparison of (M) Mutual inductances	90	Demonstration
П	<ul> <li>1.Spectrometer - i - i'curve</li> <li>2.Spectrometer - Cauchy's Constants</li> <li>3.Spectrometer - Hartmann's Interpolation formula</li> <li>4.Maxwell's Bridge (AC Method) - Self inductance</li> <li>5.Light Intensity - Inverse Square Law</li> <li>6.Spot Galvanometer - Absolute Capacity of a Condenser</li> <li>7.L.C.R - Parallel resonance circuits</li> <li>8.Impedance and Power factor - L.R.circuit</li> </ul>	90	Demonstration

Course Designed by: Dr.P.Kavitha & Dr.S.S.Jayabalakrishnan



### MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF PHYSICS (For those who joined in 2021-2022 and after)

Course Name	ELECTRONICS PRACTICAL									
Course Code	21UPHCP4			L	Р	С				
Category	CORE						5			
Nature of cours	<b>ire of course:</b> EMPLOYABILITY SKILL ORIENTED ✓ ENTREPRENE			EURS	HIP					
Course Objectives: The learners will be able to 1.Understand the principles and applications of Digital Electronics 2. Understand the principles and applications of Analog Electronics 3. Gain knowledge about the development of the Microprocessors.										
4. Motivate the	students to apply the	e prir	ciples of Analog Flectron	nics in their day-to-	-day 11 —day	ie. life				
LIST OF EXP	ERIMENTS		leipies of Analogi Electre	Juies in their day–to	-uay	me.				
Any Fourteen	Experiments									
1.Determina	tion Band gap	-	Semiconductor							
2.Zener Dio	de	-	Characteristics	Characteristics						
3.Transistor		-	Characteristics CE n	Characteristics CE mode						
4.Zener Diode		-	Voltage Regulator	Voltage Regulator						
5.Single Stage Amplifier		-	Voltage Gain	Voltage Gain						
6.Hartley Oscillator		-	Inductance of pair of coils							
7. Astable Multivibrator		-	Discrete components	Discrete components						
8.Logic Gates NAND)		-	Discrete Components (OR,AND,NOT,NOR and							
9.Logic Gates		-	IC(7432, 7408, 7404, 7402, 7400 and 7486)							
10.Adder and Subtractor		-	OPAMP - IC 741							
11.Astable Multivibrator		-	TIMER - IC 555							
12.NOR as Universal Gate		-	IC 7402	IC 7402						
13.NAND as Universal Gate		-	IC 7400							
14.Half Adder, Full Adder		-	IC 7486, IC 7408 and IC 7432							

15.Four Bit Binary Adder

16.Four Bit Binary Subtractor - IC 7483 and IC 7404

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**Total Lecture Hours** 18

180 Hrs

#### **Books For Study:**

1. Srinivasan.M.N.,Balasubramanian.S.,Ranganathan.R.,A Text Book of Practical Physics,2017 Edition Sultan Chand & Sons

IC 7483

#### **Books For Reference:**

1. Ouseph.C., Practical Physics and Electronics, 2013. S. Viswanathan. P. Ltd.

2.Hamam Singh Hemne, S.Chand and Co.New Delhi, 2017

**3.**Shukla.R.K.,New Age International,2nd Edition.,New Delhi

4.Gupta.S.L.,Kumar.V.,Pragati Prakashan.M.,2016,New Delhi.

### Web Resources:

- 1. <u>https://www.slideshare.net/mobile/sunilrathore77398/basicanalogelectronics</u>
- 2. https://www.slideshare.net/mobile/PatruniChidanandaSas/basics-of-electronics-53962342
- 3. http://www.sircrrengg.ac.in/images/Others/CSE/MP-LAB-MANUAL.pdf
- 4. <u>https://www.youtube.com/playlist?list=PL_pGb42kre_QXwuaizYb21tSYpoHyXsCQ</u>

EXPECTED COURSE OUTCOME				
On successful completion of the course, the learners should be able to				
CO1:	Analyze the different types of digital circuits and their applications	K4		
<b>CO2:</b>	Realize the applications of registers in computers	K3		
CO3:	Update the knowledge of Microprocessor programming	K2		
<b>CO4:</b>	Analyze the knowledge of Oscillators function	K4		
CO5:	Gain knowledge of applying various IC's	K2		

#### CO & PO Mapping:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	<b>PO 6</b>
CO 1	3	2	3	3	3	1
CO 2	2	1	3	2	2	2
CO 3	3	2	2	3	2	3
CO 4	2	2	2	2	3	2
CO 5	1	2	2	2	2	2

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level
### LESSON PLAN

SEM	Name of the Experiments	Hrs	Mode
Ι	<ul> <li>1.Determination Band gap - Semiconductor</li> <li>2.Zener Diode - Characteristics</li> <li>3.Single Stage Amplifier - Voltage Gain</li> <li>4.Astable Muitivibrator - Discrete Components</li> <li>5.Logic Gates - Discrete Components (OR, AND, NOT, NOR and NAND)</li> <li>6.5NAND as Universal Gate - IC 7400</li> <li>7.Half Adder, Full Adder - IC 7486, IC 7408 and IC 7432</li> <li>8.Four Bit Binary Adder - IC 7483</li> </ul>	90	Demonstration
Π	<ol> <li>I.Zener Diode - Voltage Regulator</li> <li>Transistor - Characteristics CE mode</li> <li>Hartley Oscillator - Inductance of pair of coils</li> <li>Logic Gates - IC(7432, 7408, 7404, 7402, 7400 and 7486)</li> <li>NOR as Universal Gate - IC 7402</li> <li>Adder and Subtractor - OPAMP - IC 741</li> <li>Astable Multivibrator - TIMER - IC 555</li> <li>Four Bit Binary Subtractor - IC 7483 and IC 7404</li> </ol>	90	Demonstration

Course Designed by: Dr.P.Kavitha & Dr.S.S.Jayabalakrishnan



## MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF PHYSICS (For those who joined in 2021-2022 and after)

Course Name	e Name PROJECT AND VIVA - VOCE						
Course Code	21UPHPR	1			L	Р	С
Category	CORE				-	6	4
Nature of cours	e: EMPLOY	ABILITY	SKILL ORIENTED	✓ ENTREPRENE	EURS	HIP	
<b>Course Objecti</b>	ves:						
The learners will	l be able to						
1.To iden	tify, describe	the problem	and scope of project				
2.To colle	ect, analyse a	nd present da	ta into significant form usin	g appropriate tools			
3.To cho	ose, plan and	implement a	proper approach in problem	n solving			
4.To wor	k with team a	nd ethically					
5.To pre	sent the find	ings in both	oral and written form				
Course Descrip	otion						
The Project is co	onducted by	the followin	g Course Pattern.				
Internal							
Presenta	tion						
Submiss	ion }	40					
External							
Project I	Report						
Viva Vo	ce }	60					
Total		- 100					
						100 -	
				Total Lecture Hou	ırs	180 H	lrs
COURSE OUT	COMES					K Lev	vel
On the success	ful completi	on of the co	urse , the students will b	be able to			
CO1: Apply t	he skill of pi	resentation a	nd communication techni	ques		K3	
CO2: Motive	as an indivio	lual or in a t	eam in development of pr	ojects.		K4	
CO3: Analyze	Analyze the available resources and to select most appropriate one <b>K4</b>						
CO4: Make u	se of the fun	damentals of	f Physics to search the rel	ated literature survey	y	K3	
<b>CO5:</b>   Explain	Explain the real life problems by using Physics and its Application.K4						

### CO & PO Mapping:

COS	<b>PO 1</b>	PO 2	<b>PO 3</b>	PO 4	<b>PO 5</b>	<b>PO 6</b>
CO 1	2	3	3	3	1	3
CO 2	1	2	2	1	2	1
CO 3	2	2	3	3	2	1
<b>CO 4</b>	3	2	3	2	1	2
CO 5	3	3	3	3	3	3

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

Course Designed by: Mrs.A.Lakshmi Dr.S.S.Jayabalakrishnan



## MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF PHYSICS (For those who joined in 2021-2022 and after)

Course Name DIGITAL PRINCIPLES AND APPLICATIONS							
ourse Code 21UPHE61 L P							
Category ELECTIVE 5	-	5					
Nature of course: EMPLOYABILITY ✓ SKILL ORIENTED ENTREPRENEURSH	IP						
<ul> <li>COURSE OBJECTIVES: The Learner will be able to :</li> <li>1. Review the fundamental concepts in number systems and codes.</li> <li>2. Recall the properties of Boolean algebra.</li> <li>3. Analyze and apply the basic concepts of Logic Gates and Arithmetic Circuits.</li> <li>4. Understand the operation of Flip flops and apply it to Counters and Registers.</li> <li>5. Gain the knowledge about Combinational Circuits like Multiplexers, Decoders and Encode</li> </ul>	ers.						
<b>Number System and Codes</b> Number system - Binary, decimal, octal, hexadecimal - Conversion from one toUnit: Iother - Binary addition, subtraction, multiplication, division - 1's and 2'scomplement subtraction - Binary coded decimal(BCD) - Weighted course-8421 code - Non-weighted codes - gray code.	15	hrs					
Unit: IIBoolean Algebra and Minimization Technique Boolean logic operations (OR, AND and NOT) - Basic laws of Boolean algebra (Boolean addition, subtraction, multiplication and division) - Properties of Boolean algebra (commutative, associative, distribution, absorption and consensus laws) - Principle of duality - De Morgan's theorems - Simplification of Boolean expressions - Sum of products K-map	15	hrs					
Unit: IIILogic Gates and Arithmetic Circuits Positive and negative logic - Logic gates - OR, AND, NOT, NOR, NAND, EXOR and EX-NOR - Universal gates - NOR and NAND - Realization of logic expression using logic gates - Introduction to arithmetic circuits - Half adder - Full adder - Half subtractor - Full subtractor - 4 bit binary adder - 4 bit binary subtractor.	15	hrs					
Unit: IVFlip flop and its applicationsUnit: IVFlip flops - Types of flip flops - RS flip flop - D flip flop - JK flip flop - edge triggering - Applications of flip flop - Counters - Types of counters - 4 bit binary ripple counter - Shift register - 6-bit shift register SIPO - Timer IC555 (Block diagram and Astable Multivibrator).	15	hrs					
Unit: VCombinational Circuits Multiplexer - 4 to 1 multiplexer - De-multiplexer - 1 to 4 de-multiplexer - Decoder - 3 to 8 decoder - BCD to decimal decoder - Encoder - Decimal to BCD encoder- Ladder type D / A Converter- Successive approximation A/D converter.	<ul> <li>Combinational Circuits         Multiplexer - 4 to 1 multiplexer - De-multiplexer - 1 to 4 de-multiplexer -         Decoder - 3 to 8 decoder - BCD to decimal decoder - Encoder - Decimal to BCD encoder- Ladder type D / A Converter- Successive approximation A/D converter.     </li> </ul>						
Total Lecture Hours     '       Books for Study:     '	75 H	[rs					

S.Salivahanan, S.Arivazhagan, **Digital Circuits and Design**, Oxford University Press, New Delhi, 5th Edition, 2018, Second Impression 2019.

