2023 – T

RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS)

(Reaccredited with 'A' Grade by NAAC)
(Affiliated to Bharathidasan University, Tiruchirappalli)
THANJAVUR – 613 005, TAMIL NADU.

Department of Physics

DEPARTMENT OF PHYSICS
60
YEARS

Curriculum and Syllabus for

UG

Learning Outcome – based
Curriculum Frame work (LOCF)
(CO-K, PO mapping adopted and implemented from
2023-24 onwards)

RAJAH SERFOJI GOVT. COLLEGE(AUTONOMOUS)

Re accredited with 'A' Grade by NAAC

(Affiliated to Bharathidasan University, Tiruchirappalli)

Thanjavur – 613 005, Tamil Nadu, India

DEPARTMENT OF PHYSICS

60 YEARS

BOARD OF STUDIES

IN PHYSICS

Date: 24.07.2023

RAJAH SERFOJI GOVT. COLLEGE (AUTONOMOUS)
Reaccredited with 'A' Grade by NAAC
(Affiliated to Bharathidasan University, Tiruchirappalli)
Thanjavur – 613 005, TAMIL NADU, INDIA.
04362 226417, Email: physicsrsgc@gmail.com

BOARD OF STUDIES IN PHYSICS

AGENDA

The meeting of the Board of Studies in Physics, for the Academic year 2023-24, is held on 24th July 2023 at 10.00 A.M. in the Department of PHYSICS, Rajah Serfoji Government College (autonomous), Thanjavur-5.

The following agenda will be discussed in the meeting:

1. To implement the TAMILNADU STATE COUNCIL FOR HIGHER EDUCATION (TANSCHE) syllabus for the students admitted from 2023-2024 onwards.
2. To discuss the syllabus designed by TANSCHE, Chennai for U.G and P.G programmes.
3. To discuss and approve the revised Course structure.
4. To discuss and approve the Program Specific Outcomes and Course Outcomes.
5. To discuss and approve the feedback form on Curriculum from stakeholders.
6. To suggest the panel of examiners for 2023 examination onwards.
7. Any other academic affairs.

Dr. G. RANI
Chairperson, BOS &
Head, Department of Physics

RAJAH SERFOJI GOVT. COLLEGE (AUTONOMOUS)
Reaccredited with 'A' Grade by NAAC
(Affiliated to Bharathidasan University, Tiruchirappalli)
Thanjavur – 613 005, TAMIL NADU, INDIA.

DEPARTMENT OF PHYSICS
60 YEARS

BOARD OF STUDIES MEETING : 24-07-2023

The Board of Studies (BOS) meeting in Physics was held on 24.07.2023 (Monday) at 10.00 A.M. in the Department of Physics under the chairmanship of Dr. G. Rani, Head, Department of Physics. The following members were present in the meeting.

INTERNAL MEMBERS		SIGNATURE
1. Dr. S. Sakthivel	-	24/7/2023
2. Dr. S. Rosepriya	-	24/7/23
3. Mrs. S. Senthilkumari	-	24/7/2023
4. Dr. B. Shanmugapriya	-	24/7/23
5. Dr. S. Nilavazhagan.	-	—
6. Dr. C. Kumar	-	24/7/23
7. Dr.S. Veera Rethina Murugan	-	S. Veera...
8. Dr. T. Ganesh	-	24/7/23
9. Dr. N. Chidambaram.	-	24/7/23
10. Dr. D. Anbuselvan	-	24/7/23
11. Dr. P. Jagdish	-	24/7/23
12. Dr. P. Paramasivam	-	24/7/23
13. Dr. M. Sivasubramanian	-	24/07/23
14. Mrs. P. CHITRA DEVI	-	P. Chitra 24/7/23

EXTERNAL MEMBERS: - **SIGNATURE**

1. Dr.T. C. Sabari Girisun (University Nominee) - 24/07/23
   Assistant Professor, Department of Physics,
   Bharathidasan University, Tiruchirappalli.

2. Dr. R. S. Sundararajan (Subject Expert) - 24/7/23
   Associate Professor and
   Controller of Examinations,
   Government Arts College (Autonomous),
   Kumbakonam.

3. Dr. S. Valanarasu (Subject Expert) -
   Assistant Professor, Department of Physics,
   Arul Anandar College (Autonomous),
   Madurai - 14

4. Mr. T. Manoharan
   (Representative from Industry/ Corporate relating to placement) -
   Assistant Director, District Industrial Centre (DIC),
   Thanjavur.

5. Dr. T. Arivudai Nambi (PG Meritorious alumni) -
   Principal,
   A. Govindasamy Government Arts College,
   Tindivanam, Villupuram-Dist.

The syllabus for B.Sc., Physics (Major and Electives), M.Sc., Physics and M.Phil, Physics under CBCS system by TANSCHE was discussed, corrections/changes were made and finalized. The finalized syllabus was approved in the meeting held on 24.07.2023. This syllabus is for the candidates admitted from the academic year 2023-2024.

Dr. G. Rani
(Chairman, BOS-Physics)

HEAD
PG and Research Department of Physics,
Rajah Serfoji Govt. College (Autonomous),
Thanjavur-613 005.

RAJAH SERFOJI GOVT. COLLEGE (AUTONOMOUS)
Reaccredited with 'A' Grade by NAAC
(Affiliated to Bharathidasan University, Tiruchirappalli)
Thanjavur – 613 005, TAMIL NADU, INDIA.
04362 226417, E-mail: physicsrsgc@gmail.com.

BOARD OF STUDIES IN PHYSICS

MINUTES OF THE MEETING HELD ON 24th July 2023

The meeting of the Board of Studies in Physics, for the Academic Year 2023-24, was held on 24th July 2023 at 10:00 am in Department of Physics, Rajah Serfoji Government College, Thanjavur-5.

Dr. G. RANI, Chairperson, BOS and Head, Department of Physics, Rajah Serfoji Government College, convened the meeting and the following resolutions were transacted.

1. Discussions were made for the implementation of TANSCHE syllabus for B.Sc and M.Sc. Programme and 25% modifications were made in the context of local needs and recent developments.

   RESOLUTION-1 [No.: BOS/PHY/2023-24/1]

   Resolved to implement TANSCHE syllabus for B.Sc and M.Sc. Programme and to make 25% modifications in the syllabus, in the context of local needs and recent developments.

