FATIMA COLLEGE (AUTONOMOUS)

Re-Accredited with "A++" Grade by NAAC (Cycle-IV)

74th Rank in India Ranking 2020 (NIRF) by MHRD

Maryland, Madurai- 625 018, Tamil Nadu, India

NAME OF THE DEPARTMENT : RESEARCH CENTRE OF PHYSICS

NAME OF THE PROGRAMME : M.Sc

PROGRAMME CODE : PAPH

ACADEMIC YEAR : 2023-2024

Minutes of the Board of Studies Meeting

To be implemented from 2023-2024 onwards

Venue : A1

Convened on 03-04-2023 at 2 Pm

Members Present :-

1. Dr. A. Sheela Vimala Rani — Head of the Dept
A. Sheela Vimala Rani 3/4/23
2. Dr. K. Anitha — University Nominee
Asst. Professor & Hod ~~Etc~~
Department of Physics
Maduraï Kamaraj University
Madurai - 625 021
K. Anitha 03/04/23
3. Dr. K. Marimuthu — Subject Expert
Asst. Professor
Department of Physics
Gandhigram Rural Institute
-Deemed University
Gandhigram
K. Marimuthu 03/04/2023
4. Dr. M. Umadevi — Subject Expert
Associate Professor & Head
Department of Physics
Mother Teresa Women's University
Attuvampatti, Kodaikanal
[Absent]

5. Mr. A. Kesavan — Industrialist.
CEO
Quantanics Techserve Pvt Ltd.
Madurai
A. Kesavan 3/4/23

6. Dr. R. Vishnupriya — Alumnae
Asst. Professor
Dept. of Physics
The Madura College
R. Vishnupriya 3/4/23

7. Dr. Rajeswari — Dean of Academic Affairs.
Asst. Professor
Dept. of Chemistry
Fatima College
Rajeswari 3/4/23

8. Dr. L. Caroline Sugirtham
Associate Professor
L. Caroline Sugirtham

9. Mrs. R. Alphonsa Fernando
Associate Professor
R. Alphonsa Fernando

10. Dr. M. V. Leena Chandra
Asst. Professor
Leena Chandra 03/04/2023

11. Dr. I. Jeyasheela
Asst. Professor
I. Jeyasheela 3/4/23

12. Dr. Ancemma Joseph
Asst. Professor
Ancemma Joseph 3/4/23

13. Dr. M. Ragam
Asst. Professor
M. Ragam

14. Dr. G. Jenita Rani
Asst. Professor
3/4/23

15. Dr. R. Jothimani
Asst. Professor

16. Ms. I. Janet Sherly
Asst. Professor
03/04/23

17. Ms. J. R. Sofia
Asst. Professor
03/04/23

18. Dr. J. Selvi
Asst. Professor

19. Dr. R. Niranjana Devi
Asst. Professor.

Presentation of the Action Taken Report

Action taken report for 2022-2023
UG PHYSICS

S.No.	SUGGESTIONS IN THE PREVIOUS BOARD	ACTION TAKEN IN THE ACADEMIC YEAR 202
1.	A Course on Mathematical Physics can be included as Core Paper	The Course was introduced for II UG

S.NO.	SUGGESTIONS IN THE PREVIOUS BOARD	ACTION TAKEN IN THE ACADEMIC YEAR 2028-2
2.	New course 'Mathematical Methods' can be offered as Elective / Skill based paper.	It will be carried out in the forth coming year.
3.	Interference can be shifted from Allied Physics I to Allied Physics II to be on par with the practicals.	The change has been carried out
4.	The book Principles of Electronics by Mehta can be included for Books for Study.	It has been included.
5.	In the elective paper 19P6MEI, instead of Timer and Counter, Assemblers & Compilers can be included.	It has been carried out
PG PHYSICS		
1.	In the 'Nuclear and Particle physics' course, the book Nuclear Physics Theory and Experements by Roy and N.[illegible] was suggested as book for study.	The Suggestion is carried out.
2.	The title for Certificate course was Suggested as Instrumentation on Electro Chemical techniques	The Suggestion is carried out.

S.No.	SUGGESTIONS IN THE PREVIOUS BOARD	ACTION TAKEN IN T ACADEMIC YEAR 2022
3.	In the 'Applied Electronics' Course, the industrialist suggested that 'Pulse width Modulation' and 'Switching Regulators' can be introduced instead of Registers and counters.	This suggestion is carried out.
4.	In the 'Instrumentation and Microcontroller' it was suggested that programing in 8051 can be reduced and Assemblers & Simulators can be included	

2. Revision of Courses : Nil for UG & PG OBE

3. New Courses introduced : Nil for UG & PG O

4. Introducton of purely Skill Embedded certificate/ Diplo / Advanced Dyploma value-Added Course other than value-Added course that is already being offered : Nil for UG & PG OBE

5. Approval of Ph.D Course Work Syllabus :
Course Work Paper and core paper for Research Scholar are as follows

	Ph.D Scholar	Course Work Paper	Core Paper
1.	T. Sabeetha	23PHDCWP01 Solid State Ionics	23PHDCPP02 Materials Scienc
2.	M. Mehraj Begum	"	"

6. Rubrics for Internship/ Project (changes needed) : Nil

UG TANSCHE

CORE COURSES INTRODUCED PART III

S.No.	Course Code	Course Title with Semester	Relevance to L	R	N	G	Scope for Emp	Entre	SD	Need for Introduction
		Sem I								
1. 1.	CC1	Properties of Matter and Sound				✓	✓		✓	TANSCHE
2.	CC2	Digital Electronics				✓	✓	✓		
3.	CC3	Practicals - I				✓	✓	✓	✓	
		Sem II								
4.	CC4	Mechanics				✓	✓	✓	✓	
5.	CC5	Heat & Thermo dynamics				✓	✓	✓		
6.	CC6	Practicals - II				✓	✓	✓	✓	

Elective Courses Introduced Part III

S. No.	Generic Discipline Specific	Course code	Course Title	Relevance to L	R	N	G	Scope for Emp	Entre	SD	Need for Introduction
			Sem I								
1.	Generic	EC1	Allied Physics I [For chemistry students]				✓	✓			
2.			Sem II								
	Generic	EC2	Allied Physics II [For chemistry students]				✓	✓			TANSCHE

Skill Enhancement / Foundation / Ability Enhancement Course (Part IV)

S.No.	Course Code	Course Title with Semester	Relevance to				Scope for			
			L	R	N	G	Emp	Entre	SD	In
		Sem I								
1.	SEC-I	Physics in Everyday Life				✓			✓	
2.	FC	Introductory Physics				✓			✓	TA
		Sem II								
3.	SEC II	Physics in Everyday Life				✓			✓	
4.	SEC III	Physics of Measuring Instruments				✓			✓	

DG TANSCHE

CORE COURSES INTRODUCED PART A

S.No.	Course code	Course Title with Semester	Relevance to				Scope for			
			L	R	N	G	Emp	Entre	SD	
		Sem I								
1.	CC1	[redacted]				✓	✓		✓	
2.	CC2	Classical Mechanics				✓	✓		✓	TA
3.	CC3	Practicals I				✓	✓	✓	✓	

S.No.	Course code	Course Title with semester	Relevance to L	R	N	Gt	Scope for Emp	Entre	SD	Need for Inko.
		Sem II								
4.	CC4	Electro Magnetic Theory				✓	✓	✓	✓	
5.	CC5	Quantum Mechanics I				✓	✓		✓	TANSCH
6.	CC6	Practicals II				✓	✓	✓	✓	

Elective Courses Introduced (Part A)

S. No.	Generic/ Discipline specific	Course code	Course Title	Relevance to L	R	N	Gt	Scope for Emp	Entre	SD	Need for Inko.
			Sem I								
1.	Discipline Specific	EC1	Linear and Digital Ics & Applications / Medical Physics				✓	✓	✓	✓	TANSCHE
2.	Discipline Specific	EC2	Instrumentation / Bio Physics				✓		✓	✓	

Elective Courses Introduced (Part-A)

S. No.	Generic / Discipline specific	Course code	Course Title	Relevance to L	R	N	G	Scope for Emp	Entp	SD	Need for Introd
			Sem II								
3.	Generic	EC3	Digital Photography / Solar Energy Utilization				✓	✓		✓	TANSCHE
4.	Discipline Specific	EC4	Communication Electronics / Micro Processor 8086 & Micro controller				✓	✓	✓	✓	

Skill Enhancement / Ability Enhancement Course (Part B)

S. No.	SEC/AECC with semester	Course code	Course Title	Relevance to L	R	N	G	Scope for Emp	Entre	SD	Need for Inter.
			Sem I								
1.	SEC Discipline Specific	SEC 1	Numerical Methods & Programming in C++				✓	✓		✓	
2.	AECC So	AECC1	Soft Skill -I [By English Dept]					✓		✓	TANSCHE
			Sem II								
3.	SEC Discipline specific	SEC 2	Physics of Nanoscience & Technology				✓			✓	
4.	AECC	AECC2	Soft Skill -II [By English Dept.]							✓	

Details of proposed / Signed MoUs :

Nil

Other Suggestions	Commendations
1. In (CC2) Digital Electronics Communication part can be removed as per the TANSCHE syllabus	The Syllabus proposed is more than 90% in accordance with the TANSCHE Syllabus and the Board was very much appreciative of this.
2. In CC1, Properties of Matter In Unit III, Terminal velocity & Stoke's Formula can be added in the Viscosity part.	
3. In PG EC1, Linear and Digital ICs, The Reference book Integrated Electronics by Millman Halkias can be included	
4. In PG EC2, Instrumentation Unit III has to be revised as per NET syllabus and content on Electric vehicles and PCB design can be included	

1) Dr. A. Sheela Vimala Rani — A. Sheela Vimala 3/4/23

2) Dr. K. Anitha — Anitha 3/4/23

3) Dr. K. Marimuthu — 03/04/2023

4) Dr. M. Umadevi — Absent

5) Mr. A. Kesavan — A. Kesavan 3/4/23

6) Dr. R. Vishnupriya — 3/4/23.

7) Dr. Rajeswari — 3/4/23

8) Dr. L. Caroline Sugirtham — L. Caroline Sugirtham

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03/04/2023

VISION OF THE DEPARTMENT

Educating and Empowering the youth and make them excel in all fields of Physics.

MISSION OF THE DEPARTMENT

- To ignite the young minds and impart quality education in basic Physics
- To promote enthusiasm in the study of physics through innovative and dedicated teaching methodologies
- To discover the budding talents in theoretical and experimental physics and ensure their global competency
- To provide a stimulating environment and strengthen basic and application oriented research aptitude among the students.

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

A graduate of M.Sc. Physics programme after two years will be

PEO 1	Our graduates will be academic, digital and information literates, creative, inquisitive, innovative and committed researchers who would be desirous for the "more" in all aspects
PEO 2	They will be efficient individual and team performers who would deliver excellent professional service exhibiting progress, flexibility, transparency, accountability and in taking up initiatives in their professional work
PEO 3	The graduates will be effective managers of all sorts of real life and professional circumstances, making ethical decisions, pursuing excellence within the time framework and demonstrating apt leadership skills
PEO 4	They will engage locally and globally evincing social and environmental stewardship demonstrating civic responsibilities and employing right skills at the right moment.

GRADUATE ATTRIBUTES (GA)

Fatima College empowers her women graduates holistically. A Fatimite achieves all-round empowerment by acquiring Social, Professional and Ethical competencies. A graduate would sustain and nurture the following attributes:

I. SOCIAL COMPETENCE	
GA 1	Deep disciplinary expertise with a wide range of academic and digital literacy
GA 2	Hone creativity, passion for innovation and aspire excellence
GA 3	Enthusiasm towards emancipation and empowerment of humanity
GA 4	Potentials of being independent
GA 5	Intellectual competence and inquisitiveness with problem solving abilities befitting the field of research
GA 6	Effectiveness in different forms of communications to be employed in personal and professional environments through varied platforms
GA 7	Communicative competence with civic, professional and cyber dignity and decorum
GA 8	Integrity respecting the diversity and pluralism in societies, cultures and religions
GA 9	All inclusive skill sets to interpret, analyse and solve social and environmental issues in diverse environments
GA 10	Self awareness that would enable them to recognise their uniqueness through continuous self-assessment in order to face and make changes building on their strengths and improving their weaknesses

GA 11	Finesse to co-operate exhibiting team-spirit while working in groups to achieve goals
GA 12	Dexterity in self-management to control their selves in attaining the kind of life that they dream for
GA 13	Resilience to rise up instantly from their intimidating setbacks
GA 14	Virtuosity to use their personal and intellectual autonomy in being life-long learners
GA 15	Digital learning and research attributes
GA 16	Cyber security competence reflecting compassion, care and concern towards the marginalised
GA 17	Rectitude to use digital technology reflecting civic and social responsibilities in local, national and global scenario
II. PROFESSIONAL COMPETENCE	
GA 18	Optimism, flexibility and diligence that would make them professionally competent
GA 19	Prowess to be successful entrepreuners and become employees of trans-national societies
GA 20	Excellence in Local and Global Job Markets
GA 21	Effectiveness in Time Management
GA 22	Efficiency in taking up Initiatives
GA 23	Eagerness to deliver excellent service
GA 24	Managerial Skills to Identify, Commend and tap Potentials

III. ETHICAL COMPETENCE	
GA 25	Integrity and be disciplined in bringing stability leading a systematic life promoting good human behaviour to build better society
GA 26	Honesty in words and deeds
GA 27	Transparency revealing one's own character as well as self-esteem to lead a genuine and authentic life
GA 28	Social and Environmental Stewardship
GA 29	Readiness to make ethical decisions consistently from the galore of conflicting choices paying heed to their conscience
GA 30	Right life skills at the right moment

PROGRAMME OUTCOMES (PO)

The learners will be able to

PO 1	Apply acquired scientific knowledge to solve major and complex issues in the society/industry.
PO 2	Attain research skills to solve complex cultural, societal and environmental issues.
PO 3	Employ latest and updated tools and technologies to solve complex issues.
PO 4	Demonstrate Professional Ethics that foster Community, Nation and Environment Building Initiatives.

PROGRAMME SPECIFIC OUTCOMES (PSO)

On completion of **M.Sc. Physics** programme, the graduates would be able to

PSO 1	Acquire thorough knowledge of the basic concepts of the frontier areas of Physics comprising Mathematical Physics, Electromagnetic theory, Classical Mechanics, Quantum Mechanics, Condensed Matter Physics, Nuclear Physics, Numerical Methods, Communication systems, Molecular Spectroscopy, Material Science and Advanced Quantum Mechanics.
PSO 2	Understand and solve the physics problems in everyday life using the acquired basic knowledge.
PSO 3	Develop skills to perform experiments based on the theoretical understanding
PSO 4	Apply the knowledge acquired to analyse and design models in the versatile realm of physics.
PSO 5	Equip with the essential foundations for higher education and research in physics.

M. SC., DEGREE COURSE IN PHYSICS
COURSE STRUCTURE

SEMESTER – I

COURSE COMPONENTS	NAME OF THE COURSE	CREDITS.	INST. HRS	MAX MARKS	
				CIA	EXT.
23PG1P1	Mathematical Physics	5	6	40	60
23PG1P2	Classical Mechanics and Relativity	5	6	40	60
23PG1P3	Practical I	4	6	40	60
23PG1PE1/ 23PG1PE2	Linear and Digital ICs and Applications/ Medical Physics	3	5	40	60
23PG1PE3/ 23PG1PE4	Advanced Optics/Communication Electronics	3	5	40	60
23PG1PAE	Digital Photography	1	2	40	60
	Total	**21**	**30**		

SEMESTER - II

COURSE COMPONENTS	NAME OF THE COURSE	CREDITS	INST. HRS	MAX MARKS	
				CIA	EXT.
23PG2P4	Statistical Mechanics	5	6	40	60
23PG2P5	Quantum Mechanics –I	5	6	40	60
23PG2P6	Practical – II	4	6	40	60
23PG2PE5/ 23PG2PE6	Advanced Mathematical Physics/Non-linear Dynamics	3	4	40	60
23PG2PE7/ 23PG2PE8	Microprocessor 8086 and Microcontroller 8051/ Biophysics	3	4	40	60
23PG2PAE	Modern Photography	2	4	40	60
	Total	**22**	**30**		

SEMESTER III						
19PG3P13	Condensed Matter Physics	6	5	40	50	100
19PG3P14	Statistical Mechanics	6	5	40	60	100
19PG3P15	Nuclear and Particle Physics	6	5	40	60	100
19PG3P16	Practicals-V General Physics Lab	4	2	40	60	100
19PG3P17	Practicals-V1 Advanced Electronics Lab	4	2	40	60	100
Total		**26**	**19**			
SEMESTER IV						
19PG4P18	Advanced Condensed MatterPhysics	6	5	40	60	100
19PG4P19	Molecular Spectroscopy	6	5	40	60	100
19PG4P20	Advanced Quantum Mechanics	6	5	40	60	100
19PG4P21	Practicals-VII Advanced General Physics Experiments	4	2	40	60	100
19PG4P22	Practicals – VIII Programming in C++	4	2	40	60	100
Total		**26**	**19**			
	Total	**106**	**70**			

MAJOR ELECTIVE / EXTRA DEPARTMENTAL COURSE
INTERNSHIP/ PROJECT - 14 CREDITS

S. No	SEMESTER	COURSE CODE	COURSE TITLE	HRS	CREDITS	CIA Mks	ESE Mks	Total Mks
1	III	19PG3PE1A/ 19PG3PE1B	Communication System / Numerical methods and Programming C++	4	4	40	60	100
2		19PG3PSI	Summer Internship	-	3	40	60	100
3	IV	19PG4PE2A/ 19PG4PE2B	Material Science / Astro Physics	4	4	40	60	100
4		19PG4PPR	Project		3	40	60	100
		Total		8	14			

OFF-CLASSPROGRAMME

ADD-ONCOURSES

Course Code	Courses	Hrs	Credits	Semester in which the course is offered	CIA Marks	ESE Mks	Total Marks
19PAD 2SS	**Soft Skills**	40	4	I	40	60	100
19PAD 2CA	**Computer Applications** LATEX (Dept. Specific Course)	40	4	II	40	60	100

	MOOC COURSES (Department Specific Courses) * Students can opt other than the listed course from UGC-SWAYAM /UGC /CEC	-	Minimum 2 Credits	-	-	-	
19PAD4CV	**COMPREHENSIVE VIVA** (Question bank to be prepared for all the papers by the respective course teachers)	-	2	IV	-	-	100
19PAD4RC	**READING CULTURE**	15 / Semester	1	I-IV	-	-	-
	TOTAL		13 +				

EXTRA CREDIT COURSE

Course Code	Courses	Hrs	Credits	Semester in which the course is offered	CIA Marks	ESE Mks	Total Marks
19PGSLP1	**Self Learning Course For Advance Learners** (Offered for II PG) Instrumentation & Experimental Methods	-	3	III & IV	40	60	100
21PG2PSL1	Nanotechnology for All	-	3	II	40	60	100
22PGSLP1	Digital signal Processing	-	3	III & IV	40	60	100
22PG4SLCP	Batteries and its Applications	-	3	IV	40	60	100

- **Lab Courses:**
  - A range of 10-15 experiments per semester

- **Summer Internship:**
  - Duration-1 month (2nd Week of May to 2nd week of June-before college reopens)

- **Project:**
  - Off class
  - Evaluation components-Report writing + Viva Voce (Internal marks-50) + External marks 50

- **EDC:**

  Syllabus should be offered for two different batches of students from other than the parent department in Sem-I & Sem-II .