	10101100
Unit – I: Chapter-1 (1.1, 1.2, 1.2.1 to 1.2.7, 1.4, 1.4.1, 1.5, 1.5.1, 1.5.2, 1.6, 1.7, 1.8,	1.9, 1.9.1, 1.9.2,
1.9.5).	
<b>Unit – II:</b> Chapter-2 (2.1, 2.2, 2.3, 2.3.1, 2.3.2, 2.3.3, 2.4, 2.4.1 to 2.4.4, 2.5, 2.6, 2.6	.1 to 2.6.4).
<b>Unit – III:</b> Chapter-3 (3.1, 3.2, 3.3, 3.3.1 to 3.3.8), Chapter-5 (5.1, 5.2, 5.3, 5.4, 5.	6, 5.7, 5.8, 5.8.1,
5.8.2).	
Unit – IV: Chapter-7 (7.3, 7.3.1, 7.4, 7.5, 7.6, 7.7, 7.8.2, 7.10.2, 7.12), Chapter-8	(8.1, 8.2, 8.5.1),
Chapter-9 (9.1, 9.1.1, 9.2, 9.2.1, 9.4, 9.4.1).	
Unit – V: Chapter-6 (6.1, 6.2, 6.2.1, 6.4, 6.4.1, 6.5, 6.5.2, 6.5.6, 6.5.9, 6.7, 6.7.2)	
Books for References:	
1. Malvino and Leach, Principles of Digital Electronics, Tata McGraw – Hill Edition	on, Fifth Edition,
New York, 2004.	
2. R.P.Jain, Modern Digital Electronics, Tata McGraw – Hill Edition, Fourth E	dition, New
Delhi, 2011.	
Web Resources:	
1 https://www.geeksforgeeks.org/digital-electronics-logic-design-tutorials/	
2. https://howtomechatronics.com/how-it-works/electronics/555-timer-ic-workir	ng-principle-
block-diagram-circuit-schematics/	
3. https://www.electronicshub.org/multiplexer-and-demultiplexer/	
EXPECTED COURSE OUTCOME	V I and
On successful completion of the course, the learners should be able to	K Level
CO1. Convert different type of codes and number systems which are used in digital	V2
communication and computer systems	<b>K</b> 2
<b>CO2:</b> Employ the codes and number systems in converting circuits	K3
CO3: Construct logic circuits using boolean algebra	K4
CO4: Analyze filp-flops, counters and registers	K4
<b>CO5:</b> Examine Logic gates, sequential and combinational circuits	K3
	•

## CO & PO Mapping:

COS	<b>PO 1</b>	<b>PO 2</b>	<b>PO 3</b>	PO 4	<b>PO 5</b>	<b>PO 6</b>
CO 1	3	3	3	3	3	3
CO 2	3	3	3	3	2	2
CO 3	3	2	2	2	2	1
<b>CO 4</b>	3	2	2	2	2	1
CO 5	3	2	2	2	2	1

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

### LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
I	Number system - Binary, decimal, octal, hexadecimal - Conversion from one to other - Binary addition, subtraction, multiplication, division - 1's and 2's complement subtraction – Binary coded decimal(BCD) - Weighted course-8421 code - Non-weighted codes - gray code.	15	Chalk & Talk, Videos and PPT
п	Boolean logic operations (OR, AND and NOT) - Basic laws of Boolean algebra (Boolean addition, subtraction, multiplication and division) - Properties of Boolean algebra (commutative, associative, distribution, absorption and consensus laws) - Principle of duality - De Morgan's theorems - Simplification of Boolean expressions - Sum of products and Product of sums.	15	Chalk & Talk, Videos and PPT
ш	Positive and negative logic - Logic gates - OR, AND, NOT, NOR, NAND, EXOR and EXNOR - Universal gates - NOR and NAND - Realization of logic expression using logic gates - Introduction to arithmetic circuits - Half adder - Full adder - Half subtractor - Full subtractor - 4 bit binary adder - 4 bit binary subtractor.	15	Chalk & Talk, Videos and PPT
IV	Flip flops - Types of flip flops - RS flip flop - D flip flop - JK flip flop - edge triggering -Applications of flip flop - Counters - Types of counters - 4 bit binary ripple counter - Shift register - 6-bit shift register SIPO - Timer IC555 (Block diagram and Astable Multivibrator).	15	Chalk & Talk, Videos and PPT
V	Multiplexer - 4 to 1 multiplexer - De-multiplexer - 1 to 4 de-multiplexer - Decoder - 3 to 8 decoder - BCD to decimal decoder - Encoder - Decimal to BCD encoder- Ladder type D / A Converter- Successive approximation A/D converter.	15	Chalk & Talk, Videos and PPT

# Course Designed by: Dr.S.S.Jayabalakrishnan & Mrs.A.Lakshmi

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)							
			Section	h A	Section	n B	Section C	Section D
Inte	Cos	K Level	MCQ	S	Short Ans	swers	Either or	Onen
rnal	005		No. of. Questions	K - Level	No. of. Questions	K - Level	Choice	Choice
CI	CO1	Up to K2	2	K1	1	K1	2	1
AI	CO2	Up to K3	2	K1	2	K2	2	1
CI	CO3	Up to K4	2	K2	1	K1	2	1
AII	<b>CO4</b>	Up to K4	2	K2	2	K2	2	1
		No. of Questions to be asked	4		3		4	2
Question Pattern		No. of Questions to be answered	4		3	2	2	1
	Marks for each question	1		2		5	10	
		Total Marks for each section	4		6		10	10

	Distribution of Marks with K Level CIA I & CIA II							
	K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either / Or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
	K1	2	2			4	8	60
	K2	2	4	10	10	26	52	00
СІА	K3			10	10	20	40	40
	K4							
-	Marks	4	6	20	20	50	100	100
	K1	2	2			4	8	20
	K2	2	4			6	12	20
CIA	K3			10	10	20	40	40
II	K4			10	10	$\overline{20}$	40	40
	Marks	4	6	20	20	50	100	100

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

S	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)							
			MCQs		Short An	Short Answers		Section D
S.No	COs	K - Level	No. of Questions	K – Level	No. of Question	K – Level	(Either / or Choice)	(Open Choice)
1	CO1	Upto K2	2	K1& K2	1	K1	2(K1 & K1)	1(K2)
2	CO2	Upto K3	2	K& K2	1	K1	2(K3 & K3)	1(K3)
3	CO3	Upto K4	2	K& K2	1	К2	2(K3 & K3)	1(K4)
4	CO4	Upto K4	2	K1& K2	1	К2	2(K4 & K4)	1(K3)
5	CO5	Upto K3	2	K1 & K2	1	K2	2(K2 & K2)	1(K3)
No. of Questions to be Asked		10		5		10	5	
No.of Questions to be answered		10		5		5	3	
Marks for each question		1		2		5	10	
Total N	Marks for	each section	10		10		25	30
	(Figures	in parenthesi	s denotes, qu	estions s	hould be as	ked with	the given K	level)

		Dis	stribution of	Marks with	n K Leve		
K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either/ or Choice)	Section D ( Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5	4			9	7.5	17
K2	5	6			11	9.17	17
K3			25	20	45	37.5	37
K4			25	30	55	45.83	46
Marks	10	10	50	50	120	100	100
NB: Hig of K lev	gher level of p els.	erformance o	of the students	s is to be asse	essed by a	attempting	higher level

Section	A (Mul	tiple Choio	ce Questions)
Answei	r All Qu	estions	(10x1=10 marks)
Q.No	CO	K Level	Questions
1	CO1	K1	
2	CO1	K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	
6	CO3	K2	
7	CO4	K1	
8	CO4	K2	
9	CO5	K1	
10	CO5	K2	
Section	B (Sho	rt Answers	
Answei	r All Qu	estions	(5x2=10 marks)
Q.No	CO	K Level	Questions
11	CO1	K1	
12	CO2	K1	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
Section	C (Eith	er/Or Typ	e)
Answei	r All Qu	estions	(5 x 5 = 25 marks)
Q.No	CO	K Level	Questions
16) a	CO1	K3	
16) b	CO1	K3	
17) a	CO2	K3	
17) b	CO2	K3	
18) a	CO3	K3	
18) b	CO3	K3	
19) a	CO4	K3	
19) b	CO4	K3	
20) a	CO5	K4	
20) b	CO5	K4	
NB: Hi	gher lev	el of perfo	rmance of the students is to be assessed by attempting higher
level of	K levels	5	
Section	D (Ope	n Choice)	
Answei	r Any Tl	hree questi	ons (3x10=30 marks)
Q.No	CO	K Level	Questions
21	CO1	K2	
22	CO2	K3	
-			
23	CO3	K4	
23 24	CO3 CO4	K4 K3	