2. Discussions were made in the course structure of B.Sc./M.Sc. programme. For UG, it includes CC-15 papers, EC-8 papers, SEC-7 papers, Foundation Course-1 and Professional Competency skill-1 Paper. For PG, it includes CC-16 papers and EC 4 Papers. The necessity of two Elective Courses in the first two years for the implementation of Elective Course Practicals were discussed.

   RESOLUTION-2 [No.: BOS/PHY/2023-24/2]

   - Resolved to include one Elective Course as running paper between Semester I & II and another Elective Paper as running paper between Semester III & IV in the UG Course Structure given by TANSCHE.
   - Resolved to approve the modified Course Structure of UG Programme with 10 EC papers and Course Structure of PG Programme.

3. Discussions were made in the syllabus content of UG and PG Programme. Few modifications were carried out in the syllabus content of some papers.

   RESOLUTION-3 [No.: BOS/PHY/2023-24/3]

   - Resolved to approve the modifications made in the syllabus contents of UG and PG Programme.

4. Discussions were made in the implementation of Summer Internship/Industrial Training in 5.8 semester –V UG syllabus given by TANSCHE. Summer Internship/Industrial Training can be implemented in the summer vacation of Semester -IV and Credits can be given in the Semester-V.

RESOLUTION-4 [No.: BOS/PHY/2023-24/4]

- Resolved to implement, Summer Internship/Industrial Training in the Semester –V of UG programme.

5. Discussions were made in the implementation of Core Course/Project with viva-voce CC-XII in Semester-V. Unanimously decided to implement Core Course Practical-V and not to implement Project with viva-voce in the UG level.

RESOLUTION-5 [No.: BOS/PHY/2023-24/5]

- Resolved to implement Core Course Practical-V in the place of CC-XII given in curriculum structure of TANSCHE syllabus.

6. Discussions were made in the list of Generic Elective Courses designed by the department and Discipline Specific Elective Papers given in the TANSCHE syllabus of UG & PG Programme. Few modifications were made.

RESOLUTION-6 [No.: BOS/PHY/2023-24/6]

- Resolved to implement Generic Elective papers designed by the department in the First year and Second year of UG Programme and Discipline Specific Elective Papers given in the TANSCHE syllabus in the third of UG Programme.
- Resolved to implement the Elective Papers (List-1 & List-2) and Industry oriented Elective Papers IOE (List-3).

7. Discussions were made in the UG and PG Programme on the proposed POs, PSOs and Course Outcomes.

RESOLUTION-7 [No.: BOS/PHY/2023-24/7]

- Resolved to give approval for POs PSOs and COs and the mapping of COs of each course with POs.

The meeting ended with vote of thanks, particularly to the external members of the Board, recollecting their valuable inputs in their tenure.

Chairman:

1. **Dr. G. Rani**
   Associate Professor & Head,
   Department of Physics. : 

Members of the Board:

2. **Dr.T. C. Sabari Girisun** :
University Nominee
Assistant Professor,
Department of Physics,
Bharathidasan University, Tiruchirappalli-24

3. **Dr. R. S. Sundararajan** :
Subject Expert
Associate Prof. and Controller of Examinations
Govt.Arts College(Auto),
Kumbakonam. Ph: 9843256826

4. **Dr. S. Valanarasu** :
Subject Expert
Associate Prof. and Head
Department of Physics
Arul Anandar College(Auto),
Madurai-625514. Ph:9786654343

5. **Mr. T. Manoharan** :
Representative from Industry/
Corporate relating to placement
Assistant Director
District Industrial Centre(Dic)
Thanjavur

6. **Dr. T. Arivudai Nambi** :
PG Meritorious alumni
Principal, Thiru. A. Govindasamy Govt. Arts College,
Tindivanam Ph:9443618023

MEMBERS **SIGNATURE**

7. **Dr. S. Sakthivel** :
Assistant Professor of physics

8. **Dr. S. Rosepriya** :
Assistant Professor of Physics

9. **Mrs. S. Senthilkumari**
Assistant Professor of Physics :

10. **Dr. B. Shanmugapriya**
Assistant Professor of Physics :

11. **Dr. S. Nilavazhagan.**
Assistant Professor of Physics :

12. **Dr. C. Kumar**
Assistant Professor of Physics :

13. **Dr. S. Veera Rethina Murugan**
Assistant Professor of Physics :

14. **Dr. T. Ganesh**
Assistant Professor of Physics :

15. **Dr. N. Chidambaram**
Assistant Professor of Physics :

16. **Dr. D. Anbuselvan**
Assistant Professor of Physics :

17. **Dr. P. Jagdish**
Assistant Professor of Physics :

18. **Dr. P. Paramasivam**
Assistant Professor of Physics :

19. **Dr. M. Sivasubramanian**
Assistant Professor of Physics :

20. Mrs. P. CHITRA DEVI :

RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS),THANJAVUR-613005

B.Sc PHYSICS COURSE STRUCTURE

Curriculum -UG

(For the candidates admitted from 2023–2024 onwards)

Sem.	Part	Course	Course Code	Title of the Paper	Credit	Inst. Hrs.	Exam. Hrs.	Marks		Total	Page No.
								Int.	Ext.		
I	I	LT1	T1T1	Tamil – I	3	6	3	25	75	100	
	II	LE1	T1E1	English – I	2	4	2	15	45	100	
			T1E1P	English Practical	1	2	1	10	30		
	III	CC1	T1PH1	Properties of Matter and Acoustics	5	5	3	25	75	100	1
	III	CC2	T1PH2	Physics Practical-I	3	3	3	25	75	100	3
	III	EC1		Elective Course-I	3	4	3	25	75	100	
	III	EC2		Elective Course-II	-	2	-	-	-	-	
	IV	SEC1	T1PHSE1	Skill Enhancement Course –1 **FIRST AID AND EMERGENCY CARE**	2	2	3	25	75	100	60
	IV	FC	PHFC	Foundation Course- **INTRODUCTORY PHYSICS**	2	2	3	25	75	100	5
				Total	**21**	**30**				**700**	
II	I	LT2	T2T2	Tamil – II	3	6	3	25	75	100	
	II	LE2	T2E2	English – I	2	4	2	15	45	100	
			T2E2P	English Practical	1	2	1	10	30		
	III	CC3	T2PH3	Heat, Thermodynamics and Statistical Physics	5	5	3	25	75	100	7
	III	CC4	T2PH4	Physics Practical-II	3	3	3	25	75	100	9
	III	EC2		Elective Course-II	4	2	3	25	75	100	
	III	EC3		Elective Course-III	3	4	3	25	75	100	
	IV	SEC2	T2PHSE2	Skill Enhancement Course –2 **DOMESTIC APPLIANCES**	2	2	3	25	75	100	62
	IV	SEC-3	T2PHSE3	Skill Enhancement Course –3 **STRESS MANAGEMENT AND YOGA**	2	2	3	25	75	100	64
				Total	**25**	**30**				**800**	