Employability,
Skill Development
100%

I M.Sc. PHYSICS

SEMESTER –I

For those who joined in 2023 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
PAPH	23PG1P1	MATHEMATICAL PHYSICS	Theory	6 Hrs.	5

COURSE DESCRIPTION

This course emphasize the basic concepts and applications of Mathematical Physics which involves vectors, matrices, complex variables, integral transforms and special functions

COURSE OBJECTIVES

This course provides the foundation in conceptual understanding of vectors, complex variables, matrices, special functions and Fourier and Laplace transforms required for the description of its applications in the physical phenomena

UNIT –I LINEAR VECTOR SPACE (18 HRS.)

Basic concepts – Definitions- examples of vector space – Linear independence - Scalar product- Orthogonality – Gram-Schmidt orthogonalization procedure –linear operators – Dual space- ket and bra notation – orthogonal basis – change of basis – Isomorphism of vector space – projection operator –Eigen values and Eigen functions – Direct sum and invariant subspace – orthogonal transformations and rotation

UNIT – II COMPLEX VARIABLES (18 HRS.)

Review of Complex Numbers -de Moivre's theorem-Functions of a Complex Variable- Differentiability -Analytic functions- Harmonic Functions- Complex

Integration- Contour Integration, Cauchy – Riemann conditions – Singular points – Cauchy's Integral Theorem and integral Formula -Taylor's Series - Laurent's Expansion- Zeros and poles – Residue theorem and its Application: Potential theory - (1) Electrostatic fields and complex potentials - Parallel plates, coaxial cylinders and an annular region (2) Heat problems - Parallel plates and coaxial cylinders

UNIT –III MATRICES (18 HRS.)

Types of Matrices and their properties, Rank of a Matrix -Conjugate of a matrix - Adjoint of a matrix - Inverse of a matrix - Hermitian and Unitary Matrices -Trace of a matrix- Transformation of matrices - Characteristic equation - Eigen values and Eigen vectors - Cayley–Hamilton theorem – Diagonalization

UNIT –III FOURIER TRANSFORMS& LAPLACE TRANSFORMS(18 HRS.)

Definitions -Fourier transform and its inverse - Transform of Gaussian function and Dirac delta function -Fourier transform of derivatives - Cosine and sine transforms - Convolution theorem. Application: Diffusion equation: Flow of heat in an infinite and in a semi - infinite medium - Wave equation: Vibration of an infinite string and of a semi - infinite string.

Laplace transform and its inverse - Transforms of derivatives and integrals – Differentiation and integration of transforms - Dirac delta functions - Application - Laplace equation: Potential problem in a semi - infinite strip

UNIT –V DIFFERENTIAL EQUATIONS 18 HRS.)

Second order differential equation- Sturm-Liouville's theory - Series solution with simple examples - Hermite polynomials - Generating function - Orthogonality properties - Recurrence relations – Legendre polynomials - Generating function - Rodrigue formula – Orthogonality properties - Dirac delta function- One dimensional Green's function and Reciprocity theorem - Sturm-Liouville's type equation in one dimension & their Green's function.

UNIT –VI DYNAMISM (Evaluation Pattern-CIA only)

Solving Problems on Fourier transforms and special functions

TEXT BOOKS:

1. Mathematical Physics with classical mechanics by SatyaPrakash – Sultan chand and Sons, Fourth Revised and enlarged edition 2002

2. George Arfken and Hans J Weber, 2012, Mathematical Methods for Physicists – A Comprehensive Guide (7th edition), Academic press.

3. P.K. Chattopadhyay, 2013, *Mathematical Physics* (2nd edition), New Age, New Delhi

4. A W Joshi, 2017, Matrices and Tensors in Physics, 4th Edition (Paperback), New Age International Pvt.Ltd., India

5. B. D. Gupta, 2009, *Mathematical Physics* (4th edition), VikasPublishing House, New Delhi.

6. H. K. Dass and Dr. Rama Verma, 2014, Mathematical Physics, Seventh Revised Edition, S. Chand & Company Pvt. Ltd., New Delhi

BOOKS FOR REFERENCES:

1. The Mathematics of physics and chemistry by Margenau& Murphy

2. Fourier Transforms in Physics- D.C. Champeneywiley Eastern Ltd. July 1988.

3. Matrices and Tensors in Physics – A.W.Joshi-2nd edition

4. Applied Mathematics for engineers and Physicists by Louis . A. Pipes and Lawrence

R. Harvill IIIedn. McGraw – Hill International

5. Essential Mathematical methods for Physicists by Hans . J .Weber and George .B.Arfken - Academic Press

6. H. K. Dass and Dr. Rama Verma, 2014, Mathematical Physics, Seventh Revised Edition, S. Chand & Company Pvt. Ltd., New Delhi

7. E. Kreyszig, 1983, Advanced Engineering Mathematics, Wiley Eastern, New Delhi,

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 LINEAR VECTOR SPACE				
1.1	Basic concepts – Definitions- examples of vector space – Linear independence	3	Chalk & Talk	Black Board
1.2	Scalar product- Orthogonality – Gram-Schmidt orthogonalization procedure	3	Chalk & Talk	Black Board
1.3	Linear operators – Dual space- ket and bra notation	2	Lecture	Black Board
1.4	Orthogonal basis – change of basis – Isomorphism of vector space – projection operator	4	Lecture	Black Board
1.5	Eigen values and Eigen functions – Direct sum and invariant subspace	3	Lecture	Black Board
1.6	Orthogonal transformations and rotation	3	Chalk & Talk	Black Board
UNIT -2 COMPLEX ANALYSIS				
2.1	Review of Complex Numbers - de Moivre's theorem	1	Chalk& Talk	Black Board
2.2	Functions of a Complex Variable- Differentiability - Analytic functions- Harmonic Functions	3	Chalk& Talk	Black Board

2.3	Complex Integration- Contour Integration	2	Lecture	Black Board
2.4	Cauchy – Riemann conditions – Singular points – Cauchy's Integral Theorem and integral Formula	3	Lecture	Black Board
2.5	Taylor's Series - Laurent's Expansion- Zeros and poles	3	Chalk& Talk	Black Board
2.6	Residue theorem and its Application: Potential theory - (1) Electrostatic fields and complex potentials - Parallel plates, coaxial cylinders and an annular region	4	Chalk& Talk	Black Board
2.7	(2) Heat problems - Parallel plates and coaxial cylinders	2	Chalk& Talk	Black Board
UNIT - 3 MATRICES				
3.1	Types of Matrices and their properties	2	Chalk & Talk	Black Board
3.2	Rank of a Matrix - Conjugate of a matrix - Adjoint of a matrix - Inverse of a matrix	4	Chalk & Talk	Black Board
3.3	Hermitian and Unitary Matrices	2	Chalk & Talk	Black Board
3.4	Trace of a matrix- Transformation of matrices - Characteristic equation	4	Chalk & Talk	Black Board

3.5	Eigen values and Eigen vectors - Cayley–Hamilton theorem –Diagonalization	3	Chalk & Talk	Black Board
UNIT -4 FOURIER TRANSFORMS & LAPLACE TRANSFORMS				
4.1	Definitions -Fourier transform and its inverse	2	Chalk & Talk	Black Board
4.2	Transform of Gaussian function and Dirac delta function	1	Chalk & Talk	Black Board
4.3	Fourier transform of derivatives - Cosine and sine transforms - Convolution theorem.	3	Chalk & Talk	Black Board
4.4	Application: Diffusion equation: Flow of heat in an infinite and in a semi - infinite medium -	3	Lecture	Black Board
4.5	Wave equation: Vibration of an infinite string and of a semi - infinite string.	3	Chalk & Talk	Black Board
4.6	Laplace transform and its inverse - Transforms of derivatives and integrals – Differentiation and integration of transforms - Dirac delta functions	4	Chalk & Talk	Black Board
4.7	Application - Laplace equation: Potential problem in a semi - infinite strip	2	Chalk & Talk	Black Board
UNIT – 5 DIFFERENTIAL EQUATIONS				
5.1	Second order differential equation	2	Chalk & Talk	Black Board
5.2	Sturm-Liouville's theory - Series solution with simple examples -	3	Chalk & Talk	Black Board
5.3	Hermite polynomials - Generating function - Orthogonality properties - Recurrence relations	4	Chalk & Talk	Black Board

5.4	Legendre polynomials - Generating function - Rodrigue formula – Orthogonality properties	3	Chalk & Talk	Black Board
5.5	Dirac delta function- One dimensional Green's function and Reciprocity theorem	3	Chalk & Talk	Black Board
5.6	Sturm-Liouville's type equation in one dimension & their Green's function.	3	Chalk & Talk	Black Board

EVALUATION PATTERN

Levels	**C1**	**C2**	**C3**	**C4**	**C5**	**Total Scholastic Marks**	**Non Scholastic Marks C6**	**CIA Total**	**% of Assess Ment**
	T1 10 Mks.	T2 10 Mks.	Seminar 5 Mks	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks	5 Mks	40 Mks	
K2	4	4	-	-	-	8	-	8	20
K3	2	2	-	5	-	9	-	9	22.5
K4	2	2	-	-	5	9	-	9	22.5
K5	2	2	5	-	-	9	-	9	22.5
Non Scholastic	-	-	-	-	-		5	5	12.5
Total	10	10	5	5	5	35	5	40	100

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

SCHOLASTIC					NON - SCHOLASTIC	MARKS		
C1	**C2**	**C3**	**C4**	**C5**	**C6**	**CIA**	**ESE**	**Total**
10	**10**	**5**	**5**	**5**	**5**	**40**	**60**	**100**

PG CIA Components

			Nos		
C1	-	Test (CIA 1)	1	-	10 Mks
C2	-	Test (CIA 2)	1	-	10 Mks
C3	-	Assignment	2 *	-	5 Mks
C4	-	Open Book Test/PPT	2 *	-	5 Mks
C5	-	Seminar	1	-	5 Mks
C6	-	Attendance		-	5 Mks

****The best out of two will be taken into account***

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Define and deduce gauss	K1	PSO1& PSO2

	divergence and stokes theorem and solving problems on gauss divergence and stokes theorem		
CO 2	Discuss complex variables and Cauchy Residue Theorem	K1, K2,	PSO3
CO 3	Explain special type of matrices and its Eigen value problems	K2 & K4	PSO5
CO 4	Illustrate the properties of Fourier and Laplace transforms	K2, K3	PSO4& PSO5
CO5	Define Special Functions and find its relations	K2,K3	PSO4& PSO5

Mapping of COs with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2	1	1
CO2	2	2	3	1	1
CO3	2	3	3	1	3
CO4	2	1	2	3	3
CO5	2	1	2	3	3

Mapping of COs with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	3	1	1	1
CO2	2	3	1	2
CO3	1	3	2	1
CO4	2	3	1	1
CO5	1	3	3	1

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSE DESIGNER:

1. **Dr. M.Ragam**
2. **Ms. J. R. Sofia**

Forwarded By

Dr. A. SheelaVimala Rani

HoD'S Signature & Name

I M.Sc. PHYSICS

SEMESTER –I

Employability, Skill Development 100%

(*For those who joined in 2023 onwards*)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
PAPH	23PG1P2	CLASSICAL MECHANICS AND RELATIVITY	Lecture	6 Hrs.	5

COURSE DESCRIPTION

This course imparts a thorough knowledge of Mechanics of single particle and a system of particles, applying various classical theories. This would help them to analyse any system using classical mechanics.

COURSE OBJECTIVES

- To understand fundamentals of classical mechanics.
- To understand Lagrangian formulation of mechanics and apply it to solve equation of motion.
- To understand Hamiltonian formulation of mechanics and apply it to solve equation of motion.
- To discuss the theory of small oscillations of a system.
- To learn the relativistic formulation of mechanics of a system.

UNITS

UNIT - I: PRINCIPLES OFCLASSICAL MECHANICS (18 HRS)

Mechanics of a single particle – mechanics of a system of particles – conservation laws for a system of particles – constraints – holonomic & non-holonomic constraints – generalized coordinates – configuration space – transformation equations – principle of virtual work.

UNIT - II:LAGRANGIAN FORMULATION (18 HRS)

D'Alembert's principle – Lagrangian equations of motion for conservative systems – applications: (i) simple pendulum (ii) Atwood's machine (iii) projectile motion.

UNIT III:HAMILTONIAN FORMULATION (18 HRS)

Phase space – cyclic coordinates – conjugate momentum – Hamiltonian function – Hamilton's canonical equations of motion – applications: (i) simple pendulum (ii) one dimensional simple harmonic oscillator (iii) motion of particle in a central force field.

UNIT - IV:SMALL OSCILLATIONS (18 HRS)

Formulation of the problem – transformation to normal coordinates – frequencies of normal modes – linear triatomic molecule.

UNIT - V: RELATIVITY (18 HRS)

Inertial and non-inertial frames – Lorentz transformation equations – length contraction and time dilation – relativistic addition of velocities – Einstein's mass-energy relation – Minkowski's space – four vectors – position, velocity, momentum, acceleration and force in for vector notation and their transformations.

UNIT –VI DYNAMISM (Evaluation Pattern-CIA only)

Discussions on the current Space Missions of ISRO.

REFERENCES

TEXT BOOKS:

1. H. Goldstein, 2002, *Classical Mechanics*, 3rd Edition, Pearson Edu.
2. J. C. Upadhyaya, *Classical Mechanics*, Himalaya Publshing. Co. New Delhi.
3. R. Resnick, 1968, *Introduction to Special Theory of Relativity*, Wiley Eastern, New Delhi.
4. R. G. Takwala and P.S. Puranik, Introduction to Classical Mechanics – Tata – McGraw Hill, New Delhi, 1980.
5. N. C. Rana and P.S. Joag, Classical Mechanics - Tata McGraw Hill, 2001

REFERENCE BOOKS:

1. K. R. Symon, 1971, *Mechanics,* Addison Wesley, London.
2. S. N. Biswas, 1999, *Classical Mechanics*, Books & Allied, Kolkata.
3. Gupta and Kumar, *Classical Mechanics*, Kedar Nath.
4. T.W.B. Kibble, *Classical Mechanics*, ELBS.
5. Greenwood, *Classical Dynamics*, PHI, New Delhi.

WEB SOURCES:

1. http://poincare.matf.bg.ac.rs/~zarkom/Book_Mechanics_Goldstein_Classical_Mechanics_optimized.pdf
2. https://pdfcoffee.com/classical-mechanics-j-c-upadhyay-2014-editionpdf-pdf-free.html
3. https://nptel.ac.in/courses/122/106/122106027/
4. https://ocw.mit.edu/courses/physics/8-09-classical-mechanics-iii-fall-2014/lecture-notes/
5. https://www.britannica.com/science/relativistic-mechanics

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 PRINCIPLES OFCLASSICAL MECHANICS				
1.1	Mechanics of a single particle	2	Chalk & Talk	Black Board
1.2	Mechanics of a system of particles	2	Chalk & Talk	Black Board
1.3	Conservation laws for a system of particles	2	Chalk & Talk	Black Board
1.4	Constraints – holonomic & non-holonomic constraints	2	Chalk & Talk	Black Board
1.5	Generalized coordinates	2	Chalk & Talk	Black Board
1.6	Configuration space	3	Chalk & Talk	Black Board
1.7	Transformation equations	3	Chalk & Talk	Black Board
1.8	Principle of virtual work	2	Chalk & Talk	Black Board
UNIT -2 LAGRANGIAN FORMULATION				
2.1	D'Alembert's principle	3	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
2.2	Lagrangian equations of motion for conservative systems	3	Chalk & Talk	Black Board
2.3	Applications	3	Chalk & Talk	Black Board
2.4	Simple pendulum	3	Chalk & Talk	Black Board
2.5	Atwood's machine	3	Chalk & Talk	Black Board
2.6	Projectile motion	3	Chalk & Talk	Black Board
UNIT -3 HAMILTONIAN FORMULATION				
3.1	Phase space	3	Chalk & Talk	Black Board
3.2	Cyclic coordinates	2	Chalk & Talk	Black Board
3.3	Conjugate momentum	3	Chalk & Talk	Black Board
3.4	Hamiltonian function	2	Chalk & Talk	Black Board
3.5	Hamilton's canonical equations of motion	2	Chalk & Talk	Black Board
3.6	Applications	2	Chalk & Talk	Black Board
3.7	Simple pendulum & one dimensional simple harmonic oscillator	2	Chalk & Talk	Black Board
3.8	Motion of particle in a central force field	2	Chalk & Talk	Black Board
UNIT -4 SMALL OSCILLATIONS				

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
4.1	Formulation of the problem	4	Chalk & Talk	Black Board
4.2	Types of equilibrium	4	Chalk & Talk	Black Board
4.3	Eigen value equation and the principle axis transformation	4	Chalk & Talk	Black Board
4.3	Frequencies of normal modes	4	Chalk & Talk	Black Board
4.4	Linear tri atomic molecule	2	Chalk & Talk	Black Board
UNIT -5 RELATIVITY				
5.1	Inertial and non-inertial frames	2	Chalk & Talk	Black Board
5.2	Lorentz transformation equations	2	Chalk & Talk	Black Board
5.3	Length contraction and time dilation	3	Chalk & Talk	Black Board
5.4	Relativistic addition of velocities	3	Chalk & Talk	Black Board
5.5	Einstein's mass-energy relation	2	Chalk & Talk	Black Board
5.6	Minkowski's space	2	Chalk & Talk	Black Board
5.	Four vectors	2	Chalk & Talk	Black Board
5.8	Position, velocity, momentum, acceleration and force in for vector notation and their transformations	2	Chalk & Talk	Black Board

EVALUATION PATTERN

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assess Ment
	T1 10 Mks.	T2 10 Mks.	Seminar 5 Mks	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks	5 Mks	40 Mks	
K2	4	4	-	-	-	8	-	8	20
K3	2	2	-	5	-	9	-	9	22.5
K4	2	2	-	-	5	9	-	9	22.5
K5	2	2	5	-	-	9	-	9	22.5
Non Scholastic	-	-	-	-	-		5	5	12.5
Total	10	10	5	5	5	35	5	40	100

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

SCHOLASTIC					NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	C6	CIA	ESE	Total
10	10	5	5	5	5	40	60	100

PG CIA Components

			Nos		
C1	-	Test (CIA 1)	1	-	10 Mks
C2	-	Test (CIA 2)	1	-	10 Mks
C3	-	Assignment	2 *	-	5 Mks
C4	-	Open Book Test/PPT	2 *	-	5 Mks
C5	-	Seminar	1	-	5 Mks
C6	-	Attendance		-	5 Mks

****The best out of two will be taken into account***

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	To understand the mechanics of single particle and system of particles and identify different types of constraints imposed on systems.	K2	PSO2, PSO3 & PSO4
CO 2	To derive Lagrange's equation equation of motion for any given system according to Lagrangian formulation.	K3	PSO2, PSO3 & PSO4
CO 3	To explain the Hamilton's canonical equation of motion and hence to discuss motion of particle in a central force field.	K3 & K5	PSO2, PSO3 & PSO4

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 4	To apply the theory of small oscillations to a linear triatomic molecule and get the normal modes and normal frequencies of the same.	K4 & K5	PSO2, PSO3 & PSO4
CO 5	Understand and apply the principles of relativistic kinematics to the mechanical systems.	K2 & K3	PSO2, PSO3 & PSO4

Mapping of C0s with PSOs

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	**2**	**3**	**3**	**3**	**2**
CO2	**2**	**3**	**3**	**3**	**2**
CO3	**2**	**3**	**3**	**3**	**2**
CO4	**2**	**3**	**3**	**3**	**2**
CO5	**2**	**3**	**3**	**3**	**2**

Mapping of C0s with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	**3**	**2**	**3**	**2**
CO2	**3**	**2**	**3**	**2**
CO3	**3**	**2**	**3**	**2**
CO4	**3**	**2**	**3**	**2**
CO5	**3**	**2**	**3**	**2**

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSE DESIGNER:

Dr. Ancemma Joseph

Dr. I. Janet Sherly

Forwarded By

Dr. A. Sheela Vimala Rani

HoD'S Signature & Name

I PG

SEMESTER –I

For those who joined in 2023 onwards

Employability, Skill Development 100%

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
PAPH	23PG1P3	PRACTICAL I	Practical	6	4

COURSE DESCRIPTION

The course provides hands on training to work with fiber, Laser and young's modulus, AC bridges, Flip – Flop, and OP-AMP circuits.