# **Summative Examinations - Question Paper – Format**



### MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF PHYSICS (For those who joined in 2021-2022 and after)

Course Code21UPHE62LP	С									
Category ELECTIVE 5 -	5									
Nature of course:EMPLOYABILITYSKILL ORIENTED✓ENTREPRENEURSHIP										
<ul> <li>COURSE OBJECTIVES: The Learner will be able to :</li> <li>1.Study the various parts of microprocessor in Architecture of 8085.</li> <li>2. Examine the instruction set groups in Instruction set of 8085.</li> <li>3. Apply and write simple programs for basic arithmetic and logical operations using the instruction set of 8085 in Programming of Microprocessor.</li> <li>4. Understand interfacing techniques involved in 8085.</li> <li>5. Review the applications of 8085 such as digital display, traffic control.</li> </ul>										
Unit: IIntroduction in Architecture Microprocessor architecture and its operations—Microprocessors-initiated operations and 8085 Bus organization—Internal Data operations and the 8085 registers—Input and output(I/O) devices—I/Os with 16 bit addresses—8085 MPU—the 8085 microprocessor—Demultiplexing the bus AD7-AD0— Detailed look at the 8085 MPU and its applications.1	5hrs									
Unit: II       Instruction Set         Data transfer operations—Addressing modes—arithmetic operations—         Addition-Addition and increment—logic operations—logic AND – Data         making with logic AND – OR, Exclusive OR and NOT—Branch operations—         unconditional Jump-unconditional Jump to set up a continuous loop-Testing the         Carry Flag	5hrs									
Unit: IIIAssembly Language Program Programming techniques:Looping,counting,AND indexing-continuous loop— conditional loop—additional Data transfer and 16 bit Arithmetic instructions – 16 Bit Data transfer to register pairs(LXI)-Data transfer from memory to the microprocessor arithmetic operations related to 16 bits-block transfer of data bytes-arithmetic related to memory.1	5 hrs									
Unit: IVCounters and Time Delays Counter—Time delay using one register using a loop within a technique - counter design with time delay - Simple Programs(Example:-Debugging program, Delay calculations)1	5 hrs									
Unit: VStack and Subroutine Stack – subroutine—traffic signal control program—Documentation and parameter passing program- simple programs(Traffic signal controller)1	5hrs									
Total Lecture Hours 75H	rs									

### **Books for Study:**

Ramesh S Gaonkar, Microprocessor Architecture, programming, and Applications with the 8085, VIthEdn., Penram International publishing (India) private limited. 2011.

Unit I:Sections 3.1,3.1.1, 3.1.2,3.3, 4.1, 4.1.1-4.1.3, 4.1.5
Unit II:Sections 6.1, 6.1.1, 6.2, 6.2.1, 6.2.2, 6.3, 6.3.1-6.3.3, 6.4, 6.4.1-6.4.4
Unit-III:Sections 7.1, 7.2, 7.2.1-7.2.4, 7.2.6, 7.3, 7.3.1, 7.4, 7.4.1, 7.5, 7.5.1, 7.5.3
Unit-IV:Sections 8.1, 8.1.1, 8.1.3, 8.1.5
Unit-V:Sections 9.1(Pages 296-302),9.2,9.2.1(Upto to page 314)

#### **Books for References:**

- 1. B.Ram, Dhanbath Rai **Fundamentals of microprocessors and microcomputers**, Publications, VIthEdn., 2006.
- 2. A.P. Mathur. "Introduction to microprocessor", III Edition, TMH 2004.
- N.Mathivanan. "**Microprocessors, PC hardware and interfacing**", Prentice Hall of India,New Delhi, 2005.

#### Web Resources:

1. https://www.tutorialspoint.com/microprocessor/microprocessor_overview.html								
2. https://www.geeksforgeeks.org/introduction-of-microprocessor/								
3. NPTEL :: Electrical Engineering - NOC:Microprocessors And Microcontrollers								
EXPECTED COURSE OUTCOME	1							
On successful completion of the course, the learners should be able to	<i>i</i> evel							
<b>CO1:</b> Define address bus, instruction, looping, counters and time delays and stack <b>K</b>	2							
Describe Pins and signals, logic instruction, 16 Bit arithmetic instruction, loop	V2							
technic,traffic signal control program	.3							
Write Architecture of microprocessors ,Branch instruction. Arithmetic	- 1							
operations related to memory, time delay one register loop, subroutine	⊾4							
Functioning of bus organizations, addressing modes, looping counting and	- 1							
K indexing,	<b>\</b> 4							
Assess microprocessors operations, Data transfer instruction, Arithmetic								
<b>CO5:</b> operations, time delays and counters, subroutine program, Counter design with	3							
time delay								

#### CO & PO Mapping:

COS	<b>PO 1</b>	PO 2	<b>PO 3</b>	PO 4	<b>PO 5</b>	PO 6
CO 1	3	2	3	2	3	2
CO 2	2	3	2	1	3	2
CO 3	2	1	2	2	2	2
<b>CO 4</b>	3	2	2	3	2	3
CO 5	3	3	1	2	3	2

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

### LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
I	Microprocessor architecture and its operations—Microprocessors- initiated operations and 8085 Bus organization—Internal Data operations and the 8085 registers—Input and output(I/O) devices—I/Os with 16 bit addresses—8085 MPU—the 8085 microprocessor— Demultiplexing the bus AD7-AD0—Detailed look at the 8085 MPU and its applications.	15	Chalk & Talk, Videos and PPT
п	Data transfer operations—Addressing modes—arithmetic operations— Addition-Addition and increment—logic operations—logic AND – Data making with logic AND – OR, Exclusive OR and NOT—Branch operations—unconditional Jump-unconditional Jump to set up a continuous loop-Testing the Carry Flag	15	Chalk & Talk, Videos and PPT
III	Programming techniques:Looping,counting,AND indexing—continuous loop—conditional loop—additional Data transfer and 16 bit Arithmetic instructions –16 Bit Data transfer to register pairs(LXI)-Data transfer from memory to the microprocessor arithmetic operations related to 16 bits—Block transfer of data bytes—arithmetic operations realated to 16 bits—block transfer of data bytes—arithmetic related to memory— instructions –logic operations: rotate –instructions—logic operations: Compare instructions-sorting.	15	Chalk & Talk, Videos and PPT
IV	Counter—Time delay using one register using a loop within a technique – counter design with time delay-simple programs	15	Chalk & Talk, Videos and PPT
V	Stack – subroutine—traffic signal control program—Documentation and parameter passing program –Documentation and parameter passing-simple programs	15	Chalk & Talk, Videos and PPT

# Course Designed by: Dr.S.S.Jayabalakrishnan & Mrs.A.Lakshmi

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)									
			Section	h A	Section	B	Section C	Section D	
Inte	Cos	K Level	MCQ	S	Short Ans	swers	Either or	Onen	
rnal			No. of. Questions	K - Level	No. of. Questions	K - Level	Choice	Choice	
CI	CO1	Up to K2	2	K1	1	K1	2	1	
AI	CO2	Up to K3	2	K1	2	K2	2	1	
CI	CO3	Up to K4	2	K2	1	K1	2	1	
AII	<b>CO4</b>	Up to K4	2	K2	2	K2	2	1	
Question Pattern CIA I & II		No. of Questions to be asked	4		3		4	2	
		No. of Questions to be answered	4		3	2	2	1	
		Marks for each question	1		2		5	10	
		Total Marks for each section	4		6		10	10	

	Distribution of Marks with K Level CIA I & CIA II										
	K Level	Section ASection BSection C(Multiple(Short(Either / Or(Open Choice)Questions)Questions)Choice)Choice)		Total Marks	% of (Marks without choice)	Consolidate of %					
	K1	2	2			4	8	60			
	K2	2	4	10	10	26	52	00			
СТА	K3			10	10	20	40	40			
I	K4										
-	Marks	4	6	20	20	50	100	100			
	K1	2	2			4	8	20			
	K2	2	4			6	12	20			
CIA	K3			10	10	20	40	40			
II	K4			10	10	20	40	40			
	Marks	4	6	20	20	50	100	100			

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)										
			MCC	)s	Short An	swers	Section C			
S.No	COs	K - Level	No. of QuestionsK – Level		No. of Question	K – Level	(Either / or Choice)	(Open Choice)		
1	CO1	Upto K2	2	K1& K2	1	K1	2(K1 & K1)	1(K2)		
2	CO2	Upto K3	2	K& K2	1	K1	2(K3 & K3)	1(K3)		
3	CO3	Upto K4	2	K& K2	1	K2	2(K3 & K3)	1(K4)		
4	CO4	Upto K4	2	K1& K2	1	K2	2(K4 & K4)	1(K3)		
5	CO5	Upto K3	2	K1 & K2	1	K2	2(K2 & K2)	1(K3)		
No. of Questions to be Asked			10		5		10	5		
No.of Questions to be answered			10		5		5	3		
Marks for each question			1		2		5	10		
Total N	Marks for	each section	10		10		25	30		
	(Figures	in parenthesi	s denotes, qu	estions s	hould be as	ked with	the given K	level)		

Distribution of Marks with K Level											
K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either/ or Choice)	Section D ( Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %				
K1	5	4			9	7.5	17				
K2	5	6			11	9.17	17				
K3			25	20	45	37.5	37				
K4			25	30	55	45.83	46				
Marks	10	10	50	50	120	100	100				
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.											