Sem.	Part	Course	Subject Code	Title of the Paper	Credit	Inst. Hrs.	Exam. Hrs.	Marks		Total	Page No.
								Int.	Ext.		
III	I	LT-3	T3T3	Tamil – III	3	6	3	25	75	100	
	II	LE3	T3E3	English – I	2	4	2	15	45	100	
			T3E3P	English Practical	1	2	1	10	30		
	III	CC-5	T3PH5	Mechanics	5	5	3	25	75	100	11
	III	CC-6	T3PH6	Physics Practical-III	3	3	3	25	75	100	13
	III	EC-4		Elective Course-IV	3	3	3	25	75	100	
	III	EC-5		Elective Course-V	-	3	-	-	-	-	
	IV	SEC-4	T3PHSE4	Skill Enhancement Course –4 **ENTREPRENEURIAL SKILL**	1	1	3	25	75	100	66
	IV	SEC-5	T3PHSE5	Skill Enhancement Course –5 **CELL PHONE BASICS AND SERVICING**	2	2	3	25	75	100	68
	IV	EVS	T4ES	Environmental Studies	-	1	-	-	-	-	
				Total	**20**	**30**				**700**	
IV	I	LT-4	T4T4	Tamil– IV	3	6	3	25	75	100	
	II	LE4	T4E4	English – I	2	4	2	15	45	100	
			T4E4P	English Practical	1	2	1	10	30		
	III	CC-7	T4PH7	Optics and Laser Physics	4	4	3	25	75	100	15
	III	CC-8	T4PH8	Physics Practical-IV	3	3	3	25	75	100	17
	III	EC-5		Elective Course-V	4	3	3	25	75	100	
	III	EC-6		Elective Course-VI	3	3	3	25	75	100	
	IV	SEC-6	T4PHSE6	Skill Enhancement Course –6 **HOUSE WIRING**	2	2	3	25	75	100	70
	IV	SEC-7	T4PHSE7	Skill Enhancement Course –7 **PERSONALITY DEVELOPMENTT**	2	2	3	25	75	100	72
	IV	EVS	T4ES	Environmental Studies	2	1	3	25	75	100	
				Total	**26**	**30**				**900**	

Sem.	Part	Course	Subject Code	Title of the Paper	Credit	Inst. Hrs.	Exam. Hrs.	Marks		Total	Page No.
								Int.	Ext.		
V	III	CC-9	T5PH9	Electricity, Magnetism and Electromagnetism	4	5	3	25	75	100	19
	III	CC-10	T5PH10	Atomic and Nuclear Physics	4	5	3	25	75	100	21
	III	CC-11	T5PH11	Analog and Communication Electronics	4	4	3	25	75	100	23
	III	CC-12	T5PH12	Physics Practical –V	3	6	3	25	75	100	25
	III	EC-7		Elective Course – VII	3	4	3	25	75	100	
	III	EC-8		Elective Course – VIII	3	4	3	25	75	100	
	IV	VE	T5VE	Value Education	2	2	3	25	75	100	
	IV			Internship* / Industrial Visit/Field Visit	2	-				-	
				Total	**25**	**30**				**700**	
VI	III	CC-13	T6PH13	Quantum Mechanics and Relativity	5	6	3	25	75	100	27
	III	CC-14	T6PH14	Solid State Physics	5	6	3	25	75	100	29
	III	CC-15	T6PH15	Physics Practical-VI	4	6	3	25	75	100	32
	III	EC-9		Elective Course –IX (Compulsory Elective) Digital Electronics and Microprocessor 8085	3	6	3	25	75	100	34
	III	EC-10		Elective Course – X	3	4	3	25	75	100	
	IV	PCS	T6PHPC	**PROFESSIONAL COMPETENCY SKILL**	2	2	3	25	75	100	74
	IV			Extension Activity.	1	-				-	
				Total	**23**	**30**				**600**	
				Grand Total	**140**						

Total Marks in Part – III –2500

** **Internship will be carried out during the summer vacation of the Second year and marks will be included in the Fifth Semester Marks Statement.**

RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS), THANJAVUR -613005
B.Sc., PHYSICS COURSE STRUCTURE
(for the candidates admitted from the academic year **2023-2024** onwards)

List of Elective courses

Part -A (Generic)

S.No	Course Code	Title of the Course
1	T1GMA1	Algebra and Differential Calculus
2	T2GMA2	Vector Analysis and Analytical Geometry 3D
3	T2GMA3	Integration and Laplace Transforms
4	T3GCH1	General Chemistry –I
5	T4GCH2	General Chemistry - Practical
6	T4GCH3	General Chemistry- II
7	TGMA4	Calculus II & III
8	TGMA5	Probability and Statistics
9	TGCH4	Applied Chemistry–I
10	TGCH5	Applied Chemistry – II

Part -B (Discipline)

S.No	Course Code	Title of the Course	Page No.
1	TPHECA	DIGITAL ELECTRONICS AND MICROPROCESSOR 8085 **(Compulsory Elective)**	34
	TPHECB	COMMUNICATION SYSTEMS	36
2	TPHECC	ENERGY PHYSICS	37
3	TPHECD	MATHEMATICAL PHYSICS	38
4	TPHECE	ADVANCED MATHEMATICAL PHYSICS	39
5	TPHECF	NUMERICAL METHODS AND C PROGRAMMING	40
6	TPHECG	MATERIALS SCIENCE	41
7	TPHECH	LASERS AND FIBER OPTICS	42
8	TPHECI	DIGITAL PHOTOGRAPHY	43
9	TPHECJ	NANOSCIENCE AND NANO TECHNOLOGY	44
10	TPHECK	MEDICAL INSTRUMENTATION	45