COURSE OBJECTIVE/S

This course offers opportunity to handle the laboratory equipment's and develop lab skills in non-electronics and electronic experiments

List of experiments

(Minimum of Twelve Experiments from the list)

1. Determination of Young's modulus and Poisson's ratio by Hyperbolic fringes - Cornu's Method
2. Determination of Viscosity of the given liquid – Meyer's disc
3. Measurement of Coefficient of linear expansion- Air wedge Method
4. B-H loop using Anchor ring.
5. Determination of Thickness of the enamel coating on a wire by diffraction
6. Determination of Rydberg's Constant - Hydrogen Spectrum
7. Thickness of air film - FP Etalon
8. Measurement of Band gap energy- Thermistor
9. Determination of Specific charge of an electron – Thomson's method.
10. Determination of Wavelength, Separation of wavelengths - Michelson Interferometer
11. GM counter – Characteristics and inverse square law.
12. Measurement of Conductivity - Four probe method.
13. Molecular spectra – AlO band.
14. Measurement of wavelength of Diode Laser / He – Ne Laser using Diffraction grating.
15. Measurements of Standing wave and standing wave co-efficient, Law of Inverse square, Receiver end transmitter behavior, Radiation Pattern - Microwave test bench

16. UV-Visible spectroscopy – Verification of Beer-Lambert's law and identification of wavelength maxima – Extinction coefficient
17. Construction of relaxation oscillator using UJT
18. FET CS amplifier- Frequency response, input impedance, output impedance
19. Study of important electrical characteristics of IC741.
20. V- I Characteristics of different colours of LED.
21. Study of attenuation characteristics of Wien's bridge network and design of Wien's bridge oscillator using Op-Amp.
22. Study of attenuation characteristics of Phase shift network and design of Phase shift oscillator using Op-Amp
23. Construction of Schmidt trigger circuit using IC 741 for a given hysteresis- application as squarer.
24. Construction of square wave Triangular wave generator using IC 741
25. Construction of a quadrature wave using IC 324
26. Construction of pulse generator using the IC 741 – application as frequency divider
27. Study of R-S, clocked R-S and D-Flip flop using NAND gates
28. Study of J-K, D and T flip flops using IC 7476/7473
29. Arithmetic operations using IC 7483- 4-bit binary addition and subtraction.
30. Study of Arithmetic logic unit using IC 74181.

TEXT BOOKS

1. Practical Physics, Gupta and Kumar, PragatiPrakasan.
2. Kit Developed for doing experiments in Physics- Instruction manual, R.Srinivasan K.R Priolkar, Indian Academy of Sciences.
3. Electronic Laboratory Primer a design approach, S. Poornachandra, B.Sasikala, Wheeler Publishing, New Delhi.
4. Electronic lab manual Vol I, K ANavas, Rajath Publishing.
5. Electronic lab manual Vol II, K ANavas, PHI eastern Economy Edition

REFERENCE BOOKS

1. Advanced Practical Physics, S.P Singh, PragatiPrakasan.
2. An advanced course in Practical Physics, D.Chattopadhayay, C.R Rakshit, New Central Book Agency Pvt. Ltd
3. Op-Amp and linear integrated circuit, Ramakanth A Gaykwad, Eastern Economy Edition.
4. A course on experiment with He-Ne Laser, R.S. Sirohi, John Wiley & Sons (Asia) Pvt. Ltd.
5. Electronic lab manual Vol II, Kuriachan T.D, Syam Mohan, Ayodhya Publishing

Employability,
Skill Development
100%

I M.Sc.PHYSICS

SEMESTER –I

(For those who joined in 2023 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
PAPH	23PG1PE1	LINEAR AND DIGITAL ICs AND APPLICATIONS	Theory	5	3

COURSE DESCRIPTION

This course aims to introduce applied electronics to students, encompassing the concepts of Op-Amp characteristics and it's applications, registers, counters, and analog to digital conversion techniques.

COURSE OBJECTIVES

This course provides the foundation for conceptual understanding of the basic building blocks of linear integrated circuits, linear and non-linear applications of operational amplifiers, theory and applications of PLL, concepts of waveform generation and introduces one special function ICs and digital ICs.

UNIT I: INTEGRATED CIRCUITS AND OPERATIONAL AMPLIFIER (15 HRS)

Introduction, Classification of IC's, basic information of Op-Amp 741 and its features, the ideal Operational amplifier, Op-Amp internal circuit and Op-Amp. characteristics.

UNIT II: APPLICATIONS OF OP-AMP (15 HRS)

LINEAR APPLICATIONS OF OP-AMP: Solution to simultaneous equations and differential equations, Instrumentation amplifiers, V to I and I to V converters.

NON-LINEAR APPLICATIONS OF OP-AMP:

Sample and Hold circuit, Log and Antilog amplifier, multiplier and divider, Comparators, Schmitt trigger, Multivibrators, Triangular and Square waveform generators.

UNIT III: ACTIVE FILTERS & TIMER AND PHASE LOCKED LOOPS (15 HRS)

ACTIVE FILTERS: Introduction, Butterworth filters – 1st order, 2nd order low pass and high pass filters, band pass, band reject and all pass filters.

TIMER AND PHASE LOCKED LOOPS: Introduction to IC 555 timer, description of functional diagram, monostable and astable operations and applications, Schmitt trigger, PLL - introduction, basic principle, phase detector/comparator, voltage controlled oscillator (IC 566), low pass filter, monolithic PLL and applications of PLL

UNIT IV: VOLTAGE REGULATOR & D to A AND A to D CONVERTERS (15 HRS)

VOLTAGE REGULATOR: Introduction, Series Op-Amp regulator, IC Voltage Regulators, IC 723 general purpose regulators, Switching Regulator.

D to A AND A to D CONVERTERS: Introduction, basic DAC techniques - weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, A to D converters -parallel comparator type ADC, counter type ADC, successive approximation ADC and dual slope ADC, DAC and ADC Specifications.

UNIT V:CMOS LOGIC, COMBINATIONAL CIRCUITS USING TTL 74XX ICs & SEQUENTIAL CIRCUITS USING TTL 74XX ICs (15 HRS)

CMOS LOGIC: CMOS logic levels, MOS transistors, Basic CMOS Inverter, NAND and NOR gates, CMOS AND-OR-INVERT and OR-AND-INVERT gates, implementation of any function using CMOS logic. COMBINATIONAL CIRCUITS USING TTL 74XX ICs: Study of logic gates using 74XX ICs, Four-bit parallel adder (IC 7483), Comparator (IC 7485), Decoder (IC 74138, IC74154),BCD to 7-segment decoder (IC7447), Encoder (IC74147), Multiplexer (IC74151), Demultiplexer (IC 74154).

SEQUENTIAL CIRCUITS USING TTL 74XX ICs: Flip Flops (IC 7474, IC 7473), Shift Registers, Universal Shift Register (IC 74194), 4- bit asynchronous binary counter (IC 7493).

UNIT –VI DYNAMISM

Expert Lectures, Online Seminars - Webinars on Industrial Interactions/Visits, Competitive Examinations, Employable and Communication Skill Enhancement, Social Accountability and Patriotism

TEXT BOOK

1. D. Roy Choudhury, Shail B. Jain (2012), Linear Integrated Circuit, 4th edition, New Age International Pvt. Ltd., New Delhi, India
2. Ramakant A. Gayakwad, (2012), OP-AMP and Linear Integrated Circuits, 4th edition, Prentice Hall / Pearson Education, New Delhi.
3. B.L. Theraja and A.K. Theraja, 2004, A Textbook of Electrical technology, S. Chand & Co.
4. V.K. Mehta and Rohit Mehta, 2008, Principles of Electronics, S. Chand & Co, 12th Edition.
5. V. Vijayendran, 2008, Introduction to Integrated electronics (Digital & Analog), S. Viswanathan Printers & Publishers Private Ltd, Reprint. V.

BOOKS FOR REFERENCE

1. Sergio Franco (1997), Design with operational amplifiers and analog integrated circuits, McGraw Hill, New Delhi.
2. Gray, Meyer (1995), Analysis and Design of Analog Integrated Circuits, Wiley International, New Delhi.
3. Malvino and Leach (2005), Digital Principles and Applications 5th Edition, Tata McGraw Hill, New Delhi
4. Floyd, Jain (2009), Digital Fundamentals, 8th edition, Pearson Education, New Delhi.
5. Integrated Electronics, Millman & Halkias, Tata McGraw Hill, 17th Reprint (2000)

WEB SOURCES

1. https://nptel.ac.in/course.html/digital circuits/
2. https://nptel.ac.in/course.html/electronics/operational amplifier/
3. https://www.allaboutcircuits.com/textbook/semiconductors/chpt-7/field-effect-controlled-thyristors/
4. https://www.electrical4u.com/applications-of-op-amp/
5. https://www.geeksforgeeks.org/digital-electronics-logic-design-tutorials/

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 FIELD EFFECT TRANSISTORS				
1.1	Introduction	2	Chalk & Talk	Black Board
1.2	Classification of IC's	3	Chalk & Talk	Black Board
1.3	Basic information of Op-Amp 741 and its features	3	Chalk & Talk	Black Board
1.4	The ideal Operational amplifier	3	Chalk & Talk	Black Board
1.5	Op-Amp internal circuit and Op-Amp. Characteristics.	4	Chalk & Talk	Black Board
UNIT -2 LINEAR ANALOG SYSTEMS				
2.1	Solution to simultaneous equations and differential equations	2	Chalk & Talk	Black Board
2.2	Instrumentation amplifiers, V to I and I to V converters	3	Chalk & Talk	Black Board
2.3	Sample and Hold circuit, Log and Antilog amplifier	2	Chalk & Talk	Black Board
2.4	multiplier and divider, Comparators	2	Chalk & Talk	Black Board
2.5	Schmitt trigger	2	Lecture	LCD
2.6	Multivibrators	2	Chalk & Talk	Black Board
2.7	Triangular and Square waveform generators	2	Lecture	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -3 NON-LINEAR ANALOG SYSTEMS				
3.1	Introduction, Butterworth filters – 1st order, 2nd order low pass and high pass filters	3	Chalk & Talk	Black Board
3.2	band pass, band reject and all pass filters.	2	Chalk & Talk	Black Board
3.3	Introduction to IC 555 timer, description of functional diagram	3	Chalk & Talk	Black Board
3.4	Monostable and astable operations and applications, Schmitt trigger	2	Chalk & Talk	Black Board
3.5	PLL - introduction, basic principle, phase detector/comparator, voltage controlled oscillator (IC 566)	3	Chalk & Talk	Black Board
3.6	low pass filter, monolithic PLL and applications of PLL	2	Chalk & Talk	Black Board
UNIT -4 REGISTERS AND COUNTERS				
4.1	Introduction, Series Op-Amp regulator	2	Lecture	Black Board
4.2	Voltage Regulators, IC 723 general purpose regulators	2	Lecture	LCD
4.3	Switching Regulator, D to A AND A to D CONVERTERS: Introduction	3	Chalk & Talk	Black Board
4.4	Basic DAC techniques - weighted resistor DAC, R-2R ladder DAC	2	Lecture	LCD
4.5	Inverted R-2R DAC, A to D converters -parallel comparator type ADC	1	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
4.6	Counter type ADC	2	Chalk & Talk	Black Board
4.7	Successive approximation ADC and dual slope ADC	1	Chalk & Talk	Black Board
4.8	DAC and ADC Specifications	2	Chalk & Talk	Black Board
UNIT -5 ANALOG TO DIGITAL CONVERSIONS				
5.1	CMOS LOGIC: CMOS logic levels, MOS transistors, Basic CMOS Inverter, NAND and NOR gates, CMOS AND-OR-INVERT and OR-AND-INVERT gates, implementation of any function using CMOS logic.	3	Chalk & Talk	Black Board
5.2	COMBINATIONAL CIRCUITS USING TTL 74XX ICs: Study of logic gates using 74XX ICs, Four-bit parallel adder (IC 7483), Comparator (IC 7485), Decoder (IC 74138, IC74154),BCD to 7-segment decoder (IC7447)	3	Chalk & Talk	Black Board
5.3	Encoder (IC74147), Multiplexer (IC74151), Demultiplexer (IC 74154).	3	Chalk & Talk	Black Board
5.4	SEQUENTIAL CIRCUITS USING TTL 74XX ICs: Flip Flops (IC 7474, IC 7473),	2	Chalk & Talk	Black Board
5.5	Shift Registers, Universal Shift Register (IC 74194), 4- bit asynchronous binary counter (IC 7493).	3	Chalk & Talk	Black Board

EVALUATION PATTERN

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assess Ment
	T1 10 Mks.	T2 10 Mks.	Seminar 5 Mks	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks	5 Mks	40 Mks	
K2	4	4	-	-	-	8	-	8	20
K3	2	2	-	5	-	9	-	9	22.5
K4	2	2	-	-	5	9	-	9	22.5
K5	2	2	5	-	-	9	-	9	22.5
Non Scholastic	-	-	-	-	-		5	5	12.5
Total	10	10	5	5	5	35	5	40	100

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

SCHOLASTIC					NON - SCHOLASTIC	MARKS		
C1	**C2**	**C3**	**C4**	**C5**	**C6**	**CIA**	**ESE**	**Total**
10	**10**	**5**	**5**	**5**	**5**	**40**	**60**	**100**

PG CIA Components

			Nos		
C1	-	Test (CIA 1)	1	-	10 Mks
C2	-	Test (CIA 2)	1	-	10 Mks
C3	-	Assignment	2 *	-	5 Mks
C4	-	Open Book Test/PPT	2 *	-	5 Mks
C5	-	Seminar	1	-	5 Mks
C6	-	Attendance		-	5 Mks

****The best out of two will be taken into account***

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO1	Learn about the basic concepts for the circuit configuration for the design of linear integrated circuits and develops skill to solve problems	K1, K5	PSO1,PSO2& PSO3
CO2	Develop skills to design linear and non-linear applications circuits using Op-Amp and design the active filters circuits.	K3	PSO5
CO3	Gain knowledge about PLL, and develop the skills to design the simple circuits using IC 555 timer and can solve problems related to it.	K1, K3	PSO2,PSO3

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO4	Learn about various techniques to develop A/D and D/A converters.	K2	PSO4,PSO5
CO5	Acquire the knowledge about the CMOS logic, combinational and sequential circuits.	K1, K4	PSO4,PSO5

Mapping of COs with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	**3**	**3**	**3**	**1**	**2**
CO2	**2**	**2**	**1**	**2**	**3**
CO3	**2**	**3**	**3**	**1**	**2**
CO4	**1**	**2**	**2**	**3**	**3**
CO5	**2**	**1**	**2**	**3**	**3**

Mapping of C0s with POs

CO/ PO	PO1	PO2	PO3	PO4
CO1	**2**	**3**	**2**	**2**
CO2	**2**	**3**	**3**	**2**
CO3	**2**	**3**	**2**	**2**
CO4	**2**	**2**	**3**	**2**
CO5	**2**	**3**	**3**	**2**

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSE DESIGNER

R.ALPHONSA FERNANDO

R.NIRANJANA DEVI

Forwarded By

Dr. A. Sheela Vimala Rani

HoD's Signature & Name

Employability, Skill Development 100%

I M.Sc.,PHYSICS

SEMESTER –I

(For those who joined in 2023 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
PAPH	23PG1PE2	Medical Physics	Lecture	5 Hrs.	3

COURSE DESCRIPTION

This course aims to introduce to students, application of physics in the field of medicine, encompassing the principle and working of medical devices such as X-ray, Sphygmomanometer, Ultrasonic imaging as well as concepts on Radiation Protection.

COURSE OBJECTIVES

To understand the major applications of Physics to Medicine
To study the aid of different medical devices such as X-ray machines, gamma camera, accelerator and nuclear magnetic resonance.
To outline the principles of Physics of different medical radiation devices and their modern advances, especially in medical radiation therapy and different applications in medical physics.
To introduce the ideas of Radiography.
To form a good base for further studies like research.

UNITS

UNIT I: X-RAYS AND TRANSDUCERS [15 HRS]

Electromagnetic Spectrum – Production of X-Rays – X-Ray Spectrum – Bremsstrahlung – Characteristic X-Ray – X-Ray Tubes – Coolidge Tube – X-Ray Tube Design – Thermistors – photo electric transducers – Photo voltaic cells – photo emissive cells –Photoconductive cells– piezoelectric transducer

UNIT II: BLOOD PRESSURE MEASUREMENTS[15 HRS]Introduction – sphygmomanometer – Measurement of heart rate – basic principles of electrocardiogram (ECG) –Basic principles of electro-neurography (ENG) – Basic principles of magnetic resonance imaging (MRI).

UNIT III: RADIATION PHYSICS [15 HRS]

Radiation Units – Exposure – Absorbed Dose – Rad to Gray – Kera Relative Biological Effectiveness –Effective Dose – Sievert (Sv) – Inverse Square Law –

Interaction of radiation with Matter – Linear Attenuation Coefficient – Radiation Detectors –Thimble Chamber – Condenser Chambers – Geiger Counter – Scintillation Counter

UNIT IV :MEDICAL IMAGING PHYSICS [15 HRS]

Radiological Imaging – Radiography – Filters – Grids – Cassette – X-Ray Film – Film processing – Fluoroscopy – Computed Tomography Scanner – Principal Function – Display – Mammography – Ultrasound Imaging – Magnetic Resonance Imaging – Thyroid Uptake System – Gamma Camera (Only Principle, Function and display)

UNIT V :RADIATION PROTECTION [15 HRS]

Principles of Radiation Protection – Protective Materials – Radiation Effects – Somatic – Genetic Stochastic and Deterministic Effect – Personal Monitoring Devices – TLD Film Badge – Pocket Dosimeter

UNIT –VI DYNAMISM (Evaluation Pattern-CIA only)

Radiation from Nuclear Power plants –Standards for Protection against Ionizing Radiation

TEXT BOOKS:

1. Dr.K.Thayalan ,Basic Radiological Physics, Jayapee Brothers Medical Publishing Pvt. Ltd. New Delhi, 2003.
2. Curry, Dowdey and Murry, Christensen's Physics of Diagnostic Radiology: -LippincotWilliams and Wilkins, 1990.
3. FM Khan, Physics of Radiation Therapy, William and Wilkins, 3rd ed, 2003.
4. D. J. Dewhurst, An Introduction to Biomedical Instrumentation, 1st ed, Elsevier Science, 2014.
5. R.S. Khandpur, Hand Book of Biomedical Instrumentations, 1st ed, TMG, New Delhi, 2005.

BOOKS FOR REFERENCE

1. Muhammad Maqbool, An Introduction to Medical Physics, 1st ed, Springer International Publishing, 2017.
2. Daniel Jirák, FrantišekVítek, Basics of Medical Physics, 1st ed, Charles University, Karolinum Press, 2018
3. Anders Brahme, Comprehensive Biomedical Physics, Volume 1, 1st ed, Elsevier Science, 2014.
4. K. Venkata Ram, Bio-Medical Electronics and Instrumentation, 1st ed, Galgotia Publications, New Delhi, 2001.
5. John R. Cameron and James G. Skofronick, 2009, Medical Physics, John Wiley Interscience Publication, Canada, 2nd edition.