Section A (Multiple Choice Questions)									
Answei	r All Qu	estions	(10x1=10 marks)						
Q.No	CO	K Level	Questions						
1	CO1	K1							
2	CO1	K2							
3	CO2	K1							
4	CO2	K2							
5	CO3	K1							
6	CO3	K2							
7	CO4	K1							
8	CO4	K2							
9	CO5	K1							
10	CO5	K2							
Section	B (Sho	rt Answers							
Answei	r All Qu	estions	(5x2=10 marks)						
Q.No	CO	K Level	Questions						
11	CO1	K1							
12	CO2	K1							
13	CO3	K2							
14	CO4	K2							
15	CO5	K2							
Section	C (Eith	er/Or Typ	e)						
Answei	r All Qu	estions	(5 x 5 = 25 marks)						
Q.No	CO	K Level	Questions						
16) a	CO1	K3							
16) b	CO1	K3							
17) a	CO2	K3							
17) b	CO2	K3							
18) a	CO3	K3							
18) b	CO3	K3							
19) a	CO4	K3							
19) b	CO4	K3							
20) a	CO5	K4							
20) b	CO5	K4							
NB: Hi	gher lev	el of perfo	rmance of the students is to be assessed by attempting higher						
level of	K levels	5							
Section	D (Ope	n Choice)							
Answei	r Any Tl	hree questi	ons (3x10=30 marks)						
Q.No	CO	K Level	Questions						
21	CO1	K2							
22	CO2	K3							
- 12	002	I KA							
23	CO3	114							
23 24	CO3 CO4	K4 K3							

# **Summative Examinations - Question Paper – Format**



### MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF PHYSICS (For those who joined in 2021-2022 and after)

Course Name MATHEMATICAL PHYSICS													
Course Co	ode	21UPH	E63								L	Р	С
Category		ELECT	IVE								5	-	5
Nature of course: EMPLOYABILITY ✓ SKILL ORIENTED ENTREPRENEURSH									HIP				
COURSE OBJECTIVES: The Learner will be able to :													
1. Recall and solve various types of vectors													
2. Review	the op	perations	of matric	es									
3. Solve va	arious	types of	differen	tial equ	uati	ons		C C					
4. Explore	vario	us Fourie	r series a	ind als	o to	detern	nine its i	transfor	ms				
5. Evaluate	e the 1	unctions	of compl	lex var	1ab.	les							
	Vect	ors											
Unit: I	Revi	ew of ve	ector algo	ebra –	A	ldition	of vect	ors – I	Prod	luct of two vec	tors -	- 15	hrs
	Phys	ical appl	ications c	of vect	or p	product	– Diffe	rentiatio	on o	f vectors.			
	Mat	rices	р [,]	C I			<i>.</i> •			G 11/			
<b>T</b> T <b>1</b> / <b>TT</b>	Intro	duction	– Review	v of a	lget	oric op	erations	on ma	trice	es – Special ty	pes of		7
Unit: II	matr	lces - 11	ranspose	or ma	trix	-1 ne	conjug	ates of	mai	trix – Symmetr	ic and	13	nrs
	Asyi	ninetric i atriv Si	indular a	- Herr	muia Notin	an and	Skew H		n m	of a matrix	mnan		
	Diff	rential l	Equation		1-511	iguiai	matrices	s – Auju	m				
	Intro	duction -	– Order	and de	egre	e of a	differer	ntial equ	natio	on – Solution c	of first	+	
Unit: III	order differential equation by separation of variables - Solution of first order									1	15		
	diffe	lifferential equation by method of integrating factor - Solution of first order									h	ITS	
	differential equation reducible to linear form.												
	Fou	ier and	Laplace	Trans	for	m							
Unit. IV	Intro	Introduction – Fourier transform – Properties of fourier transform – Fourier									: 1	15	
	sine	and cosi	ne transf	orm of	f a	derivat	ive – L	aplace	tran	sform – Proper	ties of	f h	irs
	Lapl	place transform – Laplace transform of periodic functions.											
	Com	plex Va	riables										
	Com	plex nur	nbers –	Revie	W C	of alge	bric ope	erations	of	complex num	bers -	-	
Unit: V	Com	plex con	jugate –	Modu	lus	and ar	gument	of com	plex	k numbers – Fu	nctior	¹ 15	hrs
	of C	omplex	variable	-L1	mit,	, conti	nuity a	nd diff	terei	ntiability – Ai	halytic		
	tunction – Cauchy-Riemann differential equation – Laplace equation –									-			
	Harr	nome für	ictions.						То	tal Laatura Ua	urg	7511-	•6
									10	ial Lecture H0	urs	/3П[	. 5

### **Books for study:**

Satya Prakash, **Mathematical Physics with Classical Mechanics**, Sulthan Chand and Sons, Educational Publicaters, New Delhi.

**Unit – I:** Chapter – 1 – 1.1, 1.1 (a), 1.1 (e), 1.1 (f), 1.1 (j). **Unit – II:** Chapter – 2 – 2.1, 2.2, 2.5, 2.6, 2.7, 2.9, 2.10, 2.11, 2.14, 2.15.

**Unit – III:** Chapter – 7 – 7.1, 7.2, 7.3, 7.4 (a) and 7.4 (b). **Unit – IV:** Chapter – 10 – 10.1, 10.2, 10.3, 10.5, 10.9, 10.10, 10.11. **Unit – V:** Chapter – 6 – 6.1, 6.2, 6.3, 6.4, 6.7, 6.8, 6.9, 6.11.

#### **Books for Reference:**

1. H.K. Dass, Dr. Rama Varma, Mathematical Physics, Revised Edition, S.Chand and Co, New Delhi.

**2.** George B. Arfken, Hans J. Weber, Frank E. Harris, **Mathematical Methods for Physicists**, 7th Edition, Academic Press, Elsevier.

**3.** Louis A. Pipes, Lawrence R. Harvill, **Applied Mathematics for Engineers and Physicists**, 3rd Edition, Dover Publication, Inc. New York, 2014.

#### Web Resources:

1.<u>https://www.google.com/url?sa=t&source=web&rct=j&url=http://ndl.ethernet.edu.et/bitstream/123</u> 456789/79541/4/Mathematical%2520Physics%2520%2528Gupta%2529.pdf&ved=2ahUKEwjbuKaW <u>sKv-AhVHS2wGHTJFAc0QFnoECDwQAQ&usg=AOvVaw0tnCcRf_7DLOr0BzAVoAYJ</u>

2. <u>https://ocw.mit.edu/courses/18-02sc-multivariable-calculus-fall-2010/pages/1.-vectors-and-matrices/</u> 3.<u>https://www.google.com/url?sa=t&source=web&rct=j&url=http://ndl.ethernet.edu.et/bitstream/123</u> 456789/79541/4/Mathematical%2520Physics%2520%2528Gupta%2529.pdf&ved=2ahUKEwjbuKaW sKv-AhVHS2wGHTJFAc0QFnoECDwQAQ&usg=AOvVaw0tnCcRf_7DLOr0BzAVoAYJ

EXPECTED COURSE OUTCOME					
On successful completion of the course, the learners should be able to	K Level				

CO1:	Review vector algebra, differential equation, complex numbers, properties of fourier transform	K2
CO2:	Solve ordinary and partial differential equations of second order that are common in the physical sciences	K3
CO3:	Solve physical problems using complex analysis and fourier transform	K4
<b>CO4:</b>	Explain about special type of matrices that are relevant in physics	K4
CO5:	Analyze Cauchy-Riemann differential equation, laplace equation, harmonic functions.	K3

#### CO & PO Mapping:

COS	<b>PO 1</b>	PO 2	<b>PO 3</b>	PO 4	<b>PO 5</b>	<b>PO 6</b>
CO 1	3	3	3	3	3	3
CO 2	3	3	2	1	2	2
CO 3	3	3	2	1	2	2
<b>CO 4</b>	3	2	2	1	1	1
CO 5	3	2	2	1	1	1

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

### LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
I	Review of vector algebra – Addition of vectors – Product of two vectors – Physical applications of vector product – Differentiation of vectors.	15	Chalk & Talk, Videos and PPT
п	Introduction – Review of algebric operations on matrices – Special types of matrices – Transpose of matrix – The conjugates of matrix – Symmetric and Asymmetric matrices – Hermitian and Skew Hermitian matrices – Determinant of matrix – Singular and Non-singular matrices – Adjoint of a matrix.	15	Chalk & Talk, Videos and PPT
ш	Introduction – Order and degree of a differential equation – Solution of first order differential equation by separation of variables - Solution of first order differential equation by method of integrating factor - Solution of first order differential equation reducible to linear form.	15	Chalk & Talk, Videos and PPT
IV	Introduction – Fourier transform – Properties of fourier transform – Fourier sine and cosine transform of a derivative – Laplace transform – Properties of Laplace transform – Laplace transform of periodic functions.	15	Chalk & Talk, Videos and PPT
V	Complex numbers – Review of algebric operations of complex numbers – Complex conjugate – Modulus and argument of complex numbers – Function of complex variable – Limit, continuity and differentiability – Analytic function – Cauchy-Riemann differential equation – Laplace equation – Harmonic functions.	15	Chalk & Talk, Videos and PPT

Course designed by: Dr.P.Kavitha & Mrs.A.Lakshmi

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)									
			Section	A	Section	B		Section D		
Inte	Cos	K Level	MCQ	S	Short Ans	swers	Either or	Onen		
rnal		I Lova	No. of. Questions	K - Level	No. of. Questions	K - Level	Choice	Choice		
CI	CO1	Up to K2	2	K1	1	K1	2	1		
AI	CO2	Up to K3	2	K1	2	K2	2	1		
CI	CO3	Up to K4	2	K2	1	K1	2	1		
AII	<b>CO4</b>	Up to K4	2	K2	2	K2	2	1		
Question Pattern CIA I & II		No. of Questions to be asked	4		3		4	2		
		No. of Questions to be answered	4		3	2	2	1		
		Marks for each question	1		2		5	10		
		Total Marks for each section	4		6		10	10		

		D	istribution of	f Marks with	K Level CI	A I & Cl	AII	
	K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either / Or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
	K1	2	2			4	8	60
	K2	2	4	10	10	26	52	00
СІА	K3			10	10	20	40	40
I	K4							
•	Marks	4	6	20	20	50	100	100
	K1	2	2			4	8	20
	K2	2	4			6	12	20
CIA	K3			10	10	20	40	40
II	K4			10	10	20	40	40
	Marks	4	6	20	20	50	100	100