Credit Distribution for UG Programmes

Sem I	Credit	H	Sem II	Credit	H	Sem III	Credit	H	Sem IV	Credit	H	Sem V	Credit	H	Sem VI	Credit	H
Part 1. Language – Tamil	3	6	Part..1. Language – Tamil	3	6	Part..1. Language – Tamil	3	6	Part..1. Language – Tamil	3	6	5.1 Core Course – \CC IX	4	5	6.1 Core Course – CC XIII	5	6
Part.2 English	3	6	Part..2 English	3	6	Part..2 English	3	6	Part..2 English	3	6	5.2 Core Course – CC X	4	5	6.2 Core Course – CC XIV	5	6
1.3 Core Course – CC I	5	5	2..3 Core Course – CC III	5	5	3.3 Core Course – CC V	5	5	4.3 Core Course – CC VII Core Industry Module	4	4	5. 3.Core Course CC -XI	4	4	6.3 Core Course – CC XV	4	6
1.4 Core Course – CC II	3	3	2.4 Core Course – CC IV	3	3	3.4 Core Course – CC VI	3	3	4.4 Core Course – CC VIII	3	3	5. 4.Core Course –/ CC -XII	3	6	6.4 Elective -IX Generic/ Discipline Specific	3	6
1.5 Elective I Generic/ Discipline Specific	3	4	2.5 Elective II Generic/ Discipline Specific	4	2	3.5 Elective IV Generic/ Discipline Specific	3	3	4.5 Elective V Generic/ Discipline Specific	4	3	5.5 Elective VII Generic/ Discipline Specific	3	4	6.5 Elective X Generic/ Discipline Specific	3	4
1.6 Elective II Generic/ Discipline Specific	-	2	2.6 Elective III Generic/ Discipline Specific	3	4	3.6 Elective V Generic/ Discipline Specific	-	3	4.6 Elective VI Generic/ Discipline Specific	3	3	5.6 Elective VIII Generic/ Discipline Specific	3	4	6.6 Professional Competency Skill	2	2
1.7 Skill Enhancement Course SEC-1	2	2	2.6 Skill Enhancement Course SEC-2	2	2	3.7 Skill Enhancement Course SEC-4, (Entrepreneurial Skill)	1	1	4.7 Skill Enhancement Course SEC-6	2	2	5.7 Value Education	2	2	6.7 Extension Activity	1	-
1.8 Skill Enhancement - (Foundation Course)	2	2	2.7 Skill Enhancement Course –SEC-3	2	2	3.8 Skill Enhancement Course SEC-5	2	2	4.8 Skill Enhancement Course SEC-7	2	2	5.8 Summer Internship /Industrial Training	2				
						3.9 E.V.S.	-	1	4.9 E.V.S	2	1						
	21	**30**		**25**	**30**		**20**	**30**		**26**	**30**		**25**	**30**		**23**	**30**
Total – 140 Credits																	

(For the candidates admitted from 2023 – 2024 onwards)

Course	**CC 1**	**Semester - I**	**Course Code: T1PH1**
Course Title	**PROPERTIES OF MATTER AND ACOUSTICS**		
Credits	**5**	**Instruction Hours - 5**	**Medium: English and Tamil**
Course Objectives	Study of the properties of matter leads to information which is of practical value to both the physicist and the engineers. It gives us information about the internal forces which act between the constituent parts of the substance. Students who undergo this course are successfully bound to get a better insight and understanding of the subject.		

UNITS	COURSE DETAILS
Unit - I	**ELASTICITY:** Hooke's law – stress-strain diagram – elastic constants – Poisson's ratio – relation between elastic constants and Poisson's ratio – work done in stretching and twisting a wire – twisting couple on a cylinder – rigidity modulus by static torsion– torsional pendulum (with and without masses)
Unit - II	**BENDING OF BEAMS:** cantilever– expression for Bending moment – expression for depression at the loaded end of the cantilever– oscillations of a cantilever – expression for time period – experiment to find Young's modulus – non-uniform bending– experiment to determine Young's modulus by Koenig's method – uniform bending – expression for elevation – experiment to determine Young's modulus using microscope
Unit - III	**FLUID DYNAMICS:** *Surface tension*: definition – molecular forces– excess pressure over curved surface – application to spherical and cylindrical drops and bubbles – determination of surface tension by Jaegar's method–variation of surface tension with temperature *Viscosity*: definition – streamline and turbulent flow – rate of flow of liquid in a capillary tube – Poiseuille's formula –corrections – terminal velocity and Stoke's formula– variation of viscosity with temperature
Unit - IV	**WAVES AND OSCILLATIONS:** Simple Harmonic Motion (SHM) – differential equation of SHM – graphical representation of SHM – composition of two SHM in a straight line and at right angles – Lissajous's figures- free, damped, forced vibrations –resonance and Sharpness of resonance. Laws of transverse vibration in strings –sonometer – determination of AC frequency using sonometer –determination of frequency using Melde's string apparatus
Unit - V	**ACOUSTICS OF BUILDINGS AND ULTRASONICS:** Intensity of sound – decibel – loudness of sound –reverberation – Sabine's reverberation formula – acoustic intensity – factors affecting the acoustics of buildings. *Ultrasonic waves*: production of ultrasonic waves – Piezoelectric crystal method – magnetostriction effect – application of ultrasonic waves
Unit - VI	**PROFESSIONAL COMPONENTS:** expert lectures –seminars — webinars – industry inputs – social accountability – patriotism
Text Books	1. D.S.Mathur, 2010, Elements of Properties of Matter, S.Chand & Co. 2. BrijLal & N. Subrahmanyam, 2003, Properties of Matter, S.Chand & Co 3. D.R.Khanna & R.S.Bedi, 1969, Textbook of Sound, AtmaRam & sons 4. BrijLal and N.Subrahmanyam, 1995, A Text Book of Sound, Second revised edition,Vikas Publishing House. 5. R.Murugesan,2012, Properties of Matter, S.Chand& Co.