WEB SOURCES

1. **https:nptel.ac.in/courses/108/103/108103157/**
2. **https://www.studocu.com/en/course/university-of-technology-sydney/medical-devices-and-diagnostics/225692**
3. **https://www.technicalsymposium.com/alllecturenotes_biomed.html**
4. **https://lecturenotes.in/notes/17929-note-for-biomedical-instrumentation-bi-by-deepraj-adhikary/78**
5. **https://www.modulight.com/applications-medical/**

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 X-RAYS AND TRANSDUCERS				
1.1	Electromagnetic Spectrum – Production of X-Rays – X-Ray Spectrum	3	Chalk & Talk	Black Board
1.2	Bremsstrahlung – Characteristic X-Ray	2	Chalk & Talk	Black Board
1.3	X-Ray Tubes – Coolidge Tube – X-Ray Tube Design	3	Chalk & Talk	Black Board
1.4	Thermistors – photo electric transducers	3	Chalk & Talk	Black Board
1.5	Photo voltaic cells – photo emissive cells	2	Lecture	LCD
1.6	Photoconductive cells– piezoelectric transducer	2	Lecture	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -2 BLOOD PRESSURE MEASUREMENTS				
2.1	Introduction– sphygmomanometer	2	Chalk & Talk	Black Board
2.2	Measurement of heart rate	3	Chalk & Talk	Black Board
2.3	Basic principles of electrocardiogram (ECG)	4	Chalk & Talk	Black Board
2.4	Basic principles of electro-neurography (ENG)	3	Chalk & Talk	Black Board
2.5	Basic principles of magnetic resonance imaging (MRI).	3	Lecture	LCD
UNIT -3RADIATION PHYSICS				
3.1	Radiation Units – Exposure – Absorbed Dose	2	Chalk & Talk	Black Board
3.2	Rad to Gray – Kera Relative Biological Effectiveness – Effective Dose	3	Chalk & Talk	Black Board
3.3	Sievert (Sv) – Inverse Square Law – Interaction of radiation with Matter – Linear Attenuation Coefficient	4	Chalk & Talk	Black Board
3.4	Radiation Detectors –Thimble Chamber	3	Chalk & Talk	Black Board
3.5	Condenser Chambers – Geiger Counter – Scintillation Counter	3	Chalk & Talk	Black Board
UNIT -4 MEDICAL IMAGING PHYSICS				
4.1	Radiological Imaging – Radiography	2	Lecture	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
4.2	Filters – Grids – Cassette – X-Ray Film – Film processing	2	Lecture	LCD
4.3	Fluoroscopy – Computed Tomography Scanner	2	Chalk & Talk	Black Board
4.4	Principal Function – Display – Mammography	3	Lecture	LCD
4.5	Ultrasound Imaging – Magnetic Resonance Imaging	3	Chalk & Talk	Black Board
4.6	Thyroid Uptake System	3	Lecture	LCD
UNIT -5 RADIATION PROTECTION				
5.1	Principles of Radiation Protection	3	Chalk & Talk	Black Board
5.2	Protective Materials – Radiation Effects	4	Lecture	LCD
5.3	Somatic – Genetic Stochastic and Deterministic Effect	4	Chalk & Talk	Black Board
5.4	Personal Monitoring Devices – TLD Film Badge – Pocket Dosimeter	4	Chalk & Talk	Black Board

EVALUATION PATTERN

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assess Ment
	T1 10 Mks.	T2 10 Mks.	Seminar 5 Mks	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks	5 Mks	40 Mks	
K2	4	4	-	-	-	8	-	8	20
K3	2	2	-	5	-	9	-	9	22.5

K4	2	2	-	-	5	9	-	9	22.5
K5	2	2	5	-	-	9	-	9	22.5
Non Scholastic	-	-	-	-	-		5	5	12.5
Total	10	10	5	5	5	35	5	40	100

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

SCHOLASTIC					**NON - SCHOLASTIC**	**MARKS**		
C1	**C2**	**C3**	**C4**	**C5**	**C6**	**CIA**	**ESE**	**Total**
10	**10**	**5**	**5**	**5**	**5**	**40**	**60**	**100**

PG CIA Components

			Nos		
C1	-	Test (CIA 1)	1	-	10 Mks
C2	-	Test (CIA 2)	1	-	10 Mks
C3	-	Assignment	2 *	-	5 Mks
C4	-	Open Book Test/PPT	2 *	-	5 Mks
C5	-	Seminar	1	-	5 Mks
C6	-	Attendance		-	5 Mks

****The best out of two will be taken into account***

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Learn the fundamentals, production and applications of X-rays.	K1,K2	PSO1& PSO2
CO 2	Understand the basics of blood pressure measurements. Learn about sphygmomanometer, EGC, ENG and basic principles of MRI.	K2	PSO3
CO 3	Apply knowledge on Radiation Physics	K1 , K2	PSO5
CO 4	Analyze Radiological imaging and filters	K2, K3	PSO2,PSO3
CO 5	Assess the principles of radiation protection	K2 , K3	PSO4,PSO5

Mapping of COs with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	**3**	**3**	**2**	**1**	**1**
CO2	**2**	**2**	**2**	**2**	**1**
CO3	**2**	**3**	**3**	**1**	**3**
CO4	**2**	**1**	**2**	**3**	**3**
CO5	**2**	**1**	**2**	**2**	**3**

Mapping of COs with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	**2**	**3**	**1**	**1**
CO2	**2**	**3**	**1**	**2**
CO3	**2**	**3**	**2**	**2**
CO4	**2**	**1**	**3**	**1**
CO5	**3**	**3**	**3**	**2**

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSE DESIGNER:

Ms. J. R. Sofia

Forwarded By

Dr. A. SheelaVimala Rani

HoD'S Signature & Name

Employability,
Skill Development
100%

I MSC PHYSICS

SEMESTER –I

(*For those who joined in 2023 onwards*)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
PAPH	23PG1PE3	Advanced Optics	Lecture	5 Hrs.	3

COURSE DESCRIPTION

This course introduces ray properties and wave nature of light. And also introduces about magneto and electro optics.

COURSE OBJECTIVES

To enable the student to understand the basic concepts of polarization and double refraction, applications of various lasers, Non linear optics process, fiber optics and their types and various effects in magneto and electro optics.

UNITS

UNIT –I : POLARIZATION AND DOUBLE REFRACTION (15 HRS.)

Introduction- Production of polarized light : Wire grid polarizer and the polaroid – Polarization by reflection – Polarization by double refraction – Polarization by scattering. Malu's law - The phenomenon of double refraction (Normal and oblique incidence). Analysis of polarized light .

UNIT –II : LASERS (15 HRS.)

Basic principles – Spontaneous and stimulated emissions – Components of the laser – Resonator and lasing action – Types of lasers and its applications – Solid state lasers – Ruby laser – Nd:YAG laser – gas lasers – He-Ne laser – CO_2 laser – Chemical lasers – HCl laser – Semiconductor laser

UNIT –III : FIBER OPTICS (15HRS.)

Introduction – Total internal reflection – The optical fiber – Glass fibers – The coherent bundle – The numerical aperture – Attenuation in optical fibers – Single and multi-mode fibers – Pulse dispersion in multimode optical fibers – Ray dispersion in multimode step index fibers – Parabolic-index

fibers – Fiber-optic sensors: precision displacement sensor – Precision vibration sensor

UNIT–IV : NON-LINEAR OPTICS (15HRS.)

Basic principles – Harmonic generation – Second harmonic generation – Phase matching – Third harmonic generation – Optical mixing – Parametric generation of light – Self-focusing of light

UNIT –V : MAGNETO-OPTICS AND ELECTRO-OPTICS (15HRS.)

Magneto-optical effects – Zeeman effect – Inverse Zeeman effect – Faraday effect – Voigt effect – Cotton-mouton effect – Kerr magneto-optic effect – Electro-optical effects – Stark effect – Inverse stark effect – Electric double refraction – Kerr electro-optic effect – Pockels electro-optic effect

UNIT –VI DYNAMISM (Evaluation Pattern-CIA only)

Applications of lasers , Non linear optics and fiber optics in daily life.

TEXT BOOK:

1. Ajoy Ghatak, 2017, Optics, 6th Edition, McGraw – Hill Education Pvt. Ltd.
   Unit I : 18.1 – 18.3. 18.5 & 18.7.
2. B. B. Laud, 2017, Lasers and Non – Linear Optics, 3rd Edition, New Age International (P) Ltd.
   Unit II : 6.1-6.3,7.1-7.3,7.5(a),8.5-8.5.1,9.1-9.5,10.3-10.3.1
   Unit IV : 13.1 – 13.7.
3. F. S. Jenkins and H. E. White, 1981, Fundamentals of Optics, (4th Edition), McGraw – Hill International Edition.
   Unit V : 32.1 – 32.11.
   4. J. Peatros, Physics of Light and Optics, a good(and free) electronic book.
   5. B. Saleh nd M.Tech, Fundamentals of Photonics, Wiley-Interscience.

REFERENCES:

1. F. S. Jenkins and H. E. White, 1981, Fundamentals of Optics, (4th Edition), McGraw – Hill International Edition.
2. Dieter Meschede, 2004, Optics, Light and Lasers, Wiley – VCH, Varley GmbH.
3. Lipson, S. G. Lipson and H. Lipson, 2011, Optical Physics, 4th Edition,

Cambridge University Press, New Delhi, 2011.

4. Y. B. Band, Light and Matter, Wiley and Sons (2006)
5. R. Guenther, Modern Optics, Wiley and Sons (1990)

Web Reference

1. https://www.youtube.com/watch?v=WgzynezPiyc
2. https://www.youtube.com/watch?v=ShQWwobpW60
3. https://www.ukessays.com/essays/physics/fiber–optics–and–it-applications.php
4. https://www.youtube.com/watch?v=0kEvr4DKGRI
5. http://optics.byu.edu/textbook.aspx

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 POLARIZATION AND DOUBLE REFRACTION				
1.1	Introduction and Classification of polarization	2	Chalk & Talk	Black Board
1.2	Transverse character of light waves and Polarizer and analyzer	1	Chalk & Talk	Black Board
1.3	Malu's law and Production of polarized light	2	Chalk & Talk	Black Board
1.4	Wire grid polarizer and the polaroid & Polarization by reflection	2	Chalk & Talk	Black Board
1.5	Polarization by double refraction & Polarization by scattering	2	Chalk & Talk	Black Board
1.6	The phenomenon of double refraction & Normal and oblique incidence	2	Chalk & Talk	Black Board
1.7	Interference of polarized light: Quarter and half wave plates	2	Chalk & Talk	Black Board
1.8	Analysis of polarized light &	2	Chalk &	Black

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
	Optical activity		Talk	Board
UNIT -2 LASERS				
2.1	Introduction and Basic principles	2	Chalk & Talk	Black Board
2.2	Spontaneous and stimulated emissions	1	Chalk & Talk	Black Board
2.3	Components of the laser	1	Chalk & Talk	Black Board
2.4	Resonator and lasing action	1	Chalk & Talk	Black Board
2.5	Types of lasers and its applications	2	Chalk & Talk	Black Board
2.6	Solid state lasers & Ruby laser	2	Chalk & Talk	Black Board
2.7	Nd:YAG laser & gas lasers	2	Chalk & Talk	Black Board
2.8	He-Ne laser & CO_2 laser	2	Chalk & Talk	Black Board
2.9	Chemical lasers & HCl laser	1	Chalk & Talk	Black Board
2.10	Semiconductor laser	1	Chalk & Talk	Black Board
UNIT -3 FIBER OPTICS				
3.1	Introduction	1	Chalk & Talk	Black Board
3.2	Total internal reflection	1	Chalk & Talk	Black Board
3.3	The optical fiber & Glass fibers	2	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
3.4	The coherent bundle, The numerical aperture & Attenuation in optical fibers	2	Chalk & Talk	Black Board
3.5	Single and multi mode fibers	2	Chalk & Talk	Black Board
3.6	Pulse dispersion in multimode optical fibers Ray dispersion in multimode step index fibers	2	Chalk & Talk	Black Board
3.7	Parabolic &index fibers	2	Chalk & Talk	Black Board
3.8	Fiber-optic sensors: precision displacement sensor	2	Chalk & Talk	Black Board
3.9	Precision vibration sensor	1	Chalk & Talk	Black Board
UNIT -4 NON-LINEAR OPTICS				
4.1	Introduction &c Basic principles	2	Chalk & Talk	Black Board
4.2	Harmonic generation & Phase matching	2	Chalk & Talk	Black Board
4.3	Second & Third harmonic generation	3	Chalk & Talk	Black Board
4.4	Optical mixing	2	Chalk & Talk	Black Board
4.5	Parametric generation of light	3	Chalk & Talk	Black Board
4.6	Self-focusing of light	3	Chalk & Talk	Black Board
UNIT -5MAGNETO-OPTICS AND ELECTRO-OPTICS				
5.1	Introduction & Magneto-optical effects	2	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
5.2	Zeeman effect & Inverse Zeeman effect	2	Chalk & Talk	Black Board
5.3	Faraday effect & Voigt effect	2	Chalk & Talk	Black Board
5.4	Cotton-mouton effect & Kerr magneto-optic effect	2	Chalk & Talk	Black Board
5.5	Electro-optical effects & Stark effect	2	Chalk & Talk	Black Board
5.6.	Inverse stark effect & Electric double refraction	2	Chalk & Talk	Black Board
5.7	Kerr electro-optic effect & Pockels electro-optic effect	3	Chalk & Talk	Black Board

EVALUATION PATTERN

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assess Ment
	T1 10 Mks.	T2 10 Mks.	Seminar 5 Mks	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks	5 Mks	40 Mks	
K2	4	4	-	-	-	8	-	8	20
K3	2	2	-	5	-	9	-	9	22.5
K4	2	2	-	-	5	9	-	9	22.5
K5	2	2	5	-	-	9	-	9	22.5

Non Scholastic	-	-	-	-	-		5	5	12.5
Total	10	10	5	5	5	35	5	40	100

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

SCHOLASTIC					NON - SCHOLASTIC	MARKS		
C1	**C2**	**C3**	**C4**	**C5**	**C6**	**CIA**	**ESE**	**Total**
10	**10**	**5**	**5**	**5**	**5**	**40**	**60**	**100**

PG CIA Components

			Nos		
C1	-	Test (CIA 1)	1	-	10 Mks
C2	-	Test (CIA 2)	1	-	10 Mks
C3	-	Assignment	2 *	-	5 Mks
C4	-	Open Book Test/PPT	2 *	-	5 Mks
C5	-	Seminar	1	-	5 Mks
C6	-	Attendance		-	5 Mks

****The best out of two will be taken into account***

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Understand the concept of polarization of light, production methods and double refraction.	K2	PSO1, PSO2, PSO3
CO 2	Understand the working of different types of LASERS	K2	PSO1, PSO2, PSO3
CO 3	Explain the types of fiber optics and their potential applications potential well; To discuss the problem of barrier penetration.	K3	PSO1, PSO2, PSO3, PSO5
CO 4	Differentiate first and second harmonic generation and explain their applications	K2, K3	PSO1, PSO2, PSO3, PSO5
CO 5	Describe the principles of magneto-optic and electro-optic effects and its applications	K3 & K4	PSO1, PSO2, PSO3, PSO5

Mapping of COs with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	**3**	**3**	**3**	**2**	**2**
CO2	**3**	**3**	**3**	**2**	**2**
CO3	**3**	**3**	**3**	**2**	**3**
CO4	**3**	**3**	**3**	**2**	**3**
CO5	**3**	**3**	**3**	**2**	**3**

Mapping of COs with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	3	2	3	2
CO2	3	2	3	2
CO3	3	2	3	2
CO4	3	2	3	2
CO5	3	2	3	2

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSE DESIGNER:

Dr. R.Jothi Mani

Dr.J.Selvi

Forwarded By

Dr. A. Sheela Vimala Rani

HoD'S Signature & Name

Employability, Skill Development 100%

I M.Sc.PHYSICS

SEMESTER –I

(For those who joined in 2023 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
PAPH	23PG1PE4	Communication Electronics	Lecture	5 Hrs.	3

COURSE DESCRIPTION

This course introduces the working principle of fiber optics and its use in telecommunication.

COURSE OBJECTIVES

- To comprehend the transmission of electromagnetic waves through different types of antenna and also to acquire knowledge about the propagation of waves through earth's atmosphere and along the surface of the earth
- To gain knowledge in the generation and propagation of microwaves
- To acquire knowledge about radar systems and its applications and also the working principle of colour television
- To understand the general theory and operation of satellite communication systems

UNITS

UNIT –I ANTENNAS AND WAVE PROPAGATION (15 HRS)

Radiation field and radiation resistance of short dipole antenna-grounded antenna-ungrounded antenna-antenna arrays-broadside and end side arrays-antenna gain-directional high frequency antennas-sky wave-ionosphere- Ecles and Larmor theory- Magnento ionic theory-ground wave propagation

UNIT –II MICROWAVES (15 HRS)

Microwave generation—multicavity Klystron-reflex klystron-magnetrontravelling wave tubes (TWT) and other microwave tubes-MASER-

Gunndiode-wave guides-rectangular wave guides-standing wave indicator andstanding wave ratio(SWR)

UNIT –III RADAR ANDTELEVISION (15HRS)

Elements of a radar system-radar equation-radar performance Factorsradar transmitting systems-radar antennas-duplexers-radarreceivers and indicators-pulsed systems-other radar systems-colour TVtransmission and reception-colour mixing principle-colour picture tubes-Delta gun picture tube-PIL colour picture tube-cable TV, CCTV and theatre TV

UNIT–IV OPTICAL FIBER (15HRS)

Propagation of light in an optical fibre-acceptance angle-numericalaperture-step and graded index fibres-optical fibres as a cylindrical waveguide-wave guide equations-wave guide equations in step index fibres -fibre losses and dispersion-applications

UNIT –V SATELLITECOMMUNICATION (15HRS)

Orbital satellites-geostationary satellites-orbital patterns-satellite systemlink models-satellite system parameters-satellite system link equationlinkbudget-INSAT communication satellites

UNIT –VI DYNAMISM (Evaluation Pattern-CIA only)

Fibre optics in telecommunication and operation of satellite communication system.

TEXT BOOK:

1. Handbook of Electronics by Gupta and Kumar, 2008 edition.
2. Electronic communication systems – George Kennedy and Davis, Tata McGraw Hill, 4th edition, 1988.
3. Taub and Schilling, principles of communication systems, second edition, Tata Mc Graw Hill (1991).
4. M. Kulkarani, Microwave and radar engineering, UmeshPublications, 1998.
5. Mono Chrome and colour television, R. R. Ghulathi

REFERENCES:

1. Electronic communications – Dennis Roody and Coolen, Prentice Hall of India, IV edition, 1995.
2. Wayne Tomasi, Advanced electronics communication systems, fourth edition, Prentice Hall of India, 1998
3. Dennis Roddy and Coolen,1995,*Electronics communications,*Prentice Hall of India IV Edition.
4. Wayne Tomasi,1998 *"Advanced Electronics communication System"* 4thedition, Prentice Hall of India, 1998
5. S. Salivahanan, N. Suersh Kumar & A. Vallavaraj, 2009, Electronic Devices and Circuits, Tata McGraw-Hill Publishing Company Limited, New Delhi, Second Edition.