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

S	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)										
			MCC	ls	Short An	swers	Section C	Section D			
S.No	COs	K - Level	No. of Questions	K – Level	No. of Question	K – Level	(Either / or Choice)	(Open Choice)			
1	CO1	Upto K2	2	K1& K2	1	K1	2(K1 & K1)	1(K2)			
2	CO2	Upto K3	2	K& K2	1	K1	2(K3 & K3)	1(K3)			
3	CO3	Upto K4	2	K& K2	1	K2	2(K3 & K3)	1(K4)			
4	CO4	Upto K4	2	K1& K2	1	K2	2(K4 & K4)	1(K3)			
5	CO5	Upto K3	2	K1 & K2	1	K2	2(K2 & K2)	1(K3)			
No	of Quest. Aske	tions to be ed	10		5		10	5			
No.of Questions to be answered		10		5		5	3				
Marks for each question			1		2		5	10			
Total Marks for each section			10		1 0		25	30			
	(Figures	in parenthesi	s denotes, qu	iestions s	hould be as	ked with	the given K	level)			

	Distribution of Marks with K Level										
K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either/ or Choice)	Section D ( Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %				
K1	5	4			9	7.5	17				
K2	5	6			11	9.17	17				
K3			25	20	45	37.5	37				
K4			25	30	55	45.83	46				
Marks	10	10	50	50	120	100	100				
NB: Hig	gher level of p	erformance o	f the students	s is to be asse	essed by a	ttempting	higher level				

of K levels.

Section	Section A (Multiple Choice Questions)							
Answei	r All Qu	estions	(10x1=10 marks)					
Q.No	CO	K Level	Questions					
1	CO1	K1						
2	CO1	K2						
3	CO2	K1						
4	CO2	K2						
5	CO3	K1						
6	CO3	K2						
7	CO4	K1						
8	CO4	K2						
9	CO5	K1						
10	CO5	K2						
Section	B (Sho	rt Answers						
Answei	r All Qu	estions	(5x2=10 marks)					
Q.No	CO	K Level	Questions					
11	CO1	K1						
12	CO2	K1						
13	CO3	K2						
14	CO4	K2						
15	CO5	K2						
Section	C (Eith	er/Or Typ	e)					
Answei	r All Qu	estions	(5 x 5 = 25 marks)					
Q.No	CO	K Level	Questions					
16) a	CO1	K3						
16) b	CO1	K3						
17) a	CO2	K3						
17) b	CO2	K3						
18) a	CO3	K3						
18) b	CO3	K3						
19) a	CO4	K3						
19) b	CO4	K3						
20) a	CO5	K4						
20) b	CO5	K4						
NB: Hi	gher lev	el of perfo	rmance of the students is to be assessed by attempting higher					
level of	K levels	6						
Section	D (Ope	n Choice)						
Answei	r Any Tl	hree questi	ons (3x10=30 marks)					
Q.No	CO	K Level	Questions					
21	CO1	K2						
22	CO2	K3						
_	002							
23	CO3	K4						
23 24	CO3 CO4	K4 K3						

# **Summative Examinations - Question Paper – Format**



## MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF PHYSICS (For those who joined in 2021-2022 and after)

Course Na	me NA	NOTECHNOLOG	GY					
Course Co	de 21U	PHE64				L	Р	С
Category	EL	ECTIVE				5	-	5
Nature of	ourse: El	MPLOYABILITY	SKILL ORIENTED	$\checkmark$	SKILL ORIEN	TED		
COURSE OBJECTIVES: The Learner will be able to :								
1. The	basics of	nanoscience and N	lanotechnology.					
<ul> <li>2. The methods of synthesis</li> <li>3. The methods of characterisation of nanomaterials</li> </ul>								
4. The	practical	applications of nan	iomaterials.					
5.Uset	ulness of a	nanotechnology in c	daily life					
Unit: I	Nanoscie Introduct Nanotech	ence ion-Nano and mology- Types of 1	Nature- understandir nano materials - Chemica	ng al rec	Nanoscience luction - cataly	and sis or	1	5hrs
	nano part	icles – oxide reaction	ons- reaction of rare earth	elen	nents.			
Unit: II	nano particles – oxide reactions- reaction of rare earth elements.         Synthetic methods         Top-down vs bottom up technique-lithographic process and its limitations- nonlithographic techniques- plasma arc discharge- sputtering-evaporation- chemical vapour deposition- sol-gel technique-eletectro-deposition-other							
	Electron	microscopy						
Unit: III	Basic prin –energy (TEM)- 2 (AFM) (0	nciples of electron a dispersive X-ray as Scanning Tunneling Dualitative analysis	microscopy – scanning el nalysis (EDX)- Transmis g Microscope (STM) - A only)	lectro ssion Atom	on microscope ( electron micro ic Force Micro	(SEM) oscope oscope	1	5 hrs
Unit: IV	X-Ray cr Structure crystal r formula) oxides –	rystallography of nanomaterials- nethod- powder n X-ray line shape small angle X-ray s	X-ray diffraction-(XRD)- nethod -determination o analysis –analysis of som scattering (SAXS)	the of gr ie con	laue method- ro rain size (Scho mmercially imp	otating errer's ortant	1	5 hrs
Unit: V	Applicati Applicati computer fabric ind machine	ions of nanoscienc ons of nanomater - high sensitivity s dustry – environme -nanobiometrics	rials – medicine-energy ensors- water purification ent- automobiles – cerar	sect n- co mic	tor- next gene mmunication- f industry – mol	eratior food – ecular	- 1	5hrs
				To	tal Lecture Ho	urs	75H	rs
1.Rajes	h kumar 7	Г, langeswaran V K	, Sangeetha R, Nano Phy	vsics,	New Century b	book l	ouse	;
Books for           1.         M.           pub           2.         K.1	<b>Reference</b> A. Shah , ⁷ Ilishing ho K. Chattop	e: Fokeer Ahmad <b>Prin</b> buse Pvt.Ltd., 2013 adhyay,A.N. Baner	nciples of Nanoscience a	nd n	anotechnology ence and Nano	v Narc <b>techn</b>	a olog	y,

PHI learning Private, 2012. 3.Edward L. Wolf, Nanophysics and Nanotechnology, Wiley VCH, 2nd edition, 2006 Web Resources: https://nptel.ac.in/courses/113106093 https://ocw.mit.edu/courses/2-57-nano-to-macro-transport-processes-spring-2012/resources/lecture-1-intro-to-nanotechnology-nanoscale-transport-phenomena/ http://www.phys.nthu.edu.tw/~spin/course/102S/102-2-21_nanophysics-introduction-Kwo-**English.pdf EXPECTED COURSE OUTCOME** K Level On successful completion of the course, the learners should be able to **CO1:** State the basics of nanoscience and Nanotechnology **K2 CO2:** Demonstrate the methods of synthesis of nanomaterials **K3 CO3:** Explain the principles of various characterization techniques **K4** Analyse the properties of nanomaterials practically **K4 CO4: CO5:** Make use of the properties of nanomaterials and their possible applications **K3** 

### CO & PO Mapping:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	2	2	2	1	1
CO 2	2	2	2	2	1	2
CO 3	2	2	1	1	1	2
CO 4	2	2	2	2	1	2
CO 5	2	1	1	2	1	2

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

### LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
I	Introduction-Nano and Nature- understanding Nanoscience and Nanotechnology- Types of nano materials - Chemical reduction - catalysis on nano particles – oxide reactions- reaction of rare earth elements.	15	Chalk & Talk, and PPT
п	Top-down vs bottom up technique-lithographic process and its limitations-nonlithographic techniques- plasma arc discharge- sputtering-evaporation-chemical vapour deposition- sol-gel technique- eletectrodeposition-other process.	15	Chalk & Talk, and PPT
III	Basic principles of electron microscopy – scanning electron microscope (SEM) –energy dispersive X-ray ananlysis (EDX)- Transmission electron microscope (TEM)- Scanning Tunneling Microscope (STM) - Atomic Force Microscope (AFM) (Qualitative analysis only)	15	Chalk & Talk, and PPT
IV	Structure of nanomaterials- X-ray diffraction-(XRD)- the laue method- rotating crystal method- powder method -determination of grain size (Scherrer's formula)X-ray line shape analysis –analysis of some commercially important oxides – small angle X-ray scattering (SAXS)	15	Chalk & Talk, and PPT
V	Applications of nanomaterials – medicine-energy sector- next generation computer- high sensitivity sensors- water purification- communication- food – fabric industry – environment- automobiles – ceramic industry – molecular machine –nanobiometrics	15	Chalk & Talk, and PPT

Course designed by: Dr.R.Sangeetha & Mrs. N. Lakshmi Kruthika

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)									
			Section	A	Section	B	a (; a	Section D		
Inte	Cos	K Level	MCQ	S	Short Ans	swers	Either or	Onen		
rnal		I Lover	No. of. Questions	K - Level	No. of. Questions	K - Level	Choice	Choice		
CI	CO1	Up to K2	2	K1	1	K1	2	1		
AI	CO2	Up to K3	2	K1	2	K2	2	1		
CI	CO3	Up to K4	2	K2	1	K1	2	1		
AII	<b>CO4</b>	Up to K4	2	K2	2	K2	2	1		
Question Pattern CIA I & II		No. of Questions to be asked	4		3		4	2		
		No. of Questions to be answered	4		3	2	2	1		
		Marks for each question	1		2		5	10		
		Total Marks for each section	4		6		10	10		

		D	istribution of	f Marks with	K Level CI	A I & Cl	AII	
	K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either / Or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
	K1	2	2			4	8	60
	K2	2	4	10	10	26	52	00
СІА	K3			10	10	20	40	40
I	K4							
•	Marks	4	6	20	20	50	100	100
	K1	2	2			4	8	20
	K2	2	4			6	12	20
CIA	K3			10	10	20	40	40
II	K4			10	10	20	40	40
	Marks	4	6	20	20	50	100	100

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

S	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)										
			MCC	)s	Short An	swers	Section C	S. d. D			
S.No	COs	K - Level	No. of Questions	K – Level	No. of Question	K – Level	(Either / or Choice)	(Open Choice)			
1	CO1	Upto K2	2	K1& K2	1	K1	2(K1 & K1)	1(K2)			
2	CO2	Upto K3	2	K& K2	1	K1	2(K3 & K3)	1(K3)			
3	CO3	Upto K4	2	K& K2	1	K2	2(K3 & K3)	1(K4)			
4	CO4	Upto K4	2	K1& K2	1	K2	2(K4 & K4)	1(K3)			
5	CO5	Upto K3	2	K1 & K2	1	K2	2(K2 & K2)	1(K3)			
No. of Questions to be Asked		10		5		10	5				
No.of Questions to be answered			10		5		5	3			
Marks for each question			1		2		5	10			
Total Marks for each section			10		10		25	30			
	(Figures	in parenthesi	s denotes, au	estions s	hould be as	sed with	the given K	level)			

	Distribution of Marks with K Level											
K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either/ or Choice)	Section D ( Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %					
K1	5	4			9	7.5	17					
K2	5	6			11	9.17	17					
K3			25	20	45	37.5	37					
K4			25	30	55	45.83	46					
Marks	10	10	50	50	120	100	100					
NB: Higher level of performance of the students is to be assessed by attempting higher level												
of K lev	els.											