Ref. books	1. C.J. Smith, 1960, General Properties of Matter, Orient Longman Publishers 2. H.R. Gulati, 1977, Fundamental of General Properties of Matter, Fifth edition,R. Chand & Co. 3. A.P French, 1973, Vibration and Waves, MIT Introductory Physics, Arnold-Heinmann India.
Web Resources	1. https://www.biolinscientific.com/blog/what-are-surfactants-and-how-do-they-work 2. http://hyperphysics.phy-astr.gsu.edu/hbase/permot2.html 3. https://www.youtube.com/watch?v=gT8Nth9NWPM 4. https://www.youtube.com/watch?v=m4u-SuaSu1s&t=3s 5. https://learningtechnologyofficial.com/category/fluid-mechanics-lab/ 6. http://www.sound-physics.com/ 7. http://nptel.ac.in/courses/112104026/

COURSE OUTCOMES:

At the end of the course, the student will be able to:

CO1	Relate elastic behavior in terms of three modulii of elasticity and working of torsion pendulum.
CO2	Able to appreciate concept of bending of beams and analyze the expression, quantify and understand nature of materials.
CO3	Explain the surface tension and viscosity of fluid and support the interesting phenomena associated with liquid surface, soap films provide an analogue solution to many engineering problems.
CO4	Analyze simple harmonic motions mathematically and apply them. Understand the concept of resonance and to evaluate the frequency of vibration. Set up experiment to evaluate frequency of ac mains
CO5	Understand the concept of acoustics, importance of constructing buildings with good acoustics. Able to apply their knowledge of ultrasonics in real life, especially in medical field and assimilate different methods of production of ultrasonic waves

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Course Outcomes (COs)↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	2	3	2	2	2	2	3	2	2	2.3
CO-2	2	2	3	2	3	2	2	2	3	2	2.3
CO-3	3	2	2	3	3	2	3	2	2	2	2.4
CO-4	3	2	2	2	3	2	2	3	2	2	2.3
CO-5	2	2	3	2	2	3	2	2	2	3	2.2
									Mean Overall Score		2.3(High)

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	75	100	

Question Paper Pattern

Maximum Marks: 75 Marks **Exam Duration: 3 Hrs**

Part-A 10×2=20 Marks Answer ALL Questions (Two questions from each unit)

Part-B 5×5=25 Marks Answer ALL Questions (Either or Type-Two questions from each unit)

Part-C 3×10=30 Marks Answer Any Three Questions (Three out of Five-one question from each unit)

HOD

COE

HEAD
PG and Research Department of Physics,
Rajah Serfoji Govt. College (Autonomous),
Thanjavur-613 005.

(For the candidates admitted from 2023 – 2024 onwards)

Course	**CC 2**	**Semester - I**	**Course Code: T1PH2**
Course Title	**PHYSICS PRACTICAL - 1**		
Credits	**3**	**Instruction Hours - 3**	**Medium: English and Tamil**
Course Objectives	Apply various physics concepts to understand Properties of Matter, set up experimentation to verify theories, quantify and analyse, able to do error analysis and correlate results.		

List of Experiments

Minimum of **Ten Experiments** from the list:

1. Determination of moment of inertia of an irregular body.
2. Verification of parallel axes theorem on moment of inertia.
3. Verification of perpendicular axes theorem on moment of inertia.
4. Determination of moment of inertia and g using Bifilar pendulum.
5. Determination of Young's modulus by stretching of wire with known masses.
6. Verification of Hook's law by stretching of wire method.
7. Determination of Young's modulus by non-uniform bending – scale and telescope.
8. Determination of Young's modulus by Koenig's method – (or unknown load)
9. Determination of Y, n and K by Searle's double bar method.
10. Determination of surface tension and interfacial surface tension by drop weight method.
11. Determination radius of capillary tube by mercury pellet method.
12. Determination of g using compound pendulum.
13. Young's modulus – Non uniform bending –Pin and microscope
14. Coefficient of viscosity of liquid- Poiseuille's flow method.
15. Sonometer – Determination of frequency of a given tuning fork.
16. Sonometer- Determination of relative density of a solid and liquid.
17. Newton's law of cooling – Specific heat capacity of a given liquid.
18. Spectrometer – Refractive index of the solid prism.
19. Newton's rings-Determination of radius of curvature of a convex lens.
20. Characteristics of Junction diode.
21. Characteristics of Zener diode.
22. Meter bridge – Determination of resistance of a coil.
23. Potentiometer – Calibration of low range voltmeter.
24. Logic gates (AND, OR and NOT) – Using discrete components.

OUTCOMES

1. Verify the theoretical concepts in physics through experiments.
2. Understand the behavior of thermal properties of materials.
3. Understand the basic laws and theories to determine various properties of materials.
4. Acquire knowledge about the characteristics of junction and Zener diodes.
5. Understand the operation of basic logic gates.

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Course Outcomes (COs)↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	2	3	2	2	2	2	2	2	3	2.3
CO-2	2	2	1	2	3	3	2	3	2	2	2.2
CO-3	3	3	3	2	3	2	2	2	2	2	2.4
CO-4	3	2	2	2	3	2	2	3	2	2	2.3
CO-5	2	3	3	2	2	3	2	2	3	2	2.3
									Mean Overall Score		2.3 (High)

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	75	100	

HOD

HEAD
PG and Research Department of Physics,
Rajah Serfoji Govt. College (Autonomous),
Thanjavur-613 005.

COE

CONTROLLER OF EXAMINATIONS,
RAJAH SERFOJI GOVT. COLLEGE (AUTONOMOUS)
THANJAVUR-613 005.

(For the candidates admitted from 2023 – 2024 onwards)

Course	FC	Semester - I	Course Code: PHFC
Course Title	INTRODUCTORY PHYSICS		
Credits	2	Instruction Hours - 2	Medium: English and Tamil
Course Objectives	To help students get an overview of Physics before learning their core courses. To serve as a bridge between the school curriculum and the degree programme.		