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 ANTENNAS AND WAVE PROPAGATION				
1.1	Radiation field and radiation resistance of short dipole antenna	2	Chalk & Talk	Black Board
1.2	Grounded antenna-ungrounded antenna	2	Chalk & Talk	Black Board
1.3	Antenna arrays - broadside and end side arrays-antenna gain	2	Chalk & Talk	Black Board
1.4	Directional high frequency antennas	3	Chalk & Talk	Black Board
1.5	Sky wave-ionosphere- Ecles and Larmor theory	3	Chalk & Talk	Black Board
1.6	Magnento ionic theory-ground wave propagation	3	Chalk & Talk	Black Board
UNIT -2 MICROWAVES				
2.1	Microwave generation— multicavity Klystron-reflex klystron	3	Chalk & Talk	Black Board
2.2	magnetron -travelling wave tubes (TWT) and other	3	Chalk &	Black

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
	microwave tubes		Talk	Board
2.3	MASER-Gunn diode-wave guides	3	Chalk & Talk	Black Board
2.4	rectangular wave guides	3	Chalk & Talk	Black Board
2.5	standing wave indicator and standing wave ratio(SWR)	3	Chalk & Talk	Black Board
UNIT -3 RADAR AND TELEVISION				
3.1	Elements of a radar system-duplexers	3	Chalk & Talk	Black Board
3.2	Radar performance factors	3	Chalk & Talk	Black Board
3.3	Radar equation- radar transmitting systems-radar antennas- Radar receivers and indicators-pulsed systems	3	Chalk & Talk	Black Board
3.4	Other radar systems-colour TV transmission and reception	3	Chalk & Talk	Black Board
3.5	Colour mixing principle-colour picture tubes	2	Chalk & Talk	Black Board
3.6	Delta gun picture tube-PIL colour picture tube - Cable TV, CCTV and theatre TV	1	Chalk & Talk	Black Board
UNIT -4 OPTICAL FIBER				
4.1	Propagation of light in an optical fibre	2	Chalk & Talk	Black Board
4.2	Acceptance angle-numerical aperture	2	Chalk & Talk	Black Board
4.3	Step and graded index fibres	2	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
4.4	Optical fibres as a cylindrical waveguide	3	Chalk & Talk	Black Board
4.5	Wave guide equations-wave guide equations in step index fibres	3	Chalk & Talk	Black Board
4.6	Fibre losses and dispersion-applications	3	Chalk & Talk	Black Board
UNIT -5 SATELLITE COMMUNICATION				
5.1	Orbital satellites and geostationary satellites	3	Chalk & Talk	Black Board
5.2	orbital patterns	3	Chalk & Talk	Black Board
5.3	satellite system link models-satellite system parameters	3	Chalk & Talk	Black Board
5.4	satellite system link equation link budget	3	Chalk & Talk	Black Board
5.5	INSAT communication satellites	3	Chalk & Talk	Black Board

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Discuss and compare the propagation of electromagnetic waves through sky and on earth's surface Evaluate the energy and	K1, K5	PSO1, PSO2, PSO3

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
	power radiated by the different types of antenna		
CO 2	Compare and differentiate the methods of generation of microwaves analyze the propagation of microwaves through wave guides- discuss and compare the different methods of generation of microwaves	K4	PSO1, PSO2, PSO3
CO 3	Classify and compare the working of different radar systems- apply the principle of radar in detecting locating, tracking, and recognizing objects of various kinds at considerable distances – discuss the importance of radar in military- elaborate and compare the working of different picture tube	K3	PSO1, PSO2, PSO3, PSO5
CO 4	Classify, discuss and compare the different types of optical fiber and also to justify the need of it-discover the use of optical fiber as wave guide	K1, K3	PSO1, PSO2, PSO3, PSO5
CO 5	Explain the importance of satellite communication in our daily life- distinguish between orbital and geostationary satellites elaborate the linking of satellites with ground station on the earth	K4	PSO1, PSO2, PSO3, PSO5

EVALUATION PATTERN

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assess Ment
	T1 10 Mks.	T2 10 Mks.	Seminar 5 Mks	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks	5 Mks	40 Mks	
K2	4	4	-	-	-	8	-	8	20
K3	2	2	-	5	-	9	-	9	22.5
K4	2	2	-	-	5	9	-	9	22.5
K5	2	2	5	-	-	9	-	9	22.5
Non Scholastic	-	-	-	-	-		5	5	12.5
Total	10	10	5	5	5	35	5	40	100

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

SCHOLASTIC					NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	C6	CIA	ESE	Total
10	10	5	5	5	5	40	60	100

PG CIA Components

			Nos		
C1	-	Test (CIA 1)	1	-	10 Mks
C2	-	Test (CIA 2)	1	-	10 Mks
C3	-	Assignment	2 *	-	5 Mks
C4	-	Open Book Test/PPT	2 *	-	5 Mks
C5	-	Seminar	1	-	5 Mks
C6	-	Attendance		-	5 Mks

****The best out of two will be taken into account***

Mapping of COs with PSOs

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

Mapping of COs with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	3	2	3	2
CO2	3	2	3	2
CO3	3	2	3	2
CO4	3	2	3	2
CO5	3	2	3	2

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSE DESIGNER:

Dr. I. Janet Sherly

Forwarded By

Dr. A. Sheela Vimala Rani

HoD'S Signature & Name

Employability,
Skill Development
100%

SEMESTER –I

(*For those who joined in 2023 onwards*)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
PAPH	23PG1PAE	DIGITAL PHOTOGRAPHY	Lecture	2 Hrs.	1

COURSE DESCRIPTION

This course will familiarize the students with the fundamental ideas of lens and camera.

COURSE OBJECTIVES

This course focuses on core photographic concepts like the uses of photography in daily life, basic parts of camera, Focusing Aspects, composition techniques of photography and indoor and outdoor subjects in photography.

UNITS

UNIT I: INTRODUCTION TO PHOTOGRAPHY (6 HRS)

Introduction to photography- Personal uses- Photography Process- Writing with light- Camera: Basic parts- Important controls- Types of camera.

UNIT II: LENS (6 HRS)

Introduction - focal length - speed of the lens- Special lenses - wide angle lens-telephoto lens – close up lens- zoom lens.

UNIT III: FOCUSING ASPECTS (6 HRS)

F-number – Aperture – shutter speed – lighting-contrast-Exposure-illumination and use of flash light

UNIT IV: COMPOSITION (6 HRS)

Rules for composition of photography – View Point – Subject Arrangement – Sharpness – Scale – Tone – Key of the Picture – Format.

UNIT –V: PRACTICING SUBJECTS (6 HRS)

Practicing indoor subjects like Passport, Portrait, Article, Still life subjects and outdoor subjects like landscape and moving object photography.

UNIT –VI DYNAMISM (For CIA only)

Applications of photography in daily life. Hands on training with camera

TEXT BOOK:

1. S.Thiagarajan (2007, IV edition), *The New Practical Photography,* Sultan Chand & Sons.
2. Vinay Ahlawat, Gaurav Birla, Photography, Vikas Publishers.

REFERENCE BOOKS:

3. David Kilpatrick (1984), *Basic Photography*, Hamlyn London.
4. Michael Freeman (2005), Mastering *Colour Digital Photography*, Lark Books.

Web Sources:

1. https://www.pixinfocus.com/modern-photography/#:~:text=Modern%20photography%20is%20a%20period,a%20tool%20to%20capture%20images.
2. https://www.googleadservices.com/pagead/aclk?sa=L&ai=DChcSEwitzLmlzYT2AhUYnUsFHW3gAGcYABAAGgJzZg&ae=2&ohost=www.google.com&cid=CAESWuD2EF-qhzLTgqE5oCetg4ol7CwWzho9AFf_wLJUdxxaWYMOs8h6doc0Jmb4W9anrNU8ujmi4sTnLTFXoK1rBFXpGMAIddNVy9yD4jZHy1zh1JTGFsCqoHiDTQ&sig=AOD64_1auHwND-kaxB8VJEJSw4Hi1extHg&q&adurl&ved=2ahUKEwiNx7KlzYT2AhUGSmwGHbKEB0AQ0Qx6BAgDEAE

3. COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 Introduction to Photography				
1.1	Introduction to photography	1	Lecture	Black Board
1.2	Personal uses	1	Lecture	Black Board
1.3	Writing with light	1	Lecture	Black Board & LCD
1.4	Photographic process	1	Lecture	Black Board & LCD
1.5	Camera: Basic parts & Important controls	1	Lecture	Black Board & LCD
1.6	Types of camera	1	Lecture	PPT
UNIT -2 LENS				
2.1	Introduction	1	Lecture	LCD
2.2	Focal length	1	Lecture	LCD
2.3	Speed of the lens	1	Lecture	LCD
2.4	Wide angle lens & Special lenses & Telephoto lens	1	Lecture	LCD
2.5	Close up lens & zoom lens & Introducing the technical knowledge of using a SLR camera.	2	Lecture	LCD
UNIT - 3 Focusing Aspects				

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
3.1	F-number	1	Lecture	LCD
3.2	Aperture & shutter speed	1	Lecture	LCD
3.3	Lighting& contrast	1	Lecture	LCD
3.4	Exposure	1	Lecture	LCD
3.5	Illumination and use of flash light	2	Lecture	LCD
UNIT – 4 COMPOSITION				
4.1	Rules for composition of photography & View Point	1	Lecture	PPT
4.2	Subject Arrangement & Sharpness	1	Lecture	PPT
4.3	Scale & Tone	2	Lecture	PPT
4.4	Key of the Picture & Format	2	Lecture	PPT
UNIT-5 PRACTICING INDOOR SUBJECTS				
5.1	Introduction	1	Lecture	PPT
5.2	Practicing indoor subjects like Passport	2	Lecture	PPT
5.3	Portrait, Article & Still life subjects	2	Lecture	PPT
5.4	Outdoor subjects like landscape and moving object photography	1	Lecture	PPT

EVALUATION PATTERN

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assess Ment
	T1 10 Mks.	T2 10 Mks.	Seminar 5 Mks	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks	5 Mks	40 Mks	
K2	4	4	-	-	-	8	-	8	20
K3	2	2	-	5	-	9	-	9	22.5
K4	2	2	-	-	5	9	-	9	22.5
K5	2	2	5	-	-	9	-	9	22.5
Non Scholastic	-	-	-	-	-		5	5	12.5
Total	10	10	5	5	5	35	5	40	100

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

SCHOLASTIC					NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	C6	CIA	ESE	Total
10	10	5	5	5	5	40	60	100

PG CIA Components

			Nos		
C1	-	Test (CIA 1)	1	-	10 Mks
C2	-	Test (CIA 2)	1	-	10 Mks
C3	-	Assignment	2 *	-	5 Mks
C4	-	Open Book Test/PPT	2 *	-	5 Mks
C5	-	Seminar	1	-	5 Mks
C6	-	Attendance		-	5 Mks

****The best out of two will be taken into account***

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Understand the basic concepts of photography	K2	PSO1, PSO2, PSO3
CO 2	Discuss the different types of lenses and to introduce the technical knowledge of SLR camera.	K2	PSO1, PSO2, PSO3
CO 3	Understand the focusing aspects of camera.	K3	PSO1, PSO2, PSO3, PSO5
CO 4	To understand the composition techniques of photography	K2, K3	PSO1, PSO2, PSO3, PSO5
CO 5	To understand the types of photography and practising indoor and outdoor objects	K3 & K4	PSO1, PSO2, PSO3, PSO5

Mapping of COs with PSOs

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

Mapping of COs with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	3	2	3	2
CO2	3	2	3	2
CO3	3	2	3	2
CO4	3	2	3	2
CO5	3	2	3	2

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSE DESIGNER:

Dr. R. Jothi Mani

Dr. I. Janet Sherly

Forwarded By

Dr. A. Sheela Vimala Rani

HoD'S Signature & Name

Employability,
Skill Development
100%

I MSC PHYSICS

SEMESTER –II

For those who joined in 2023 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
PAPH	23PG2P4	STATISTICAL MECHANICS	Core	6	5

COURSE DESCRIPTION

This course develops concepts in Classical statistical mechanics, Quantum statistics and fluctuations .

COURSE OBJECTIVES

The course provides a conceptually based exposure to some advanced topics in the field of equilibrium statistical physics.The course links thermodynamics to the micro description used in classical Statistical Mechanics. The course enables the students to understand the concepts of M-B, B-E and F-D statistics and to apply them to the real systems.

UNITS 6

UNIT –I PHASE TRANSITIONS (18 HRS)

Thermodynamic potentials - Phase Equilibrium - Gibb's phase rule - Phase transitions and Ehrenfest's classifications –Third law of Thermodynamics. Order parameters – Landau's theory of phase transition - Critical indices - Scale transformations and dimensional analysis.

UNIT –II STATISTICAL MECHANICS AND THERMODYNAMICS (18 HRS)

Foundations of statistical mechanics - Specification of states of a system - Micro canonical ensemble - Phase space – Entropy - Connection between statistics and thermodynamics – Entropy of an ideal gas using the micro canonical ensemble - Entropy of mixing and Gibb's paradox.

UNIT –III CANONICAL AND GRAND CANONICAL ENSEMBLES (18 HRS.)

Trajectories and density of states - Liouville's theorem - Canonical and grand canonical ensembles - Partition function - Calculation of statistical quantities - Energy and density fluctuations.

UNIT –IV CLASSICAL AND QUANTUM STATISTICS (18 HRS.)

Density matrix - Statistics of ensembles - Statistics of indistinguishable particles - Maxwell-Boltzmann statistics - Fermi-Dirac statistics – Ideal Fermi gas – Degeneracy - Bose-Einstein statistics - Plank radiation formula - Ideal Bose gas - Bose-Einstein condensation.

UNIT –V REAL GAS,UISING MODEL AND FLUCTUATIONS (18 HRS.)

Cluster expansion for a classical gas - Virial equation of state – Calculation of the first Virial coefficient in the cluster expansion - Ising model - Mean-field theories of the Ising model in three, two and one dimensions - Exact solutions in one dimension. Correlation of space-time dependent fluctuations - Fluctuations and transport phenomena - Brownian motion - Langevin's theory - Fluctuation-dissipation theorem - The Fokker-Planck equation

UNIT VI DYNAMISM (Evaluation Pattern-CIA only)

Quantum Hall Effect

REFERENCES:

1. S. K. Sinha, 1990, Statistical *Mechanics*, Tata McGraw Hill, New Delhi.
2. B. K. Agarwal and M. Eisner, 1998, *Statistical Mechanics,* Second Edition New Age International, New Delhi.
3. J. K. Bhattacharjee, 1996, *Statistical Mechanics*: An Introductory Text, Allied Publication, New Delhi.
4. F. Reif, 1965, *Fundamentals of Statistical and Thermal Physics,* McGraw -Hill, New York.
5. M. K. Zemansky, 1968, *Heat and Thermodynamics,* 5th edition, McGraw-Hill New York.
6. Bhattacharjee, S***tatistical Mechanics*** Allied Publishers limited,(1996).

WEB REFERNCES :

1. https://www.cmi.ac.in/~kpnmurthy/StatisticalMechanics2017/book.pdf
2. https://www.britannica.com/science/degenerate-gas
3. https://www.space.com/23756-white-dwarf-stars.html
4. http://www.damtp.cam.ac.uk/user/tong/qhe.html
5. http://www.damtp.cam.ac.uk/user/tong/qhe/three.pdf)

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 PHASE TRANSITIONS				
1.1	Thermodynamic potentials	2	Chalk & Talk	PPT
1.2	Phase Equilibrium	3	Chalk & Talk	LCD
1.3	Gibb's phase rule	2	Lecture	Black Board
1.4	Phase transitions and Ehrenfest's classifications	3	Lecture	Black Board
1.5	Third law of Thermodynamics	3	Lecture	Black Board
1.6	Order parameters	3	Lecture	Black Board
1.7	Landau's theory of phase transition	2	Chalk & talk	Google classroom
UNIT -2 STATISTICAL MECHANICS AND THERMODYNAMICS				
2.1	Foundations of statistical mechanics	1	Lecture	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
2.2	Specification of states of a system	2	Chalk & Talk	Black Board
2.3	Micro canonical ensemble	3	Lecture	Black Board
2.4	Phase space	3	Lecture	Black Board
2.5	Entropy– Entropy of an ideal gas using the micro canonical ensemble	3	Chalk & Talk	PPT
2.6	Entropy of mixing and Gibb's paradox.	3	Chalk & Talk	PPT
2.7	Entropy of a system in contact with a heat reservoir	3	Chalk & Talk	PPT
UNIT - CANONICAL AND GRAND CANONICAL ENSEMBLES				
3.1	Trajectories and density of states	2	Lecture	Black Board
3.2	Liouville's theorem	3	Chalk & Talk	Black Board
3.3	Canonical and grand canonical ensembles	2	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
3.4	Partition function - Calculation of statistical quantities	3	Chalk & Talk	PPT
UNIT - 4 CLASSICAL AND QUANTUM STATISTICS				
4.1	Statistics of indistinguishable particles	3	Chalk & Talk	Black Board
4.2	Maxwell-Boltzmann statistics - Fermi-Dirac statistics – Ideal Fermi gas	3	Chalk & Talk	Black Board
4.3	Degeneracy - Bose-Einstein statistics	2	Chalk & Talk	Black Board
4.4	Plank radiation formula - Ideal Bose gas	3	Chalk & Talk	PPT
4.5	Bose-Einstein condensation.	3	Chalk & Talk	PPT
UNIT 5 REAL GAS,UISING MODEL AND FLUCTUATIONS				
5.1	Cluster expansion for a classical gas	3	Chalk & Talk	PPT
5.2	Virial equation of state – Calculation of the first Virial coefficient in the cluster expansion	4	Chalk & Talk	PPT
5.3	Ising model - Fluctuations and transport phenomena - Brownian motion	4	Chalk & Talk	PPT

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
5.4	Langevin's theory - Fluctuation-dissipation theorem	4	Chalk & Talk	PPT
5.5	The Fokker-Planck equation	3	Chalk & Talk	PPT
UNIT –6 DYNAMISM				
6.1	The Quantum Hall Effect		Chalk & Talk	PPT

EVALUATION PATTERN

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assessment
	T1 10 Mks.	T2 10 Mks.	Seminar 5 Mks	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks	5 Mks	40 Mks	
K2	4	4	-	-	-	8	-	8	20
K3	2	2	-	5	-	9	-	9	22.5
K4	2	2	-	-	5	9	-	9	22.5
K5	2	2	5	-	-	9	-	9	22.5
Non School astic	-	-	-	-	-		5	5	12.5
Total	10	10	5	5	5	35	5	40	100

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

SCHOLASTIC					NON - SCHOLASTIC	MARKS		
C1	**C2**	**C3**	**C4**	**C5**	**C6**	**CIA**	**ESE**	**Total**
10	**10**	**5**	**5**	**5**	**5**	**40**	**60**	**100**

- **PG CIA Components**

			Nos		
C1	-	Test (CIA 1)	1	-	10 Mks
C2	-	Test (CIA 2)	1	-	10 Mks
C3	-	Assignment	2 *	-	5 Mks
C4	-	Open Book Test/PPT	2 *	-	5 Mks
C5	-	Seminar	1	-	5 Mks
C6	-	Attendance		-	5 Mks

****The best out of two will be taken into account***

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	To examine and elaborate the effect of changes in thermodynamic quantities on the states of matter during phase transition	K3	PSO1, PSO2,PSO3
CO 2	To analyze the macroscopic properties such as pressure, volume, temperature, specific heat, elastic moduli etc. using microscopic properties like intermolecular forces, chemical bonding, atomicity etc.	K4	PSO3
CO 3	Differentiate between canonical and grand canonical ensembles and to interpret the relation between thermodynamical quantities and partition function	K2	PSO4,PSO5
CO 4	To recall and apply the different statistical concepts to analyze the behaviour of ideal Fermi gas and ideal Bose gas and also to compare and distinguish between the three types of statistics.	K2,K5	PSO4,PSO5
CO 5	To discuss and examine the thermodynamical behaviour of gases under fluctuation and also using Ising model	K1,K2,K3	PSO2, PSO4

Mapping of C0s with PSOs

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

Mapping of C0s with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	3	2	3	2
CO2	3	2	3	2
CO3	3	2	3	2
CO4	3	2	3	2
CO5	3	2	3	2

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSE DESIGNER:

1. Dr. M. V. Leena Chandra

2. Dr. I. Jeya Sheela

Forwarded By

HOD'S Signature & Name

Employability,
Skill Development
100%

I M.Sc.