Section A (Multiple Choice Questions)									
Answei	r All Qu	estions	(10x1=10 marks)						
Q.No	CO	K Level	Questions						
1	CO1	K1							
2	CO1	K2							
3	CO2	K1							
4	CO2	K2							
5	CO3	K1							
6	CO3	K2							
7	CO4	K1							
8	CO4	K2							
9	CO5	K1							
10	CO5	K2							
Section	B (Sho	rt Answers							
Answei	r All Qu	estions	(5x2=10 marks)						
Q.No	CO	K Level	Questions						
11	CO1	K1							
12	CO2	K1							
13	CO3	K2							
14	CO4	K2							
15	CO5	K2							
Section	C (Eith	er/Or Typ	e)						
Answei	r All Qu	estions	(5 x 5 = 25 marks)						
Q.No	CO	K Level	Questions						
16) a	CO1	K3							
16) b	CO1	K3							
17) a	CO2	K3							
17) b	CO2	K3							
18) a	CO3	K3							
18) b	CO3	K3							
19) a	CO4	K3							
19) b	CO4	K3							
20) a	CO5	K4							
20) b	CO5	K4							
NB: Hi	gher lev	el of perfo	rmance of the students is to be assessed by attempting higher						
level of K levels									
level of	K levels	,							
level of Section	D (Ope	n Choice)							
level of Section Answer	D (Ope	n Choice) hree questi	ions (3x10=30 marks)						
level of Section Answer Q.No	n D (Ope r Any Tl CO	n Choice) hree questi K Level	ions (3x10=30 marks) Questions						
Ievel of Section Answer Q.No 21	r Any Tl CO CO1	n Choice) hree questi K Level K2	ons (3x10=30 marks) Questions						
level of Section Answer Q.No 21 22	r Any Tl CO CO1 CO2	n Choice) nree questi K Level K2 K3	ions (3x10=30 marks) Questions						
Ievel of Section Answer Q.No 21 22 23	A levels a D (Ope r Any Tl CO CO1 CO2 CO3	n Choice) nree questi K Level K2 K3 K4	ions (3x10=30 marks) Questions						
level of Section Answer Q.No 21 22 23 24	A levels D (Ope r Any TI CO CO1 CO2 CO3 CO4	n Choice) nree questi K Level K2 K3 K4 K3	ions (3x10=30 marks) Questions						

# **Summative Examinations - Question Paper – Format**



## MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF PHYSICS (For those who joined in 2021-2022 and after)

Course Name NON-RENEWABLE ENERGY PHYSICS									
Course Co	ode	21UPHE65	L	Р	C				
Category		ELECTIVE	5	-	5				
Nature of	cours	e: EMPLOYABILITY ✓ SKILL ORIENTED SKILL ORIEN	TED						
COURSE ( 1. Lis 2. De 3. De 4. An 5.App	<ol> <li>List the various types of non- conventional energy sources.</li> <li>Describe methods of harvesting solar energy.</li> <li>Develop newer ideologies for utilizing ind and biomass energy.</li> <li>Analyze geothermal and ocean energy</li> <li>Apply newer technologies in energy conservation</li> </ol> Energy Conservation and storage Salient Feature of "Energy Conservation Act, 2001"- Various aspects of Energy Conservation- Principles of Energy Conservation- General Electrical								
	Energy Conservation- Frinciples of Energy Conservation- General Electrical Energy Conservation opportunities - combined cycle plants- necessity of Energy Storage – Energy Storage Methods.								
Unit: II	Solar EnergySpectral Energy Distribution of Solar Radiation- Measurement of SolarRadiation- Solar Thermal Systems- Solar water heaters- Solar Refrigerationand Air-conditioning systems- Solar cookers and furnaces – solar cells- classification- solar PV systems- applications.								
Unit: III	classification- solar PV systems- applications.Wind energy and Biomass energyOrigin and nature of winds- Wind Turbine siting – Major applications of windpower- wind turbine types and their construction- Wind energy conservationsystems (WECS) – Wind energy storage.Usable forms of Biomass - composition and fuel properties – biomassconservation technologies – urban waste to Energy Conversion – BiomassGasification and Liquefaction- Biogas production from waste Biomass- Energy								
Unit: IV	Geothermal Energy and Ocean Energy         Origin and Distribution of Geothermal Energy – types of Geothermal         resources- analysis of Geothermal resources - Exploration and Development of         Geothermal Resources.         Tidal Energy- Wave Energy- Ocean thermal Energy.         Emerging Technologies								
Unit: V	Fuel Cell- Hydrogen Energy- Magneto Hydrodynamic power conservation – Thermoelectric Power Conservation – Thermionic Power Conversion.								
Books for	Study	Total Lecture Ho	urs	<u>/5H</u> 1	rs				

 B. H. Khan, Non- Conventional Energy Resources, The McGraw Hill Publications Unit I - chapter 2 Unit II- chapter 4 Unit III - chapter 7 & 8 Unit IV - chapter 9 & 10 Unit V - Chapter 12

#### **Books for Reference:**

- 1. Gilbert M. Masters, Renewable and Efficient Electric Power systems, Prentice Hall.
- 2. G.D. Ray, Non- Conventional Energy Sources, Khanna Publications.
- 3. Bansal N. K. Non- Conventional Energy Sources, Vikas Publishing house

Web Resources:

https://nptel.ac.in/courses/121106014

http://www.nitttrc.edu.in/nptel/courses/video/121106014/lec4.pdf

https://ocw.mit.edu/courses/15-031j-energy-decisions-markets-and-policies-spring-

2012/resources/lecture-15-non-renewable-energy-resources/

EXPE	EXPECTED COURSE OUTCOME					
On suc	On successful completion of the course, the learners should be able to					
CO1:	Relate various sources of non-conventional energy					
<b>CO2:</b>	Outline the solar energy harvesting and storage	K3				
CO3:	Explain the principle behind wind energy and biomass energy	K4				
CO4:	Develop the concept of geothermal and ocean energy	K4				
CO5:	Analyze newer technologies in energy conversion	K3				

#### CO & PO Mapping:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	2	2	2	2	2
CO 2	2	2	2	2	1	2
CO 3	2	2	1	2	1	2
CO 4	2	1	1	2	1	2
CO 5	2	2	1	2	1	2

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

### LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
I	Salient Feature of "Energy Conservation Act, 2001"- Various aspects of Energy Conservation- Principles of Energy Conservation- General Electrical Energy Conservation oppurtunities- combined cycle plants- necessity of Energy Storage – Energy Storage Methods.	15	Chalk & Talk, and PPT
Π	Spectral Energy Distribution of Solar Radiation- Measurement of Solar Radiation- Solar Thermal Systems- Solar water heaters- Solar Refrigeration and Air-conditioning systems- Solar cookers and furnaces – solar cells- classification- solar PV systems- applications.	15	Chalk & Talk, and PPT
ш	Origin and nature of winds- Wind Turbine siting – Major applications of wind power- wind turbine types and their construction- Wind energy conservation systems (WECS) – Wind energy storage.Usable forms of Biomass, their composition and fuel properties – biomass conservation technologies – urban waste to Energy Conversion – Biomass Gasification and Liquefaction- Biogas production from waste Biomass- Energy farming.	15	Chalk & Talk, and PPT
IV	Origin and Distribution of Geothermal Energy – types of Geothermal resources- analysis of Geothermal resources - Exploration and Development of Geothermal Resources. Tidal Energy- Wav Energy-Ocean thermal Energy.	15	Chalk & Talk, and PPT
V	Fuel Cell- Hydrogen Energy- Magneto Hydrodynamic power conservation – Thermoelectric Power Conservation – Thermoionic Power Conversion.	15	Chalk & Talk, and PPT

Course designed by: Dr.R.Sangeetha & Mrs. N. Lakshmi Kruthika

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)									
			Section A		Section B		Section C	Section D		
Inte rnal	Cos	K Level	MCQ	S	Short Ans	swers	Either or	Onen		
			No. of. Questions	K - Level	No. of. Questions	K - Level	Choice	Choice		
CI	CO1	Up to K2	2	K1	1	K1	2	1		
AI	CO2	Up to K3	2	K1	2	K2	2	1		
CI	CO3	Up to K4	2	K2	1	K1	2	1		
AII	<b>CO4</b>	Up to K4	2	K2	2	K2	2	1		
Question Pattern CIA I & II		No. of Questions to be asked	4		3		4	2		
		No. of Questions to be answered	4		3	2	2	1		
		Marks for each question	1		2		5	10		
		Total Marks for each section	4		6		10	10		