UNITS	COURSE DETAILS
Unit - I	vectors, scalars –examples for scalars and vectors from physical quantities – addition, subtraction of vectors – resolution and resultant of vectors – units and dimensions– standard physics constants
Unit - II	different types of forces–gravitational, electrostatic, magnetic, electromagnetic, nuclear –mechanical forces like, centripetal, centrifugal, friction, tension, cohesive, adhesive forces
Unit - III	different forms of energy– conservation laws of momentum, energy – types of collisions –angular momentum– alternate energy sources–real life examples
Unit - IV	types of motion– linear, projectile, circular, angular, simple harmonic motions – satellite motion – banking of a curved roads – stream line and turbulent motions – wave motion – comparison of light and sound waves – free, forced, damped oscillations
Unit - V	surface tension – shape of liquid drop – angle of contact – viscosity –lubricants – capillary flow – diffusion – real life examples– properties and types of materials in daily use- conductors, insulators – thermal and electric
Unit - VI	**PROFESSIONAL COMPONENTS:** expert lectures –seminars — webinars – industry inputs – social accountability – patriotism
Text Books	1. D.S.Mathur, 2010, Elements of Properties of Matter, S.Chand & Co 2. BrijLal & N. Subrahmanyam, 2003, Properties of Matter, S.Chand & Co.
Ref. books	1. H.R. Gulati, 1977, Fundamental of General Properties of Matter, Fifth edition, S.Chand & Co.
Web Resources	1. http://hyperphysics.phy-astr.gsu.edu/hbase/permot2.htmlhttps://science.nasa.gov/ems/ 2. https://eesc.columbia.edu/courses/ees/climate/lectures/radiation_hays/

COURSEOUTCOMES:
At the end of the course, the student will be able to:

CO1	Apply concept of vectors to understand concepts of Physics and solve problems
CO2	Appreciate different forces present in Nature while learning about phenomena related to these different forces.
CO3	Quantify energy in different process and relate momentum, velocity and energy
CO4	Differentiate different types of motions they would encounter in various courses and understand their basis
CO5	Relate various properties of matter with their behaviour and connect them with different physical parameters involved.

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Course Outcomes (COs)↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	2	2	2	3	1	3	2	2.2
CO-2	2	3	2	3	2	2	2	3	2	3	2.4
CO-3	2	3	2	2	2	2	2	3	3	1	2.2
CO-4	2	3	1	3	3	2	3	1	3	3	2.4
CO-5	2	3	1	2	1	2	3	3	3	2	2.2
									Mean Overall Score		2.28 (High)

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	75	100	

Question Paper Pattern

Maximum Marks: 75 Marks **Exam Duration: 3 Hrs**

Part-A 5x6=30 Marks Answer ALL Questions (Either or Type-Two questions from each unit)
Part-B 3x15=45 Marks Answer Any Three Questions (Three out of Five-one question from each unit)

HOD
HEAD
PG and Research Department of Physics,
Rajah Serfoji Govt. College (Autonomous),
Thanjavur-613 005.

COE
CONTROLLER OF EXAMINATIONS,
RAJAH SERFOJI GOVT. COLLEGE (AUTONOMOUS)
THANJAVUR-613 005.

(For the candidates admitted from 2023 – 2024 onwards)

Course	CC 3	Semester - II	Course Code: T2PH3
Course Title	HEAT, THERMODYNAMICS AND STATISTICAL PHYSICS		
Credits	5	Instruction Hours - 5	Medium: English and Tamil
Course Objectives	The course focuses to understand a basic in conversion of temperature in Celsius, Kelvin and Fahrenheit scales. Practical exhibition and explanation of transmission of heat in good and bad conductor. Relate the laws of thermodynamics, entropy in everyday life and explore the knowledge of statistical mechanics and its relation		

UNITS	COURSE DETAILS
Unit - I	**HEAT TRANSFER:** modes of heat transfer: conduction, convection and radiation. *Conduction*: thermal conductivity – determination of thermal conductivity of a good conductor by Forbe's method – determination of thermal conductivity of a bad conductor by Lee's disc method. *Radiation*: black body radiation (Ferry's method) – distribution of energy in black body radiation – Wien's law and Rayleigh Jean's law –Planck's law of radiation – Stefan's law – deduction of Newton's law of cooling from Stefan's law.
Unit - II	**CALORIMETRY:** specific heat capacity – specific heat capacity of gases C_P& C_V– Meyer's relation – Joly's method for determination of C_V – Regnault's method for determination of C_P **LOW TEMPERATURE PHYSICS:** Joule-Kelvin effect – porous plug experiment – Joule-Thomson effect –Boyle temperature – temperature of inversion – liquefaction of gas by Linde's Process – adiabatic demagnetisation.
Unit - III	**THERMODYNAMICS-I:** zeroth law and first law of thermodynamics – Isothermal and adiabatic processes– P-V diagram – heat engine –efficiency of heat engine – Carnot's engine, construction, working and efficiency of petrol engine and diesel engines – comparison of engines.
Unit - IV	**THERMODYNAMICS-II:** second law of thermodynamics –entropy of an ideal gas – entropy change in reversible and irreversible processes – T-S diagram – thermodynamical scale of temperature – Maxwell's thermo dynamical relations –Clasius-Clapeyron's equation (first latent heat equation) – third law of thermodynamics.
Unit - V	**STATISTICALMECHANICS:** definition of phase-space – micro and macro states – ensembles –different types of ensembles – classical and quantum Statistics – Maxwell-Boltzmann statistics – expression for distribution function – Bose-Einstein statistics – expression for distribution function – Fermi-Dirac statistics –expression for distribution function – comparison of three statistics.
Unit - VI	**PROFESSIONAL COMPONENTS:** expert lectures –seminars — webinars – industry inputs – social accountability – patriotism
Text Books	1. Brijlal &N. Subramaniam, 2000, Heat and Thermodynamics, S.Chand& Co. 2. Narayanamoorthy&KrishnaRao, 1969,Heat,Triveni Publishers, Chennai. 3. V.R.Khanna&R.S.Bedi, 1998 1st Edition, Text book of Sound, Kedharnaath Publish & Co, Meerut 4. Brijlal and N. Subramanyam, 2001, Waves and Oscillations,Vikas Publishing House, New Delhi. 5. Ghosh, 1996, Text Book of Sound, S.Chand&Co. 6. R.Murugeshan & Kiruthiga Sivaprasath, Thermal Physics, S.Chand& Co.