SEMESTER –II

(*For those who joined in 2023 onwards*)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
PAPH	23PG2P5	Quantum Mechanics-I	Lecture	6 Hrs.	5

COURSE DESCRIPTION

This course introduces Schrodinger equation, general formalism of quantum mechanics, exactly soluble Eigen value problems, representations and angular momentum.

COURSE OBJECTIVES

To develop the physical principles and the mathematical background important to quantummechanical descriptions. To describe the propagation of a particle in a simple, one-dimensional potential. To formulate and solve the Schrodinger's equation to obtain eigenvectors and energies forparticle in a three-dimensional potential. To explain the mathematical formalism and the significance of constants of motion, and seetheir relation to fundamental symmetries in nature. To discuss the Approximation methods like perturbation theory, Variational and WKBmethods for solving the Schrödinger equation.

UNITS

UNIT –IBASICFORMALISM: (18 HRS.)

Interpretation of the wave function – Time dependent Schrodinger equation– Time independent Schrodinger equation – Stationary states – Ehrenfest'stheorem – Linear vector space – Linear operator – Eigen functions and EigenValues – Hermitian Operator – Postulates of Quantum Mechanics –Simultaneous measurability of observables – General Uncertainty relation

UNIT –II ONE DIMENSIONAL AND THREE-DIMENSIONAL ENERGY EIGENVALUE PROBLEMS: (18 HRS.)

Square – well potential with rigid walls – Square well potential with finitewalls – Square potential barrier – Alpha emission – Bloch waves in a periodic potential – Kronig-penny square – well periodic potential – Linear harmonic oscillator: Operator method – Particle moving in a spherically symmetric potential – System of two interacting particles – Hydrogen atom – Rigid rotator

UNIT –III : GENERALFORMALISM (18 HRS.)

Dirac notation – Equations of motions – Schrodinger representation – Heisenberg representation – Interaction representation – Coordinate representation – Momentum representation – Symmetries and conservation laws – Unitary transformation – Parity and time reversal

UNIT–IV APPROXIMATION METHODS (18HRS.)

Time independent perturbation theory for non-degenerate energy levels – Degenerate energy levels – Stark effect in Hydrogen atom – Ground and excited state – Variation method – Helium atom – WKB approximation – Connection formulae (no derivation) – WKB quantization – Application to simple harmonic oscillator.

UNIT –V ANGULAR MOMENTUM (18HRS.)

Eigenvalue spectrum of general angular momentum – Ladder operators andtheir algebra – Matrix representation – Spin angular momentum – Additionof angular momenta – CG Coefficients – Symmetry and anti –

symmetry ofwave functions – Construction of wave-functions and Pauli's exclusionprinciple.

UNIT –VI DYNAMISM (Evaluation Pattern-CIA only)

Quantum Mechanics in daily life including application of Quantum mechanics to innovations made in the field of Fiber Optics, Solar Cells, Telecommunication, GPS, Microscopy, Medical diagnosis and treatment, etc.

TEXT BOOKS:

1. P. M. Mathews and K. Venkatesan, A Text book of Quantum Mechanics, 2 nd edition(37th Reprint),Tata McGraw-Hill, New Delhi, 2010.
2. G. Aruldhas, Quantum Mechanics, 2nd edition, Prentice Hall of India, New Delhi, 2009.
3. David J Griffiths, Introduction to Quantum Mechanics. 4th edition, Pearson, 2011.
4. SL Gupta and ID Gupta, Advanced Quantum Theory and Fields, 1 st Edition, S.Chand& Co., New Delhi, 1982.
5. A. Ghatak and S. Lokanathan, Quantum Mechanics: Theory and Applications, 4 th Edition, Macmillan, India, 1984.

REFERENCEBOOKS

1. E. Merzbacher, Quantum Mechanics, 2nd Edition, John Wiley and Sons, New York, 1970.
2. V. K. Thankappan, Quantum Mechanics, 2nd Edition, Wiley Eastern Ltd, New Delhi, 1985.
3. L. D. Landau and E. M. Lifshitz, Quantum Mechanics, 1st edition, Pergomon Press, Oxford, 1976.
4. S. N. Biswas, Quantum Mechanics, Books and Allied Ltd., Kolkata, 1999.
5. V. Devanathan, Quantum Mechanics, 2nd edition, Alpha Science International Ltd, Oxford , 2011.

WEB SOURCES

1. http://research.chem.psu.edu/lxjgroup/download_files/chem565-c7.pdf
2. http://www.feynmanlectures.caltech.edu/III_20.html
3. http://web.mit.edu/8.05/handouts/jaffe1.pdf
4. https://hepwww.pp.rl.ac.uk/users/haywood/Group_Theory_Lectures/Lecture_ 1.pdf
5. https://theory.physics.manchester.ac.uk/~xian/qm/chapter3.pdf

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 :BASIC FORMALISM				
1.1	Interpretation of the wave function – Time dependent Schrodinger equation	3	Chalk & Talk	Black Board
1.2	Time independent Schrodinger equation – Stationary states –	3	Chalk & Talk	Black Board
1.3	Ehrenfest'stheorem	3	Chalk & Talk	Black Board
1.4	Linear vector space – Linear operator – Eigen functions and Eigen Values	3	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
1.5	Hermitian Operator – Postulates of Quantum Mechanics	3	Chalk & Talk	Black Board
1.6	Simultaneous measurability of observables – General Uncertainty relation	3	Chalk & Talk	Black Board
UNIT -2 ONEDIMENSIONALAND THREE-DIMENSIONALENERGY EIGENVALUEPROBLEMS:				
2.1	Square – well potential with rigid walls – Square well potential with finite walls – Square potential barrier	2	Chalk & Talk	Black Board
2.2	Alpha emission – Bloch waves in aperiodic potential	2	Chalk & Talk	Black Board
2.3	Kronig-penny square – well periodic potential	3	Chalk & Talk	Black Board
2.4	Linear harmonic oscillator: Operator method	2	Chalk & Talk	Black Board
2.5	Particle moving in a spherically symmetric potential	2	Chalk & Talk	Black Board
2.6	System of two interacting particles	2	Chalk & Talk	Black Board
2.7	Hydrogen atom	3	Chalk & Talk	Black Board
2.8	Rigid rotator	2	Chalk & Talk	Black Board
UNIT -3 GENERALFORMALISM:				
3.1	Dirac notation – Equations of motions	3	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
3.2	Schrodinger representation - Heisenberg representation	4	Chalk & Talk	Black Board
3.3	Interaction representation – Coordinate representation	4	Chalk & Talk	Black Board
3.4	Momentum representation – Symmetries and conservation laws	3	Chalk & Talk	Black Board
3.5	Unitary transformation – Parity and time reversal	4	Chalk & Talk	Black Board
UNIT -4 APPROXIMATION METHODS				
4.1	Time independent perturbation theory for non-degenerate energy levels	3	Chalk & Talk	Black Board
4.2	Degenerate energy levels –	3	Chalk & Talk	Black Board
4.3	Stark effect in Hydrogen atom – Ground and excited state	3	Chalk & Talk	Black Board
4.4	Variation method – Helium atom	3	Chalk & Talk	Black Board
4.5	WKB approximation Connection formulae (no derivation)	3	Chalk & Talk	Black Board
4.6	WKB quantization – Application tosimple harmonic oscillator	3	Chalk & Talk	Black Board
UNIT -5 ANGULAR MOMENTUM				
5.1	Eigenvalue spectrum of general angular momentum –	3	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
5.2	Ladder operators and their algebra – Matrix representation	3	Chalk & Talk	Black Board
5.3	Spin angular momentum – Addition of angular momenta	3	Chalk & Talk	Black Board
5.4	CG Coefficients	3	Chalk & Talk	Black Board
5.5	Symmetry and anti – symmetry of wave functions	3	Chalk & Talk	Black Board
5.6	Construction of wave-functions and Pauli's exclusion principle	3	Chalk & Talk	Black Board

EVALUATION PATTERN

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assessment
	T1 10 Mks.	T2 10 Mks.	Seminar 5 Mks	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks	5 Mks	40 Mks	
K2	4	4	-	-	-	8	-	8	20
K3	2	2	-	5	-	9	-	9	22.5
K4	2	2	-	-	5	9	-	9	22.5
K5	2	2	5	-	-	9	-	9	22.5
Non Scholastic	-	-	-	-	-		5	5	12.5
Total	10	10	5	5	5	35	5	40	100

CIA

Scholastic	**35**
Non Scholastic	**5**
	40

SCHOLASTIC					NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	C6	CIA	ESE	Total
10	10	5	5	5	5	40	60	100

*

- **PG CIA Components**

The best out of two will be taken into account

			Nos		
C1	-	Test (CIA 1)	1	-	10 Mks
C2	-	Test (CIA 2)	1	-	10 Mks
C3	-	Assignment	2 *	-	5 Mks
C4	-	Open Book Test/PPT	2 *	-	5 Mks
C5	-	Seminar	1	-	5 Mks
C6	-	Attendance		-	5 Mks

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Demonstrates a clear understanding of the basic postulates of quantummechanics which serve to formalize the rules of quantum mechanics	K1, K5	PSO1, PSO2, PSO3
CO 2	able to apply and analyze the Schrodinger equation to solve one dimensionalproblems and three dimensional problems	K3, K4	PSO1, PSO2, PSO3
CO 3	Can discuss the various representations, space time symmetries andformulations of time evolution	K1	PSO1, PSO2, PSO3, PSO5
CO 4	Can formulate and analyze the approximation methods for various quantummechanical problems	K4,K5	PSO1, PSO2, PSO3, PSO5
CO 5	To apply non-commutative algebra for topics such as angular and spin angularmomentum and hence explain spectral line splitting	K3 , K4	PSO1, PSO2, PSO3, PSO5

Mapping of COs with PSOs

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

Mapping of COs with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	3	2	3	2
CO2	3	2	3	2
CO3	3	2	3	2
CO4	3	2	3	2
CO5	3	2	3	2

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSE DESIGNER:

Dr. M.V. Leena Chandra

Forwarded By

Dr. A. Sheela Vimala Rani

HoD'S Signature & Name

Employability,
Skill Development
100%

I PG

SEMESTER –II

For those who joined in 2023 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
PAPH	23PG2P6	PRACTICAL II	Practical	6	4

COURSE DESCRIPTION

The course provides hands on training to work with fiber, Laser and young's modulus, AC bridges, Flip – Flop, and OP-AMP circuits.

COURSE OBJECTIVE/S

This course offers opportunity to handle the laboratory equipment's and develop lab skills in non-electronics and electronic experiments

(Minimum of Twelve Experiments from the list)

1. Determination of Young's modulus and Poisson's ratio by Elliptical fringes - Cornu's Method
2. Determination of Stefan's constant of radiation from a hot body
3. Measurement of Susceptibility of liquid - Quincke's method
4. B-H curve using CRO
5. Thickness of LG Plate
6. Arc spectrum: Copper
7. Determination of e/m - Millikan's method
8. Miscibility measurements using ultrasonic diffraction method
9. Determination of Thickness of thin film. - Michelson Interferometer
10. Iodine absorption spectra
11. Determination of Numerical Apertures and Acceptance angle of optical fibers using Laser Source.
12. Measurement of Dielectricity - Microwave test bench
13. Hall Effect in Semiconductor. Determine the Hall coefficient, carrier concentration and carrier mobility
14. Interpretation of vibrational spectra of a given material
15. Determination of I-V Characteristics and efficiency of solar cell
16. GM counter – Absorption coefficient – Maximum range of β rays
17. IC 7490 as scalar and seven segment display using IC7447
18. Solving simultaneous equations – IC 741 / IC LM324

19. Op-Amp –Active filters: Low pass, High pass and Band pass filters (Second Order) Batter worth filter
20. Construction of Current to Voltage and Voltage to Current Conversion using IC 741.
21. Construction of second order butterworth multiple feedback narrow band pass filter
22. Realization of analog to digital converter (ADC) using 4-bit DAC and synchronous counter IC74193
23. Construction of Schmidt trigger circuit using IC555 for a given hysteresis – Application as squarer
24. Construction of pulse generator using the IC 555 – Application as frequency divider
25. BCD to Excess- 3 and Excess 3 to BCD code conversion
26. Study of binary up / down counters - IC 7476 / IC7473
27. Shift register and Ring counter and Johnson counter- IC 7476/IC 7474

TEXT BOOKS

1. Practical Physics, Gupta and Kumar, PragatiPrakasan
2. Kit Developed for doing experiments in Physics- Instruction manual, R.Srinivasan K.R Priolkar, Indian Academy of Sciences
3. Op-Amp and linear integrated circuit, Ramakanth A Gaykwad, Eastern Economy Edition.
4. Electronic lab manual Vol I, K ANavas, Rajath Publishing
5. Electronic lab manual Vol II, K ANavas, PHI eastern Economy Edition

REFERENCE BOOKS

1. An advanced course in Practical Physics, D.Chattopadhayay, C.RRakshit, New Central Book Agency Pvt. Ltd
2. Advanced Practical Physics, S.P Singh, PragatiPrakasan
3. A course on experiment with He-Ne Laser, R.S. Sirohi, John Wiley & Sons (Asia) Pvt.ltd
4. Electronic lab manual Vol II, Kuriachan T.D, Syam Mohan, Ayodhya Publishing
5. Electronic Laboratory Primer a design approach, S. Poornachandra, B.Sasikala, Wheeler Publishing, New Delhi

Employability,
Skill Development
100%

I M.Sc. PHYSICS

SEMESTER –II

For those who joined in 2023 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
PAPH	23PG2PE5	ADVANCED MATHEMATICAL PHYSICS	Elective	4 Hrs.	3

COURSE DESCRIPTION

This course emphasise the basic concepts and applications of Mathematical Physics which involves Tensors, Special functions and group theory.

COURSE OBJECTIVES

This course provides the foundation in conceptual understanding of Tensors, Special functions and group theory, required for the description of its applications in the physical phenomena

UNIT –I TENSOR ANALYSIS (12 HRS.)

Cartesian vectors and tensors illustration with moment of inertia, conductivity, dielectric tensors. Illustration from physics. Vectors and tensors under general co-ordinate transformations, contravariant and covariant vectors and tensors, mixed tensors; tensor algebra, addition, subtraction, direct product of tensors, quotient theorem, symmetric and antisymmetric tensors-Fundamental Tensors

UNIT – II SPECIAL FUNCTIONS I (12 HRS.)

Legendre's differential equation and Legendre functions, Generating function-Rodrigue formula-Orthogonal properties-Recurrence formula

UNIT –III SPECIAL FUNCTIONS II (12 HRS.)

Bessel differential equations-Bessel functions of the first kind-recurrence formula-generating function-Hermite Polynomials-Generating function

UNIT –IV ABSTRACT GROUP THEORY (12 HRS.)

Defining properties of a group – some examples of groups – subgroups – classes – Molecular symmetry and the symmetry groups – symmetry elements and operations – symmetry planes and reflections – the inversion centre – proper axes and proper rotations – improper axes and improper rotations – the symmetry point groups – symmetries with multiple higher order axes – a systematic procedure for symmetry classification of molecules – illustrative examples – classes of symmetry operations

UNIT –V THEORY OF GROUP REPRESENTATION: (12 HRS.)

Representations of groups – the great Orthogonalitytheorem and its consequences - character tables – representations for cyclic groups – wave functions as bases for irreducible representation – the direct product

UNIT –VI DYNAMISM (Evaluation Pattern-CIA only)

Solving application problems on Group theory and special functions

TEXT BOOKS:

1. A.W.Joshi, Group Theory for Physicists
2. Matrices and Tensors in Physics by A.W. Joshi-Wiley Eastern Ltd
3. Mathematical Physics with classical mechanics by Satya Prakash SultanChand and Sons, Fourth Revised and enlarged edition 2002
4. D.B.Lichtenberg, Unitary Symmetry and Elementary Particles
5. E.Butkov, Mathematical Physics
6. J.V.Narlikar, General Relativity & Cosmology
7. R. Geroch, Mathematical Physics, The University of Chicago press (1985).
8. Chemical Applications of group theory by F. Albert Cotton – II ed. Wiley Eastern Ltd.

BOOKS FOR REFERENCES:

1. M.Hamermesh *Group Theory*

2. M.E.Rose: Elementary Theory of Angular Momentum

3. Georgi : Lie Groups for Physicists

4. E.A.Lord: Tensors, Relativity & Cosmology

5. P. Szekeres, A course in modern mathematical physics: Groups, Hilbert spaces and differential geometry, Cambridge University Press.