		D	istribution of	f Marks with	K Level CI	A I & Cl	AII	
	K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either / Or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
	K1	2	2			4	8	60
	K2	2	4	10	10	26	52	00
СІА	K3			10	10	20	40	40
I	K4							
•	Marks	4	6	20	20	50	100	100
	K1	2	2			4	8	20
	K2	2	4			6	12	20
CIA	K3			10	10	20	40	40
II	K4			10	10	20	40	40
	Marks	4	6	20	20	50	100	100

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

S	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)										
			MCC	)s	Short An	swers	Section C	Geodier D			
S.No	COs	K - Level	No. of Questions	K – Level	No. of Question	K – Level	(Either / or Choice)	(Open Choice)			
1	CO1	Upto K2	2	K1& K2	1	K1	2(K1 & K1)	1(K2)			
2	CO2	Upto K3	2	K& K2	1	K1	2(K3 & K3)	1(K3)			
3	CO3	Upto K4	2	K& K2	1	К2	2(K3 & K3)	1(K4)			
4	CO4	Upto K4	2	K1& K2	1	К2	2(K4 & K4)	1(K3)			
5	CO5	Upto K3	2	K1 & K2	1	K2	2(K2 & K2)	1(K3)			
No. of Questions to be Asked		10		5		10	5				
No.of Questions to be answered			10		5		5	3			
Marks for each question			1		2		5	10			
Total Marks for each section			10		10		25	30			
	(Figures	in parenthesi	s denotes, qu	estions s	hould be as	ked with	the given K	level)			

	Distribution of Marks with K Level										
K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either/ or Choice)	Section D ( Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %				
K1	5	4			9	7.5	17				
K2	5	6			11	9.17	17				
K3			25	20	45	37.5	37				
K4			25	30	55	45.83	46				
Marks	10	10	50	50	120	100	100				
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.											

Section A (Multiple Choice Questions)						
Answer All Questions(10x1=10 marks)						
Q.No	CO	K Level	Questions			
1	CO1	K1				
2	CO1	K2				
3	CO2	K1				
4	CO2	K2				
5	CO3	K1				
6	CO3	K2				
7	CO4	K1				
8	CO4	K2				
9	CO5	K1				
10	CO5	K2				
Section	B (Sho	rt Answers				
Answei	r All Qu	estions	(5x2=10 marks)			
Q.No	CO	K Level	Questions			
11	CO1	K1				
12	CO2	K1				
13	CO3	K2				
14	CO4	K2				
15	CO5	K2				
Section	C (Eith	er/Or Typ	e)			
Answei	r All Qu	estions	(5 x 5 = 25 marks)			
Q.No	CO	K Level	Questions			
16) a	CO1	K3				
16) b	CO1	K3				
17) a	CO2	K3				
17) b	CO2	K3				
18) a	CO3	K3				
18) b	CO3	K3				
19) a	CO4	K3				
19) b	CO4	K3				
20) a	CO5	K4				
20) b	CO5	K4				
NB: Hi	gher lev	el of perfo	rmance of the students is to be assessed by attempting higher			
level of K levels						
Section D (Open Choice)						
Answer Any Three questions(3x10=30 marks)						
Q.No	CO	K Level	Questions			
21	CO1	K2				
22	CO2	K3				
00		T 7 4				
23	CO3	<u>K4</u>				
23 24	CO3 CO4	K4 K3				

# **Summative Examinations - Question Paper – Format**



## MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF PHYSICS (For those who joined in 2021-2022 and after)

Course Na	COMMUNICATION ELECTRONICS					
Course Co	ode 21UPHE66		L	Р	С	
Category	ELECTIVE		5	-	5	
Nature of	course: EMPLOYABILITY ✓ SKILL ORIENTED S	KILL ORIENT	TED			
COURSE	<b>OBJECTIVES:</b> The Learner will be able to :			I		
1. Un	derstand concepts of communication process.					
2. Rei 3 An	nember the principles of analog modulations.					
<b>4</b> . De	evelop the communication systems					
5.Appl	y the modern communication systems for betterment					
	<u> </u>					
	Electronic communication					
	Means and modes of communication -Need for modulation	1- Block diagra	m of			
Unit. I	an electronic communication system-Brief idea of frequ	ency allocatior	1 for	1	15hua	
Unit. I	radio communication system in India (TRAI)- Electromagn	lio communication system in India (TRAI)- Electromagnetic communication				
	spectrum-band designations and usage-Channels and	base-band sig	nals-			
	Concept of Noise, signal-to-noise (S/N) ratio.					
	Amplitude Modulation modulation index and frequency sr	ectrum Gener	ation			
	of AM (Emitter Modulation) Amplitude Demodulation 4	AM (Emitter Modulation) Amplitude Demodulation 58 (diode detector)				
Unit: II	Concept of Single side band generation and detection. Fre	oncept of Single side band generation and detection. Frequency Modulation				
	(FM) and Generation of FM using VCO, FM detector					
	Qualitative idea of Super heterodyne receiver.					
	Digital Pulse Modulation					
	Channel capacity, sampling theorem, Basic Principles-	hannel capacity, sampling theorem, Basic Principles- Phase Modulation				
Unit. III	(PM)- modulation index and frequency spectrum,-equivalen	14	5 hm			
	It plan, PWM-PPM -modulation and detection technique for PAM only,					
	Carrier Modulation Techniques. Sampling. Quantization	on and Enco	ding.			
	Concept of Amplitude Shift Keying (ASK), Frequency Shift	Keying (FSK)				
	Communication and Navigation systems – I					
	ttellite Communication Introduction, need, geosynchronous satellite orbits					
Unit: IV	ostationary satellite advantages of geostationary satellites. Satellite visibility, 15 h					
	transponders (C - Band), path loss, ground station, simplified	ed block diagra	m of			
	arth station. Uplink and downlink.					
	Mobile Telephony System Basic concept of mobile commu	inication frequ	encv			
	bands used in mobile communication, concept of cell	sectoring and	cell			
Linit. V	splitting, SIM number, IMEI number, need for data encr	yption, archite	cture	1	5 h ma	
Umit: v	(block diagram) of mobile communication network, idea	of GSM, CD	MA,	1	51115	
	TDMA and FDMA technologies, simplified block diagram	m of mobile p	hone			
	handset, 2G, 3G and 4G concepts (qualitative only). GPS	avigation sy	stem			
	(qualitative idea only).					

**Books for Study:** 

Total Lecture Hours75Hrs

1. D. Roddy and J. Coolen Electronic Communications, , Pearson Education India.

**Books for Reference:** 

- 1. G. Kennedy, Electronic Communication systems, 3rd Edn, 1999, Tata McGraw Hill.
- 2. Frenzel, Principles of Electronic communication systems 3rd edition, McGraw Hill
- 3. Tomasi ,Advanced Electronics Communication Systems-, 6th edition, Prentice Hall.

#### Web Resources:

https://nptel.ac.in/courses/117101051

https://archive.nptel.ac.in/courses/117/105/117105144/

https://nptel.ac.in/courses/117102059

<b>EXPECTED COURSE OUTCOME</b> On successful completion of the course, the learners should be able to			
<b>CO1:</b>	Relate the communication process.	K2	
<b>CO2:</b>	Outline the principles of analog modulation	K3	
<b>CO3:</b>	Explain the working of analog and digital pulse modulation	K4	
<b>CO4:</b>	Distinguish various concepts of communication systems.	K4	
CO5:	Develop various types of communications.	K3	

### CO & PO Mapping:

COS	PO 1	PO 2	<b>PO 3</b>	<b>PO 4</b>	<b>PO 5</b>	<b>PO 6</b>
CO 1	3	2	2	1	1	1
CO 2	1	2	1	2	1	2
CO 3	3	2	1	2	2	2
<b>CO 4</b>	2	2	2	2	1	2
CO 5	2	3	2	2	1	1

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

### LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
I	Introduction to communication means and modes. Need for modulation. Block diagram of an electronic communication system. Brief idea of frequency allocation for radio communication system in India (TRAI). Electromagnetic communication spectrum, band designations and usage. Channels and base-band signals. Concept of Noise, signal-to-noise (S/N) ratio.	15	Chalk & Talk, and PPT
п	Amplitude Modulation, modulation index and frequency spectrum. Generation of AM (Emitter Modulation), Amplitude Demodulation 58 (diode detector), Concept of Single side band generation and detection. Frequency Modulation (FM) and Phase Modulation (PM), modulation index and frequency spectrum, equivalence between FM and PM, Generation of FM using VCO, FM detector (slope detector), Qualitative idea of Super heterodyne receiver.	15	Chalk & Talk, and PPT
ш	Channel capacity, sampling theorem, Basic Principles- PAM, PWM, PPM, modulation and detection technique for PAM only, Multiplexing. Need for digital transmission, Pulse Code Modulation, Digital Carrier Modulation Techniques, Sampling, Quantization and Encoding. Concept of Amplitude Shift Keying (ASK), Frequency Shift Keying (FSK).	15	Chalk & Talk, and PPT
IV	Satellite Communication Introduction, need, geosynchronous satellite orbits geostationary satellite advantages of geostationary satellites. Satellite visibility, transponders (C - Band), path loss, ground station, simplified block diagram of earth station. Uplink and downlink.	15	Chalk & Talk, and PPT
V	Mobile Telephony System Basic concept of mobile communication, frequency bands used in mobile communication, concept of cell sectoring and cell splitting, SIM number, IMEI number, need for data encryption, architecture (block diagram) of mobile communication network, idea of GSM, CDMA, TDMA and FDMA technologies, simplified block diagram of mobile phone handset, 2G, 3G and 4G concepts (qualitative only). GPS navigation system (qualitative idea only).	15	Chalk & Talk, and PPT