Ref. books	1. J.B.Rajam & C.L.Arora, 1976, Heat and Thermodynamics, 8th edition, S.Chand& Co. Ltd. 2. D.S.Mathur, Heat and Thermodynamics, Sultan Chand & Sons. 3. Gupta, Kumar, Sharma, 2013, Statistical Mechanics, 26th Edition, S. Chand & Co. 4. Resnick, Halliday&Walker,2010, Fundamentals of Physics, 6th Edition. 5. Sears, Zemansky, Hugh D. Young,Roger A. Freedman, 2021 University Physics with Modern Physics 15th Edition, Pearson.
Web Resources	1. https://youtu.be/M_5KYncYNyc 2. https://www.youtube.com/watch?v=4M72kQulGKk&vl=en

COURSE OUTCOMES:

At the end of the course, the student will be able to:

CO1	Study the process of thermal conductivity and apply it to good and bad conductors. Quantify different parameters related to heat, relate them with various physical parameters and analyse them
CO2	Acquires knowledge on how to distinguish between temperature and heat. Introduce him/her to the field of thermometry and explain practical measurements of high temperature as well as low temperature physics. Student identifies the relationship between heat capacity, specific heat capacity. The study of Low temperature Physics sets the basis for the students to understand cryogenics, superconductivity, super fluidity and Condensed Matter Physics
CO3	Derive the efficiency of Carnot's engine. Discuss the implications of the laws of Thermodynamics in diesel and petrol engines
CO4	Able to analyze performance of thermodynamic systems viz efficiency by problems. Gets an insight into thermodynamic properties like enthalpy, entropy
CO5	Interpret classical statistics concepts such as phase space, ensemble, Maxwell-Boltzmann distribution law. Develop the statistical interpretation of Bose-Einstein and Fermi-Dirac . Apply to quantum particles such as photon and electron

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Course Outcomes (COs)↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	2	2	3	2	3	3	3	2	2	2.5
CO-2	3	2	2	2	2	2	3	2	3	2	2.3
CO-3	3	3	3	3	2	3	3	3	1	2	2.6
CO-4	3	2	2	3	2	3	3	2	1	2	2.3
CO-5	3	2	2	2	2	3	3	2	1	2	2.2
									Mean Overall Score		2.38 (High)

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	75	100	

Question Paper Pattern

Maximum Marks: 75 Marks **Exam Duration: 3 Hrs**

Part-A 10×2=20 Marks Answer ALL Questions (Two questions from each unit)

Part-B 5×5=25 Marks Answer ALL Questions (Either or Type-Two questions from each unit)

Part-C 3×10=30 Marks Answer Any Three Questions (Three out of Five-one question from each unit)

HOD

HEAD
PG and Research Department of Physics,
Rajah Serfoji Govt. College (Autonomous),
Thanjavur-613 005.

COE

CONTROLLER OF EXAMINATIONS
RAJAH SERFOJI GOVT. COLLEGE (AUTONOMOUS)
THANJAVUR-613 005.

(For the candidates admitted from 2023 – 2024 onwards)

Course	**CC 4**	**Semester - II**	**Course Code: T2PH4**
Course Title	**PHYSICS PRACTICAL - II**		
Credits	**3**	**Instruction Hours - 3**	**Medium: English and Tamil**
Course Objectives	Apply their knowledge gained about the concept of heat and sound waves, resonance, calculate frequency of ac mains set up experimentation to verify theories, quantify and analyse, able to do error analysis and correlate results.		

Minimum of **Ten Experiments** from the list:

1. Determination of thermal conductivity of good conductor by Searle's method.
2. Determination of thermal conductivity of bad conductor by Lee's disc method.
3. Determination of thermal conductivity of bad conductor by Charlaton's method.
4. Determination of specific heat capacity of solid.
5. Determination of Latent heat of a vaporization of a liquid.
6. Determination of Stefan's constant for Black body radiation.
7. Verification of Stefan's-Boltzmans law.
8. Determination of thermal conductivity of rubber tube.
9. Velocity of sound through a wire using Sonometer.
10. Determination of velocity of sound using Kunds tube.
11. Determination of frequency of an electrically maintained tuning fork
12. To verify the laws of transverse vibration using sonometer.
13. Young's modulus – Uniform bending – Pin and microscope.
14. Young's modulus – Uniform bending – Scale and Telescope.
15. Surface tension by capillary rise method.
16. Comparison of viscosities of the given two liquids.
17. Sonometer –Verification of laws of vibrations of a stretched string.
18. Sonometer- Determination of AC frequency.
19. Melde's string -Determination of frequency of a given tuning fork - Longitudinal and Transverse modes.
20. Spectrometer – Hollow prism-μ of a given liquid.
21. Air Wedge- Determination of thickness of a thin wire.
22. Meter bridge – Verification of laws of resistance
23. Potentiometer –Ammeter Calibration
24. Logic gates (AND, OR, NOT, NAND, NOR, EXOR) – Using ICs.

OUTCOMES

1. Verify the theoretical concepts in physics through experiments.
2. Understand the behavior of thermal properties of materials.
3. Apply the knowledge of the fundamentals of physics in electricity, electronics and sound through experiments.
4. Understand the basic operation of logic gates through IC's.
5. Frequency of a given tuning fork is calculated by the transverse and longitudinal modes.

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Course Outcomes (COs)↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	2	3	2	1	3	3	3	2	1	2.3
CO-2	3	3	3	2	1	3	3	2	2	1	2.3
CO-3	3	3	3	2	1	3	2	3	2	1	2.3
CO-4	3	3	2	3	1	3	3	3	2	1	2.3
CO-5	3	3	2	2	1	3	3	2	2	1	2.3
									Mean Overall Score		2.3 (High)

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	75	100	

HOD

HEAD
PG and Research Department of Physics,
Rajah Serfoji Govt. College (Autonomous),
Thanjavur-613 005.

COE

CONTROLLER OF EXAMINATIONS,
RAJAH SERFOJI GOVT. COLLEGE (AUTONOMOUS)
THANJAVUR-613 005.