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 Tensor Analysis				
1.1	Cartesian vectors and tensors illustration with moment of inertia, conductivity, dielectric tensors. Illustration from physics	3	Chalk & Talk	Black Board
1.2	Vectors and tensors under general co-ordinate transformations, contravariant and covariant vectors	3	Chalk & Talk	Black Board
1.3	mixed tensors; tensor algebra, addition, subtraction, direct product of tensors, quotient theorem, symmetric and antisymmetric tensors-	3	Lecture	Black Board
1.4	Fundamental Tensorscoordinates	3	Lecture	Black Board
UNIT -2 SPECIAL FUNCTIONS I				
2.1	Legendre's differential equation and	2	Chalk& Talk	Black Board

2.2	Legendre functions	2	Chalk& Talk	Black Board
2.3	Generating function	2	Lecture	Black Board
2.4	Rodrigue formula	2	Lecture	Black Board
2.5	Orthogonal properties	2	Chalk& Talk	Black Board
2.6	Recurrence formula	2	Chalk& Talk	Black Board
UNIT - 3 Special Functions II				
3.1	Bessel differential equations	2	Chalk & Talk	Blac k Boar d
3.2	Bessel functions of the first kind	2	Chalk & Talk	Blac k Boar d
3.3	Recurrence formula	2	Chalk & Talk	Blac k Boar d
3.4	Generating function	3	Chalk & Talk	Blac k Boar d
3.5	Hermite Polynomials & Generating functions	3	Chalk & Talk	Blac k Boar d
UNIT – 4 ABSTRACT GROUP THEORY				
4.1	Defining properties of a group –	2	Chalk &	Black

	some examples of groups		Talk	Board
4.2	Subgroups – classes	1	Chalk & Talk	Black Board
4.3	Molecular symmetry and the symmetry groups – symmetry elements and operations	1	Chalk & Talk	Black Board
4.4	Symmetry planes and reflections – the inversion centre – proper axes	2	Lecture	PPT
4.5	proper rotations – improper axes and improper rotations	2	Lecture	PPT
4.6	The symmetry point groups – symmetries with multiple higher order axes	2	Chalk & Talk	Black Board
4.7	A systematic procedure for symmetry classification of molecules – illustrative examples – classes of symmetry operations	2	Chalk & Talk	Black Board
UNIT 5 - THEORY OF GROUP REPRESETATION				
5.1	Representations of groups – the great Orthogonalitytheorem and its consequences	3	Chalk & Talk	Black Board
5.2	character tables	2	Chalk & Talk	Black Board
5.3	representations for cyclic groups	2	Chalk & Talk	Black Board
5.4	Wave functions as bases for irreducible representation	3	Chalk & Talk	Black Board
5.5	The direct product	2	Chalk & Talk	Black Board

EVALUATION PATTERN

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assess Ment
	T1 10 Mks.	T2 10 Mks.	Seminar 5 Mks	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks	5 Mks	40 Mks	
K2	4	4	-	-	-	8	-	8	20
K3	2	2	-	5	-	9	-	9	22.5
K4	2	2	-	-	5	9	-	9	22.5
K5	2	2	5	-	-	9	-	9	22.5
Non Scholastic	-	-	-	-	-		5	5	12.5
Total	10	10	5	5	5	35	5	40	100

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

SCHOLASTIC					NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	C6	CIA	ESE	Total
10	10	5	5	5	5	40	60	100

PG CIA Components

			Nos		
C1	-	Test (CIA 1)	1	-	10 Mks
C2	-	Test (CIA 2)	1	-	10 Mks
C3	-	Assignment	2 *	-	5 Mks
C4	-	Open Book Test/PPT	2 *	-	5 Mks
C5	-	Seminar	1	-	5 Mks
C6	-	Attendance		-	5 Mks

****The best out of two will be taken into account***

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Define and Deduce illustrations in Physics as Tensors	K1	PSO1& PSO2
CO 2	Discuss Legendre functions and recurrence formula	K1, K2,	PSO3
CO 3	Explain Bessel and Hermite functions	K2 & K4	PSO5
CO 4	Describe group, cyclic group , sub group and multiplication tables	K2, K3	PSO4& PSO5
CO5	Prove great orthogonality theorem and construct character tables of a	K2,K3	PSO4& PSO5

	group		

Mapping of COs with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2	1	1
CO2	2	2	3	1	1
CO3	2	3	3	1	3
CO4	2	1	2	3	3
CO5	2	1	2	3	3

Mapping of COs with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	3	1	1	1
CO2	2	3	1	2
CO3	1	3	2	1
CO4	2	3	1	1
CO5	1	3	3	1

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSE DESIGNER:

1. Dr. M.Ragam

2. Ms. J. R. Sofia

Forwarded By

Dr. A. SheelaVimala Rani

HoD'S Signature & Name

Employability,
Skill Development
100%

I PG

SEMESTER –II

(*For those who joined in 2023 onwards*)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
PAPH	23PG2PE6	NONLINEAR DYNAMICS	Lecture	4 Hrs.	3

COURSE DESCRIPTION

This course introduces Basics of Numerical methods and Differential equations, Fundamentals of linear and nonlinear waves, and Basics of communication systems

COURSE OBJECTIVES

To enable the student to understand the analytical and numerical techniques of nonlinear dynamics, concepts of various coherent structures, bifurcations and onset of chaos, theory of chaos and its characterization and applications of solitons, chaos and fractals

UNITS

UNIT –I : GENERAL (12 HRS.)

Linear waves-ordinary differential equations(ODEs)-Partial differential equations(PDEs)- Methods to solve ODEs and PDEs.- Numerical methods – Linear and Nonlinear oscillators-Nonlinear waves-Qualitative features

UNIT –II : COHERENT STRUCTURES (12 HRS.)

Linear and Nonlinear dispersive waves - Solitons – KdB equation – Basic theory of KdB equation –Ubiquitous soliton equations – AKNS Method, Backlund transformation, Hirotabilinearization method, Painleve analysis - Perturbation methods- Solitons in Optical fibres - Applications.

UNIT –III : BIFURCATIONS AND ONSET OF CHAOS (12 HRS.)

One dimensional flows – Two dimensional flows – Phase plane – Limit cycles – Simple bifurcations – Discrete Dinamical system – Strange attractors – Routes to chaos.

UNIT–IV : FRACTALS AND CELLULAR AUTOMATA (12 HRS.)

Self similarity - Properties and examples of fractals- Fractal dimension-Construction and properties of some fractals-Middle one third cantor set-Koch curve-Sierpinski triangle-Julia setMandelbrot set-Applications of fractals-Cellular Automata-Fractal Structure- Applications.

UNIT –V : APPLICATIONS (12 HRS.)

Soliton based communication systems – Solition based computation – Synchronization of chaos – Chaos based communication – Cryptography – Image processing – Stochastic – Resonance – Chaos based computation – Time Series analysis.

UNIT –VI DYNAMISM (Evaluation Pattern-CIA only)

Applications of solitons in daily life

TEXT BOOK:

1. M.Lakshmanan and S.Rajasekar, Nonlinear Dynamics: Integrability, Chaos and Patterns.Springer, 2003.
2. A.Hasegawa and Y.Kodama, Solitons in Optical Communications. Oxford Press, 1995.
3. Drazin, P. G. Nonlinear Systems. Cambridge University Press, 2012. ISBN: 9781139172455.
4. Wiggins, S. Introduction to Applied Nonlinear Dynamical Systems and Chaos. Springer, 2003. ISBN: 9780387001777.
5. Strogatz, Steven H. Nonlinear Dynamics and Chaos: With Applications to Physics, Biology, Chemistry, and Engineering. Westview Press, 2014. ISBN: 9780813349107.

REFERENCES:

1. G.Drazin and R.S.Johnson. Solitons: An Introduction. Cambridge University Press, 1989.
2. M.Lakshmanan and K.Murali. Chaos in Nonlinear Oscillators. World Scientific, 1989.
3. S.Strogatz**.** Nonlinear Dynamics and Chaos. Addison Wesley, 1995.
4. Hao Bai-Lin, Chaos (World Scientidic, Singapore, 1984).

5. Kahn, P. B., Mathematical Methods for Scientists & Engineers (Wiley, NY, 1990)

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 GENERAL				
1.1	Introduction & Linear waves	2	Chalk & Talk	Black Board
1.2	ordinary differential equations(ODEs)-	2	Chalk & Talk	Black Board
1.3	Partial differential equations(PDEs)	2	Chalk & Talk	Black Board
1.4	Methods to solve ODEs and PDEs	2	Chalk & Talk	Black Board
1.5	Numerical methods – Linear and Nonlinear oscillators	3	Chalk & Talk	Black Board
1.6	Nonlinear waves	2	Chalk & Talk	Black Board
1.7	Qualitative features	2	Chalk & Talk	Black Board
UNIT -2 DYNAMICAL SYSTEMS				
2.1	Introduction: examples of dynamical systems	3	Chalk & Talk	Black Board
2.2	driven damped pendulum	2	Chalk & Talk	Black Board
2.3	ballon oscillating floor & dripping faucet	2	Chalk & Talk	Black Board
2.4	chaotic electrical circuits &One-dimensional maps	2	Chalk & Talk	Black Board
2.5	The logistic map &bifurcations	2	Chalk &	Black

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
	in the logistic map		Talk	Board
2.6	fixed points and their stability	2	Chalk & Talk	Black Board
2.7	other one-dimensional maps	2	Chalk & Talk	Black Board
UNIT -3 BIFURCATIONS AND ONSET OF CHAOS				
3.1	Introduction & One dimensional flow	3	Chalk & Talk	Black Board
3.2	Two dimensional flows	2	Chalk & Talk	Black Board
3.3	Phase plane – Limit cycles	2	Chalk & Talk	Black Board
3.4	Simple bifurcations	2	Chalk & Talk	Black Board
3.5	Discrete Dinamical system	2	Chalk & Talk	Black Board
3.6	Strange attractors	2	Chalk & Talk	Black Board
3.7	Routes to chaos	2	Chalk & Talk	Black Board
UNIT -4 COHERENT STRUCTURES				
4.1	Linear and Nonlinear dispersive waves	2	Chalk & Talk	Black Board
4.2	KdB equation& Basic theory of KdB equation	2	Chalk & Talk	Black Board
4.3	Solitons & Ubiquitous soliton equations	2	Chalk & Talk	Black Board
4.4	AKNS Method & Backlund transformation	2	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
4.5	Hirotabilinearization method	2	Chalk & Talk	Black Board
4.6	Painleve analysis & Perturbation methods	2	Chalk & Talk	Black Board
4.7	Solitons in Optical fibres	2	Chalk & Talk	Black Board
4.8	Applications	1	Chalk & Talk	Black Board
UNIT -5 APPLICATIONS				
5.1	Introduction & Soliton based communication systems	2	Chalk & Talk	Black Board
5.2	Solition based computation	2	Chalk & Talk	Black Board
5.3	Synchronization of chaos	2	Chalk & Talk	Black Board
5.4	Chaos based communication	2	Chalk & Talk	Black Board
5.5	Cryptography & Image processing	2	Chalk & Talk	Black Board
5.6.	Stochastic &Resonance	2	Chalk & Talk	Black Board
5.7	Chaos based computation & Time Series analysis	3	Chalk & Talk	Black Board

EVALUATION PATTERN

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assess Ment

	T1 10 Mks.	T2 10 Mks.	Seminar 5 Mks	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks	5 Mks	40 Mks	
K2	4	4	-	-	-	8	-	8	20
K3	2	2	-	5	-	9	-	9	22.5
K4	2	2	-	-	5	9	-	9	22.5
K5	2	2	5	-	-	9	-	9	22.5
Non Scholastic	-	-	-	-	-		5	5	12.5
Total	10	10	5	5	5	35	5	40	100

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

SCHOLASTIC					**NON - SCHOLASTIC**	**MARKS**		
C1	**C2**	**C3**	**C4**	**C5**	**C6**	**CIA**	**ESE**	**Total**
10	**10**	**5**	**5**	**5**	**5**	**40**	**60**	**100**

PG CIA Components

			Nos		
C1	-	Test (CIA 1)	1	-	10 Mks
C2	-	Test (CIA 2)	1	-	10 Mks
C3	-	Assignment	2 *	-	5 Mks

C4	-	Open Book Test/PPT	2 *	-	5 Mks
C5	-	Seminar	1	-	5 Mks
C6	-	Attendance		-	5 Mks

****The best out of two will be taken into account***

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	To analyze the numerical techniques of nonlinear dynamics	K2	PSO1, PSO2, PSO3
CO 2	To Understand various dynamical systems	K2	PSO1, PSO2,
CO 3	To explain the bifurcations and onset of chaos	K3	PSO2, PSO3, PSO5
CO 4	To understand the concepts of various coherent structures	K2, K3	PSO1, PSO2, PSO3, PSO5
CO 5	To describe the applications of solitons, chaos and fractals	K3 & K4	PSO2, PSO3, PSO5

Mapping of COs with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PS O5

CO1	**3**	**3**	**3**	**2**	**2**
CO2	**3**	**3**	**2**	**2**	**2**
CO3	**2**	**3**	**3**	**2**	**3**
CO4	**3**	**3**	**3**	**2**	**3**
CO5	**2**	**3**	**3**	**2**	**3**

Mapping of COs with POs

CO/ PSO	**PO1**	**PO2**	**PO3**	**PO4**
CO1	**3**	**2**	**3**	**2**
CO2	**3**	**2**	**3**	**2**
CO3	**3**	**2**	**3**	**2**
CO4	**3**	**2**	**3**	**2**
CO5	**3**	**2**	**3**	**2**

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSE DESIGNER:

Dr. R.Jothi Mani

Forwarded By

Dr. A. Sheela Vimala Rani

HoD'S Signature & Name

Employability,
Skill Development
100%

I M.Sc.PHYSICS

SEMESTER –II

(For those who joined in 2023 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
PAPH	23PG2PE7	8086 MICROPROCESSOR AND MICROCONTROLLER 8051	Theory	4	3

COURSE DESCRIPTION

This course aims at providing the students with an exposure to the popular microprocessor Intel 8086 and the microcontroller Intel 8051

COURSE OBJECTIVES

- To provide an understanding of the architecture and functioning of microprocessor 8086 and to the methods of interfacing I/O devices and memory to microprocessor
- To introduce 8086 programming and instruction sets of microcontroller 8051

Unit I: 16 BIT MICROPROCESSORS (14 Hrs)

Intel 8086 – Pin description of Intel 8086 – operation modes of 8086 – pin description for minimum mode- pin description for maximum mode – Register organization of 8086 – Bus interface and execution Unit (BIU and EU)- 8086 read and write bus cycles- lock – Addressing modes of 8086

Unit II:8086-INSTRUCTION SET & ASSEMBLY LANGUAGE PROGRAMMES (14 Hrs)

8086 Instruction groups – Addressing mode byte – Segment register – selection – segment override – 8086 instructions.

Assembly Language Programmes – To find the largest number in a data array – To find the smallest number in a data array – To arrange numbers in ascending (or descending) order – Block move or relocation – Sum of a series of 16 – Bit numbers whose sum is 16 – Bit or 32 – Bit – multibyte addition.

Unit III: INTERFACING OF A/D CONVERTER THROUGH PROGRAMMABLE PERIPHERAL INTERFACE (INTEL 8255) (12 Hrs)

Programmable Peripheral Interface – Operating modes of 8255- bit set – reset – feature- control groups- control word with examples – Handshake signals for an input in Modes 1 and 2- Interfacing of ADC 0808 or 0809 to 8086.

Unit IV : INTEL 386 AND 486 μP, AND PENTIUM (10 Hrs)

Intel 386, 486 μP- 486 Dx Architecture- Memory Organization – Operation modes- Protection – Interrupts and exception – Pentium μP –- On – chip separate cache memory for code and data.

Unit V:THE 8051 MICROCONTROLLERS & 8051 ASSEMBLY LANGUAGE PROGRAMMING (10 Hrs)

Microcontrollers and Embedded Processors – Overview of 8051 Family.

Inside the 8051 – Introduction to 8051 Assembly Programming – Assembling and Running an 8051 Program(simple programs only)

UNIT –VI PROFESSIONAL COMPONENTS

Expert Lectures, Online Seminars - Webinars on Industrial Interactions/Visits, Competitive Examinations, Employable and Communication Skill Enhancement, Social Accountability and Patriotism

TEXT BOOK

1. Advanced microprocessors and interfacing – Badri Ram
2. The 8051 Microcontroller and Embedded systems - Muhammad Ali Mazidi, Janice Gillipsie Mazidi- Pearson Prentice Hall, First Impression, 2004

BOOKS FOR REFERENCE

1. The Intel Microprocessors 8086/8088, 80186, 80286, 80386 and 80486, Prentice Hall of India, New Delhi, third edition, 1995 - - Barry B. Brey
2. Advanced Microprocessors – Daniel Tabak
3. Microprocessor interfacing, Programming and Hardware, Tata McGraw Hill 2005. Douglas V. Hall
4. Fundamentals of Microprocessor 8086 , S. Visvanathan PVT., Ltd., 3 rd Edition 2005 - Vijayendran V.

WEB SOURCES

1. https://www.tutorialspoint.com/microprocessor/microprocessor8086_architecture.html
2. http://www.electronicsengineering.nbcafe.in/peripheral-mapped-io-interfacing/
3. https://www.geeksforgeeks.org/programmable-peripheral-interface-8255/
4. http://www.circuitstoday.com/8051-microcontrollerhttps://www.elprocus.com/8051-assembly-language-programming/

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 16 BIT MICROPROCESSORS				
1.1	Introduction: Intel 8086,Pin description of Intel 8086	2	Chalk & Talk	Black Board
1.2	Operation modes of 8086, pin description for minimum mode, pin description for maximum mode	3	Chalk & Talk	Black Board
1.3	Register organization of 8086	3	Chalk & Talk	Black Board
1.4	Bus interface and execution Unit (BIU and EU), 8086 read and write bus cycles,	3	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
	lock			
1.5	Addressing modes of 8086	3	Chalk &Talk	Black Board
UNIT -2 8086-INSTRUCTION SET & ASSEMBLY LANGUAGE PROGRAMMES				
2.1	8086 Instruction groups, Addressing mode	2	Chalk & Talk	Black Board
2.2	Segment register, selection, segment override, 8086 instructions	2	Chalk & Talk	Black Board
2.3	Assembly Language Programmes, To find the largest number in a data array, To find the smallest number in a data array	2	Chalk & Talk	Black Board
2.4	To arrange numbers in ascending (or descending) order	2	Chalk & Talk	Black Board
2.5	Block move or relocation	2	Lecture	LCD
2.6	Sum of a series of 16, Bit numbers whose sum is 16	2	Chalk & Talk	Black Board
2.7	Bit or 32, Bit, multibyte addition	2	Lecture	Black Board
UNIT -3 INTERFACING OF A/D CONVERTER THROUGH PROGRAMMABLE PERIPHERAL INTERFACE (INTEL 8255)				
3.1	Programmable Peripheral Interface	3	Chalk & Talk	Black Board
3.2	Operating modes of 8255	3	Chalk & Talk	Black Board
3.3	Bit set, reset, feature, control groups, control	2	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
	word with examples			
3.4	Handshake signals for an input in Modes 1 and 2	2	Chalk & Talk	Black Board
3.5	Interfacing of ADC 0808 or 0809 to 8086	2	Chalk & Talk	Black Board
UNIT -4INTEL 386 AND 486 μP, AND PENTIUM				
4.1	Intel 386, 486 μP- 486 Dx Architecture	2	Lecture	Black Board
4.2	Memory Organization	2	Lecture	LCD
4.3	Operation modes	1	Chalk & Talk	Black Board
4.4	Protection – Interrupts and exception	2	Lecture	LCD
4.5	Pentium μP	1	Chalk & Talk	Black Board
4.6	On – chip separate cache memory for code and data	2	Chalk & Talk	Black Board
UNIT -5 THE 8051 MICROCONTROLLERS & 8051 ASSEMBLY LANGUAGE PROGRAMMING				
5.1	Microcontrollers and Embedded Processors	2	Chalk & Talk	Black Board
5.2	Overview of 8051 Family	2	Chalk & Talk	Black Board
5.3	Inside the 8051	2	Chalk & Talk	Black Board
5.4	Introduction to 8051 Assembly Programming	2	Chalk & Talk	Black Board
5.5	Assembling and Running an 8051 Program(simple	2	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
	programs only)			

CIA

Scholastic	**23**
Non Scholastic	**2**
	25

EVALUATION PATTERN

SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	CIA	ESE	Total
15		3	5	2	25	75	100

• PG CIA Components					
			Nos		
C1	-	Test (CIA 1)**	1	-	15 Mks
C2	-	Test (CIA 2)**	1	-	
C3	-	Assignment	2 *	-	3Mks
C4	-	Seminar	1	-	5 Mks
C5	-	Attendance		-	2 Mks

The best out of two will be taken into account

*** Average of C1 and C2 will be taken into account***

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO1	Gain knowledge of architecture and working of 8086 microprocessor.	K1	PSO1,PSO2& PSO3
CO2	write simple assembly language programs for 8086 microprocessor	K3	PSO5
CO3	Learn about various techniques Of Interfacing A/D Converter Through Intel 8255.	K1, K3	PSO2,PSO3
CO4	Gain knowledge of Intel 386 And 486 μP, And Pentium Processors.	K2	PSO4,PSO5
CO5	write simple assembly language programs for 8051 Microcontroller	K1, K4	PSO4,PSO5

Mapping of COs with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	**3**	**3**	**3**	**1**	**2**
CO2	**2**	**2**	**1**	**2**	**3**
CO3	**2**	**3**	**3**	**1**	**2**
CO4	**1**	**2**	**2**	**3**	**3**

CO5	**2**	**1**	**2**	**3**	**3**

Mapping of C0s with POs

CO/ PO	PO1	PO2	PO3	PO4
CO1	**2**	**3**	**2**	**2**
CO2	**2**	**3**	**3**	**2**
CO3	**2**	**3**	**2**	**2**
CO4	**2**	**2**	**3**	**2**
CO5	**2**	**3**	**3**	**2**

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSE DESIGNER

R.ALPHONSA FERNANDO

Forwarded By

Dr. A. Sheela Vimala Rani

HoD's Signature & Name

Employability,
Skill Development
100%

I MSC PHYSICS

SEMESTER –I

(*For those who joined in 2023 onwards*)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
PAPH	23PG2PE8	Biophysics	Lecture	4 Hrs.	3

COURSE DESCRIPTION

This course introduces fundamental concepts of Physics and Biology.