# Course designed by: Mrs. N. Lakshmi Kruthika & Mrs.A.Lakshmi
	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)								
			Section	A	Section	B	a (; a		
Inte	Cos	K Level	MCQ	S	Short Ans	swers	Either or	Onen	
rnal		I Lever	No. of. Questions	K - Level	No. of. Questions	K - Level	Choice	Choice	
CI	CO1	Up to K2	2	K1	1	K1	2	1	
AI	CO2	Up to K3	2	K1	2	K2	2	1	
CI	CO3	Up to K4	2	K2	1	K1	2	1	
AII	<b>CO4</b>	Up to K4	2	K2	2	K2	2	1	
Question Pattern CIA I & II		No. of Questions to be asked	4		3		4	2	
		No. of Questions to be answered	4		3	2	2	1	
		Marks for each question	1		2		5	10	
		Total Marks for each section	4		6		10	10	

	Distribution of Marks with K Level CIA I & CIA II								
	K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either / Or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidate of %	
	K1	2	2			4	8	60	
	K2	2	4	10	10	26	52	00	
СІА	K3			10	10	20	40	40	
I	K4								
•	Marks	4	6	20	20	50	100	100	
	K1	2	2			4	8	20	
	K2	2	4			6	12	20	
CIA	K3			10	10	20	40	40	
II	K4			10	10	20	40	40	
	Marks	4	6	20	20	50	100	100	

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Academic Council Meeting Held On 20.04.2023

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)								
			MCC	)s	Short An	Short Answers		Geodier D
S.No	COs	K - Level	No. of Questions	K – Level	No. of Question	K – Level	(Either / or Choice)	(Open Choice)
1	CO1	Upto K2	2	K1& K2	1	K1	2(K1 & K1)	1(K2)
2	CO2	Upto K3	2	K& K2	1	K1	2(K3 & K3)	1(K3)
3	CO3	Upto K4	2	K& K2	1	К2	2(K3 & K3)	1(K4)
4	CO4	Upto K4	2	K1& K2	1	К2	2(K4 & K4)	1(K3)
5	CO5	Upto K3	2	K1 & K2	1	K2	2(K2 & K2)	1(K3)
No. of Questions to be Asked			10		5		10	5
No.of Questions to be answered			10		5		5	3
Marks for each question			1		2		5	10
Total N	Marks for	each section	10		10		25	30
	(Figures	in parenthesi	s denotes, qu	estions s	hould be as	ked with	the given K	level)

Distribution of Marks with K Level								
K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either/ or Choice)	Section D ( Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %	
K1	5	4			9	7.5	17	
K2	5	6			11	9.17	17	
K3			25	20	45	37.5	37	
K4			25	30	55	45.83	46	
Marks	10	10	50	50	120	100	100	
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.								

Section	A (Mul	tiple Choio	ce Questions)				
Answei	r All Qu	estions	(10x1=10 marks)				
Q.No	CO	K Level	Questions				
1	CO1	K1					
2	CO1	K2					
3	CO2	K1					
4	CO2	K2					
5	CO3	K1					
6	CO3	K2					
7	CO4	K1					
8	CO4	K2					
9	CO5	K1					
10	CO5	K2					
Section	B (Sho	rt Answers					
Answei	r All Qu	estions	(5x2=10 marks)				
Q.No	CO	K Level	Questions				
11	CO1	K1					
12	CO2	K1					
13	CO3	K2					
14	CO4	K2					
15	CO5	K2					
Section	C (Eith	er/Or Typ	e)				
Answei	r All Qu	estions	(5 x 5 = 25 marks)				
Q.No	CO	K Level	Questions				
16) a	CO1	K3					
16) b	CO1	K3					
17) a	CO2	K3					
17) b	CO2	K3					
18) a	CO3	K3					
18) b	CO3	K3					
19) a	CO4	K3					
19) b	CO4	K3					
20) a	CO5	K4					
20) b	CO5	K4					
NB: Hi	gher lev	el of perfo	rmance of the students is to be assessed by attempting higher				
level of	K levels	5					
Section D (Open Choice)							
Answei	Answer Any Three questions(3x10=30 marks)						
Q.No	CO	K Level	Questions				
21	CO1	K2					
22	CO2	K3					
23	CO3	K4					
24	001	V2					
24	CO4	КЭ					

# **Summative Examinations - Question Paper – Format**

Academic Council Meeting Held On 20.04.2023



#### MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF PHYSICS (For those who joined in 2021-2022 and after)

Course Na	ame	OPTO ELECTRONICS							
Course Co	ode	21UPHS61	L	Р	С				
Category		Skilled	2	-	2				
Nature of	cours	e: EMPLOYABILITY SKILL ORIENTED ✓ SKILL ORIEN	TED						
COURSE	OBJE	CTIVES: The Learner will be able to :							
1. Understand the propagation of light waves in an optical fibre.									
2. Underst 3. Demem	and IC bor th	e concents of LED and semiconductor laser diode							
<b>4</b> Underst	4. Understand the types of optical couplers								
5. Apply th	he cor	acepts of fibre optics in communication system.							
	Opti	cal Fibres							
	Impo	ortance of optical fibres - propagation of light waves in an optical							
Unit: I	fibre	- basic structure of an optical fibre and propagation of light wave		6	hrs				
	throu	ugh it- acceptance angle and acceptance cone of a fibre-numerical							
	Fibr	e losses and Dispersion							
Unit: II	Loss	es in fibres- scattering losses-absorption losses-bending losses-			_				
	Dispersion in an optical Fibre-Inter-modal dispersion-Material								
chromatic dispersion-Wave guide dispersion.									
	Ligh	t Sources and Detectors							
	LED	LED (Light Emitting Diode)- structures of LED- LED materials-							
Unit: III	LASER and its advantages- Semiconductor LASER diode -								
	transistor								
	Opti	cal couplers							
Unit: IV	Types of optical couplers-biconically tapered directional coupler- offset								
	butt-	joint directional coupler-beam splitting directional coupler							
	Measurements on Optical Fibres								
	Mea	surement of Numerical aperture and its related terms-Optical Time-							
Unit: V	Don	Domain Reflectometer (OTDR)-Measurement of fibre attenuation-							
	Mea	Measurement of Refractive index							
		Total Lecture Ho	urs	<b>30H</b>	rs				
Books for	Stud	y:							
1. Su	ıbir Ku	mar Sarkar, Optical Fibres and Fibre Optic Communication Systems, S.	Chand						
Ι'n	it T.	& CompanyLtd.							
Un	III = II	· Chapter 7 1 7 3 7 4 7 6 8 3 8 4 8 6 8 7							
Unit-III: Chapter 9.2, 9.2.1-9.2.3, 9.3.3, 10.2, 10.8,10.9									
Un	it-IV	: Chapter 12.2, 12.2.1-12.2.3, 13.6							
2. Un	it –V :	Chapter 20.2-20.4, 20.8.20.9							
Acader	nic C	ouncil Meeting Held On 20.04.2023	Pag	e 20	8				

Books	for Reference:	
1.	G.Keiser, <b>Optical Fiber Communication</b> , TMH, Ltd. New Delhi, First Edition, 2010.	
2.P	K. Palanisamy. Semicinductor Physics and optoelectronics. Second edition	
Scit	echPublications(india) PvtLtd.	
3.S.	C.Gupta, Optical Fiber Communication and is Applications, PHI Learning Pvt.Ltd, New Delh	,
Firs	t Edition,2004.	
4.Dr	. M. Arumugam, Optical Communication, Anuradhapublications	
5.S.	Salivahanan, N. Sureskumar and A. Vallavaraj, Electronic Devices and Circuits, Tata McGrav	/-Hill
Pub	lishing Company Ltd, New Delhi, Second Edition,2011.	
	1. 6.A.P.Godse, U.A.Bakshi, Electronic Devices, Technical Publication.	
Web R	lesources:	
1. <u>https</u>	://archive.nptel.ac.in/courses/115/102/115102103/#watch	
2. <u>http</u>	s://archive.nptel.ac.in/courses/115/102/115102103/#watch	
3. <u>http</u>	s://archive.nptel.ac.in/courses/115/102/115102103/#watch	
EXPE	CTED COURSE OUTCOME	V L arral
On suc	cessful completion of the course, the learners should be able to	K Level
CO1:	Understand the propagation of light waves in an optical fibre.	K2
<b>CO2:</b>	Understand the Fibre losses and Dispersion.	K2
<b>CO</b> 2.	Understand the Light Emitting Diode, semiconductor laser diode	W3
COS:	and Photo transistor.	K3
<b>CO4:</b>	Improve the skill in the area of Types of optical couplers.	K4
COF	Apply the basics concepts of fibre optics in Fibre optic communication	TZ A
CO5:	system.	<b>K</b> 4

# CO & PO Mapping:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	3	2	3	1
CO 2	3	1	3	3	1	3
CO 3	2	2	2	3	2	1
CO 4	3	3	2	3	1	2
CO 5	3	3	2	2	3	3

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

#### LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
I	Importance of optical fibres - propagation of light waves in an optical fibre - basic structure of an optical fibre and propagation of light wave through it- acceptance angle and acceptance cone of a fibre-numerical aperture.	6	Chalk & Talk, and PPT
II	Losses in fibres- scattering losses-absorption losses-bending losses- Dispersion in an optical Fibre-Inter-modal dispersion- Material chromatic dispersion-Wave guide dispersion.	6	Chalk & Talk, and PPT
Ш	LED (Light Emitting Diode)- structures of LED- LED materials- LASER and its advantages- Semiconductor LASER diode - Characteristics of photo-detectors- Avalanche photo-diode-Photo transistor.	6	Chalk & Talk, and PPT
IV	Types of optical couplers-biconically tapered directional coupler- offset butt-joint directional coupler-beam splitting directional coupler	6	Chalk & Talk, and PPT
v	Measurement of Numerical aperture and its related terms-Optical Time- Domain Reflectometer (OTDR)-Measurement of fibre attenuation- Measurement of Refractive index	6	Chalk & Talk, and PPT

#### Course designed by: Mrs.A.Lakshmi & Dr.R.Sangeetha

Academic Council Meeting Held On 20.04.2023