COURSE OBJECTIVES

To understand the physical principles involved in cell function maintenance; to enable the students to understand the fundamentals of macromolecular structures involved in propagation of life; to have knowledge about the biophysical function of membrane and neuron; to understand various kinds of radiation and their effects on living system and to know the hazards posed by such radiations and the required precautions; to enable the students to understand the physical principles behind the various techniques available for interrogating biological macromolecules.

UNITS

UNIT –I :CELLULAR BIOPHYSICS: (12 HRS.)

Architecture and Life Cycle of cells – Organelles of Prokaryotic and Eukaryotic cell – Cell size and shape – Fine structure of Prokaryotic and Eukaryotic cell organization – Compartment & assemblies membrane system – Extracellular matrix - Molecular mechanisms of Vesicular traffic - Electrical activities of cardiac and neuronal cells.

UNIT –II MOLECULAR BIOPHYSICS: (12 HRS.)

Macromolecular structure: Protein structure – amino acids, peptide bonds, primary, secondary, tertiary and quaternary structures of proteins

Nucleic acid structure: nucleosides and nucleotides, RNA structure, DNA structure and conformation.

Special Bio-macromolecules: Metalloproteins, nucleoproteins, ribozymes, chaperons and prions.

UNIT –III MEMBRANE AND NEURO BIOPHYISCS: (12HRS.)

Models membranes - Biological membranes and dynamics – Membrane Capacitors – Transport across cell and organelle membranes – Ion channels.

Nervous system: Organization of the nervous system –Membrane potential – Origins of membrane potential - Electrochemical potentials – Nernst equation – Goldman equation.

UNIT–IV RADIATION BIO PHYSICS: (12HRS.)

X-Ray: Effects on bio-macromolecules – Gamma Radiation: Molecular effects of gamma radiation, Radiation effects on nucleic acids and membranes, Effects on cell and organelles – UV radiation: Effects on bio-macromolecules and proteins – Radiation hazards and protection – use of radiations in cancer.

UNIT –V PHYSICAL METHODS IN BIOLOGY: (12HRS.)

Spectroscopy: UV-Visible absorption spectrophotometry – Optical Rotatory Dispersion (ORD) – Structure Determination: X-ray Crystallography, Electron spin resonance (ESR) and biological applications. Chromatography: Thin layer chromatography (TLC), Gas liquid chromatography (GLC) – Centrifugation: Differential centrifugation, density gradient centrifugation. Electrophoresis: Gel electrophoresis, polyacrylamide gel electrophoresis.

UNIT –VI DYNAMISM (Evaluation Pattern-CIA only)

Biophysics applies the principles of physics and chemistry and the methods of mathematical analysis and computer modeling to biological systems in explaining the fundamental level the structure, dynamics, interactions and ultimate function of biological systems.

TEXT BOOK:

1. The cell: A molecular approach, Geoffrey M. Cooper, ASM Press, 2013.
2. Biophysics, VasanthaPattabhi, N. Gautham, Narosa Publishing, 2009

3. Biophysics, P. S. Mishra VK Enterprises, 2010.
4. Biophysics, M. A Subramanian, MJP Publishers, 2005.
5. Bioinstrumentation, L. Veerakumari, MJP Publishers, 2006.

REFERENCES:

1. Chemical Biophysics by Daniel A Beard (Cambridge University Press, 2008).
2. Essential cell biology by Bruce Albert et al (Garland Science)
3. Biophysics, W. Hoppe, W. Lohmann, H. Markl and H. Ziegler. Springer Verlag, Berlin (1983).
4. Membrane Biophysics by Mohammad Ashrafuzzaman, Jack A. Tuszynski, (Springer science & business media).
5. Biological spectroscopyby Iain D. Campbell, Raymond A. Dwek

WEB SOURCES

1. General Bio:http://www.biology.arizona.edu/DEFAULT.html
2. Spectroscopy: http://www.cis.rit.edu/htbooks/nmr/inside.htm
3. Electrophoresis:http://learn.genetics.utah.edu/content/labs/gel/
4. Online biophysics programs: http://mw.concord.org/modeler/
5. https://blanco.biomol.uci.edu/WWWResources.html

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 CELLULAR BIOPHYSICS				
1.1	Architecture and Life Cycle of cells, Organelles of Prokaryotic and Eukaryotic cell	2	Chalk & Talk	Black Board
1.2	Cell size and shape	1	Chalk & Talk	Black Board
1.3	Fine structure of Prokaryotic and Eukaryotic cell organization	2	Chalk & Talk	Black Board
1.4	Compartment & assemblies membrane system	2	Chalk & Talk	Black Board
1.5	Extracellular matrix	2	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
1.6	Molecular mechanisms of Vesicular traffic	2	Chalk & Talk	Black Board
1.7	Electrical activities of cardiac and neuronal cells.	1	Chalk & Talk	Black Board
UNIT -2 MOLECULAR BIOPHYSICS				
2.1	Macromolecular structure: Protein structure	2	Chalk & Talk	Black Board
2.2	amino acids, peptide bonds, primary, secondary, tertiary and quaternary structures of proteins	2	Chalk & Talk	Black Board
2.3	Nucleic acid structure: nucleosides and nucleotides	2	Chalk & Talk	Black Board
2.4	RNA structure, DNA structure and conformation	2	Chalk & Talk	Black Board
2.5	Special Bio-macromolecules	2	Chalk & Talk	Black Board
2.6	Metalloproteins, nucleoproteins	1	Chalk & Talk	Black Board
2.7	ribozymes, chaperons and prions	1	Chalk & Talk	Black Board
UNIT -3 MEMBRANE AND NEURO BIOPHYISCS				
3.1	Models membranes - Biological membranes and dynamics	2	Chalk & Talk	Black Board
3.2	Membrane Capacitors – Transport across cell and organelle membranes – Ion channels.	2	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
3.3	Nervous system: Organization of the nervous system –Membrane potential	3	Chalk & Talk	Black Board
3.4	Origins of membrane potential - Electrochemical potentials	3	Chalk & Talk	Black Board
3.5	Nernst equation – Goldman equation	2	Chalk & Talk	Black Board
UNIT -4 RADIATION BIO PHYSICS				
4.1	X-Ray: Effects on bio-macromolecules	2	Chalk & Talk	Black Board
4.2	Gamma Radiation: Molecular effects of gamma radiation, Radiation effects on nucleic acids and membranes	2	Chalk & Talk	Black Board
4.3	Radiation effects on nucleic acids and membranes	2	Chalk & Talk	Black Board
4.4	Effects on cell and organelles – UV radiation	2	Chalk & Talk	Black Board
4.5	Effects on bio-macromolecules and proteins – Radiation hazards and protection	2	Chalk & Talk	Black Board
4.6	use of radiations in cancer	2	Chalk & Talk	Black Board
UNIT -5 PHYSICAL METHODS IN BIOLOGY				
5.1	Spectroscopy: UV-Visible absorption spectrophotometry – Optical Rotatory Dispersion (ORD) – Structure Determination	3	Chalk & Talk	Black Board
5.2	X-ray Crystallography	2	Chalk &	Black

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
			Talk	Board
5.3	Electron spin resonance (ESR) and biological applications Chromatography:	3	Chalk & Talk	Black Board
5.4	Thin layer chromatography (TLC), Gas liquid chromatography (GLC)	2	Chalk & Talk	Black Board
5.5	Centrifugation: Differential centrifugation, density gradient centrifugation	1	Chalk & Talk	Black Board
5.6	Electrophoresis: Gel electrophoresis, polyacrylamide gel electrophoresis	1	Chalk & Talk	Black Board

EVALUATION PATTERN

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assess Ment
	T1 10 Mks.	T2 10 Mks.	Seminar 5 Mks	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks	5 Mks	40 Mks	
K2	4	4	-	-	-	8	-	8	20
K3	2	2	-	5	-	9	-	9	22.5
K4	2	2	-	-	5	9	-	9	22.5
K5	2	2	5	-	-	9	-	9	22.5
Non Scholastic	-	-	-	-	-		5	5	12.5

Total	10	10	5	5	5	35	5	40	100

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

SCHOLASTIC					NON - SCHOLASTIC	MARKS		
C1	**C2**	**C3**	**C4**	**C5**	**C6**	**CIA**	**ESE**	**Total**
10	**10**	**5**	**5**	**5**	**5**	**40**	**60**	**100**

PG CIA Components

			Nos		
C1	-	Test (CIA 1)	1	-	10 Mks
C2	-	Test (CIA 2)	1	-	10 Mks
C3	-	Assignment	2 *	-	5 Mks
C4	-	Open Book Test/PPT	2 *	-	5 Mks
C5	-	Seminar	1	-	5 Mks
C6	-	Attendance		-	5 Mks

****The best out of two will be taken into account***

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Understand the structural organization and function of living cells and should able to apply the cell signaling mechanism and its electrical activities.	K2,K3	PSO1, PSO3
CO 2	Comprehension of the role of biomolecular conformation to function.	K1	PSO1, PSO3
CO 3	Conceptual understanding of the function of biological membranes and also to understand the functioning of nervous system.	K2,K5	PSO1, PSO3, PSO5
CO 4	know the effects of various radiations on living systems and how to prevent ill effects of radiations.	K1,K5	PSO1, PSO3, PSO5
CO 5	Analyze and interpret data from various techniques viz., spectroscopy, crystallography, chromatography etc.,	K4	PSO1, PSO2, PSO3, PSO5

Mapping of COs with PSOs

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	**3**	**2**	**3**	**3**	**3**
CO2	**2**	**3**	**3**	**2**	**2**
CO3	**3**	**3**	**3**	**3**	**3**
CO4	**3**	**3**	**3**	**3**	**3**
CO5	**3**	**3**	**3**	**3**	**3**

Mapping of COs with POs

CO/ PSO	PO1	PO2	PO3	PO4

CO1	**3**	**3**	**3**	**2**
CO2	**3**	**3**	**2**	**2**
CO3	**3**	**3**	**3**	**2**
CO4	**3**	**3**	**3**	**3**
CO5	**3**	**3**	**3**	**3**

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**
♦ Weakly Correlated -**1**

COURSE DESIGNER:
Dr. J. SELVI

Forwarded By

Dr. A. Sheela Vimala Rani

HoD'S Signature & Name

Employability,
Skill Development
100%

SEMESTER –II

(For those who joined in 2023 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
PAPH	23PG2PAE	**MODERN PHOTOGRAPHY**	**Lecture**	**4 Hrs.**	**2**

COURSE DESCRIPTION

This course will familiarize the students with the fundamental techniques necessary for the creative use of photography by introducing them to the basic usage of SLR camera and Adobe Photoshop post processing.

COURSE OBJECTIVES

This course focuses on core photographic concepts like the basic parts of camera, its important control parameters and composition techniques of photography. The students will be introduced to basic exposure parameters namely F-number – Aperture – shutter speed – lighting-contrast-exposure-illumination etc., The course will include hands-on demonstrations with the SLR camera as well as basic digital image editing techniques comprising of the post production work like editing images, using retouching tools and filters by Adobe Photoshop. On completion of this course, students will have the opportunity to personally experience the creative potential of photography and the languages linked to it.

UNITS

UNIT I: INTRODUCTION TO PHOTOGRAPHY (12 HRS)

Introduction to photography- Personal uses- Photography Process- Writing with light-Types of Camera - Parts of a Camera: Shutter, Lens, Aperture and Films - Tools of Photography.

UNIT II: PHOTOGRAPHIC OPTICS (12 HRS)

Photographic Optics: Reflection of Light – Refraction of Light - Dispersion of

Light through Glass Prism – Lenses - Different kinds of Image Formation.

UNIT III: COMPOSITION AND TYPES OF CAMERA (12 HRS)

Composition and the Need for Composing a Picture - Elements, Rules and Conventions of Composition - Relevance in a Communication Message - Single Lens Reflex (SLR) - Pinhole – Box - Folding and DSLR - Large and Medium Format Cameras - Twin Lens Reflex (TLR)

UNIT IV: VARIOUS TYPES OF PHOTOGRAPHY AND PRACTICING INDOOR SUBJECTS (12 HRS)

Photographing People and Portrait Photography - Photographing Men, Women, Couples and Groups - Wildlife Photography - Environment Photography - Sports Photography - Usefulness of the Photographs - Landscape Photography - Practicing indoor subjects like Passport, Portrait, Article, Still life subjects and outdoor subjects like landscape and moving object photography.

UNIT V: MODERN TECHNIQUES (12 HRS)

Use of "Photoshop"- Practicing post production work like editing images, using retouching tools and filters by Adobe Photoshop - Preparation of digital id cards – greeting cards –video making.

UNIT –VI DYNAMISM (For CIA only)

Training in Adobe Photoshop software - Uses of Photography.

TEXT BOOK:

1. S.Thiagarajan (2007, IV edition), *The New Practical Photography,* Sultan Chand & Sons.
2. Vinay Ahlawat, Gaurav Birla, Photography, Vikas Publishers.

REFERENCE BOOKS:

3. David Kilpatrick (1984), *Basic Photography*, Hamlyn London.
4. Michael Freeman (2005), Mastering *Colour Digital Photography*, Lark Books.

Web Sources:

1. https://www.pixinfocus.com/modern-photography/#:~:text=Modern%20photography%20is%20a%20period,a%20tool%20to%20capture%20images.
2. https://www.googleadservices.com/pagead/aclk?sa=L&ai=DChcSEwitzLmlzYT2AhUYnUsFHW3gAGcYABAAGgJzZg&ae=2&ohost=www.google.com&cid=CAESWuD2EF-qhzLTgqE5oCetg4ol7CwWzho9AFf_wLJUdxxaWYMOs8h6doc0Jmb4W9anrNU8ujmi4sTnLTFXoK1rBFXpGMAIddNVy9yD4jZHy1zh1JTGFsCqoHiDTQ&sig=AOD64_1auHwND-kaxB8VJEJSw4Hi1extHg&q&adurl&ved=2ahUKEwiNx7KlzYT2AhUGSmwGHbKEB0AQ0Qx6BAgDEAE

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 Introduction to Photography				
1.1	Introduction to photography	2	Lecture	Black Board
1.2	Personal uses	2	Lecture	Black Board
1.3	Writing with light	1	Lecture	Black Board & LCD
1.4	Photographic process	1	Lecture	Black Board & LCD
1.5	Types of Camera	1	Lecture	Black Board & LCD
1.6	Parts of a Camera: Shutter	2	Lecture	PPT & Blackboard

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
1.7	Lens, Aperture and Films	2	Lecture	PPT
1.8	Tools of Photography	1	Lecture	Black Board & LCD
UNIT -2 PHOTOGRAPHIC OPTICS				
2.1	Reflection of Light	3	Lecture	LCD
2.2	Refraction of Light	3	Lecture	LCD
2.3	Dispersion of Light through Glass Prism	3	Lecture	LCD
2.4	Different kinds of Image Formation	3	Lecture	LCD
UNIT - 3 COMPOSITION AND TYPES OF CAMERA				
3.1	Composition and the Need for Composing a Picture	1	Lecture	LCD
3.2	Elements, Rules and Conventions of Composition	1	Lecture	LCD
3.3	Relevance in a Communication Message	2	Lecture	LCD
3.4	Single Lens Reflex (SLR)	2	Lecture	LCD
3.5	Pinhole - Box - Folding and DSLR	2	Lecture	LCD
3.6	Large and Medium Format Cameras	2	Lecture	LCD
3.7	Twin Lens Reflex (TLR)	2	Lecture	LCD

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT – 4 VARIOUS TYPES OF PHOTOGRAPHY AND PRACTICING INDOOR SUBJECTS				
4.1	Photographing People and Portrait Photography	2	Lecture	PPT
4.2	Photographing Men, Women, Couples and Groups	2	Lecture	PPT
4.3	Wildlife Photography - Environment Photography	2	Lecture	PPT
4.4	Sports Photography - Usefulness of the Photographs - Landscape Photography	2	Lecture	PPT
4.5	Practicing indoor subjects like Passport, Portrait, Article, Still life subjects	2		
4.6	Practicing outdoor subjects like landscape and moving object photography.	2		
UNIT-5 Modern Techniques				
5.1	Uses of “Photoshop”	2	Lecture	PPT
5.2	Practicing post production work like editing images	2	Lecture	PPT
5.3	Retouching tools and filters by Adobe Photoshop	2	Lecture	PPT
5.4	Preparation of digital ID cards	2	Lecture	PPT

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
5.5	Greeting cards	2	Lecture	PPT
5.6	Video making	2	Lecture	PPT

EVALUATION PATTERN

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assess Ment
	T1 10 Mks.	T2 10 Mks.	Seminar 5 Mks	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks	5 Mks	40 Mks	
K2	4	4	-	-	-	8	-	8	20
K3	2	2	-	5	-	9	-	9	22.5
K4	2	2	-	-	5	9	-	9	22.5
K5	2	2	5	-	-	9	-	9	22.5
Non Scholastic	-	-	-	-	-		5	5	12.5
Total	10	10	5	5	5	35	5	40	100

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

SCHOLASTIC					NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	C6	CIA	ESE	Total
10	10	5	5	5	5	40	60	100

PG CIA Components

			Nos		
C1	-	Test (CIA 1)	1	-	10 Mks
C2	-	Test (CIA 2)	1	-	10 Mks
C3	-	Assignment	2 *	-	5 Mks
C4	-	Open Book Test/PPT	2 *	-	5 Mks
C5	-	Seminar	1	-	5 Mks
C6	-	Attendance		-	5 Mks

The best out of two will be taken into account

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Understand the basic phenomena of photography	K2	PSO1, PSO2, PSO3
CO 2	To discuss the optics behind photography	K2	PSO1, PSO2, PSO3

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 3	Comprehend the types of camera, its important control parameters and composition techniques of photography	K3	PSO1, PSO2, PSO3, PSO5
CO 4	understand the types of photography and practising indoor and outdoor objects	K2, K3	PSO1, PSO2, PSO3, PSO5
CO 5	Understand the modern technique of photoshop and develop skills to manipulate, edit and enhance the real time photographs using photoshop.	K3 & K4	PSO1, PSO2, PSO3, PSO5

Mapping of C0s with PSOs

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	**3**	**3**	**3**	**2**	**2**
CO2	**3**	**3**	**3**	**2**	**2**
CO3	**3**	**3**	**3**	**2**	**3**
CO4	**3**	**3**	**3**	**2**	**3**
CO5	**3**	**3**	**3**	**2**	**3**

Mapping of C0s with POs

CO/ PSO	PO1	PO2	PO3	PO4

CO1	**3**	**2**	**3**	**2**
CO2	**3**	**2**	**3**	**2**
CO3	**3**	**2**	**3**	**2**
CO4	**3**	**2**	**3**	**2**
CO5	**3**	**2**	**3**	**2**

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSE DESIGNER:

Dr. I. Janet Sherly

Forwarded By

Dr. A. Sheela Vimala Rani

HoD'S Signature & Name