(For the candidates admitted from 2023 – 2024 onwards)

Course	CC 5	Semester - III	Course Code: T3PH5
Course Title	MECHANICS		
Credits	5	Instruction Hours - 5	Medium: English and Tamil
Course Objectives	This course allows the students: To have a basic understanding of the laws and principles of mechanics; To apply the concepts of forces existing in the system; To understand the forces of physics in everyday life; To visualize conservation laws; To apply Lagrangian equation to solve complex problems.		

UNITS	COURSE DETAILS
Unit - I	**LAWS OF MOTION:** Newton's Laws– forces – equations of motion – frictional force – motion of a particle in a uniform gravitational field – types of everyday forces in Physics. Earth-moon system – weightlessness – earth satellites – parking orbit – earth density – mass of the Sun – gravitational potential – velocity of escape – satellite potential and kinetic energy.
Unit - II	**GRAVITATION:** Newton's law of gravitation – Determination of G Boy's method – Intensity of gravitational field – Kepler's law of Gravitation - Equipotential surface – Acceleration due to gravity (g) - Variation of 'g' with Altitude, Depth and Latitude. Seismology: Earth quakes – seismic waves – Determination of epicenter and focus – Modern applications of seismology..
Unit - III	**CONSERVATION LAWS OF ENERGY AND MOMENTUM** Introduction – significance of conservation laws – law of conservation of energy concepts of work- power – energy – conservative forces Law of conservation of momentum – Center of mass - System of variable mass- Equation of Rocket motion – conservation of linear and angular momentum.
Unit - IV	**RIGID BODY DYNAMICS:** Translational and rotational motion – angular momentum – moment of inertia – general theorems of moment of inertia – examples – rotation about fixed axis – kinetic energy of rotation – examples – body rolling along a plane surface – body rolling down an inclined plane – gyroscopic precision – gyrostatic applications.
Unit - V	**LAGRANGIAN MECHANICS:** Generalized coordinates –degrees of freedom – constraints - principle of virtual work and D' Alembert's Principle –Lagrange's equation from D' Alembert's principle – application –simple pendulum – Atwood's machine.
Unit - VI	**PROFESSIONAL COMPONENTS:** expert lectures –seminars – webinars – industry inputs – social accountability – patriotism
Text Books	1. J.C. Upadhyaya, 2019, Classical Mechanics, Himalaya Publishing house, Mumbai. 2. P. DuraiPandian, Laxmi Durai Pandian, MuthamizhJayapragasam,2005, Mechanics, 6th revised edition, S.Chand& Co. 3. D. S. Mathur & P. S. Hemne, 2000, Mechanics, Revised Edition, S.Chand& Co. 4. Narayanamurthi, M. & Nagarathnam. N, 1998, Dynamics. The National Publishing,Chennai. 5. Narayanamurthi, M. and Nagarathnam, N, 1982, Statics, Hydrostatics and Hydrodynamics, The National Publishers, Chennai.
Ref. books	1. Goldstein Herbert, 1980, Classical Mechanics. U.S.A: Addison and Wesely. 2. Halliday, David & Robert, Resnick, 1995, Physics Vol.I. New Age,

	International, Chennai. 3. Halliday, David Robert Resnick and Walker Jearl, 2001, Fundamentals of Physics, John Wiley, New Delhi
Web Resources	1. https://youtu.be/X4_K-XLUIB4 2. https://nptel.ac.in/courses/115103115 3. https://www.youtube.com/watch?v=p075LPq3Eas 4. https://www.youtube.com/watch?v=mH_pS6fruyg 5. https://onlinecourses.nptel.ac.in/noc22_me96/preview 6. https://www.youtube.com/watch?v=tdkFc88Fw-M 7. https://onlinecourses.nptel.ac.in/noc21_me70/preview

COURSE OUTCOMES:

At the end of the course, the student will be able to:

CO1	Understand the Newton's Law of motion and to realize the basic principles behind planetary motion.
CO2	Kepler's laws and understand the basic concepts of gravitation and seismology.
CO3	Apply conservation law and calculate energy of various systems, understand and differentiate conservative forces
CO4	Gain knowledge on rigid body dynamics and solve problems based on this concept
CO5	Appreciate Lagrangian system of mechanics, apply D' Alemberts principle

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Course Outcomes (COs)↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	2	3	2	1	3	3	3	2	1	2.3
CO-2	3	2	3	2	1	3	3	2	3	1	2.3
CO-3	3	3	2	2	2	3	3	2	1	1	2.2
CO-4	3	3	2	3	1	3	3	3	2	1	2.4
CO-5	3	3	3	2	1	3	3	2	2	1	2.3
									Mean Overall Score		**2.3 (High)**

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	75	100	

Question Paper Pattern

Maximum Marks: 75 Marks **Exam Duration: 3 Hrs**

Part-A 10×2=20 Marks Answer ALL Questions (Two questions from each unit)
Part-B 5×5=25 Marks Answer ALL Questions (Either or Type-Two questions from each unit)
Part-C 3×10=30 Marks Answer Any Three Questions (Three out of Five-one question from each unit)

HOD
HEAD
PG and Research Department of Physics,
Rajah Serfoji Govt. College (Autonomous),
Thanjavur-613 005.

COE
CONTROLLER OF EXAMINATIONS,
RAJAH SERFOJI GOVT. COLLEGE (AUTONOMOUS)
THANJAVUR-613 005.

(For the candidates admitted from 2023 – 2024 onwards)

Course	**CC 6**	**Semester - III**	**Course Code: T3PH6**
Course Title	**PHYSICS PRACTICAL - III**		
Credits	**3**	**Instruction Hours - 3**	**Medium: English and Tamil**
Course Objectives	Construct circuits to learn about the concept of electricity, current, resistance in the path of current, different parameters that affect a circuit. Set up experiments, observe, analyse and assimilate the concept		

Minimum of **Ten Experiments** from the list:

1. Measurement of low resistances using potentiometer.
2. Determination of specific resistance of the material of the wire using PO box.
3. Determination of resistance and specific resistance using Carey Foster's bridge.
4. Determination of internal resistance of a cell using potentiometer.
5. Determination of specific conductance of an electrolyte.
6. Determination of capacitance using Desauty's bridge and B.G./ Spot galvanometer/head phone.
7. Determination of figure of merit of Table galvanometer.
8. Comparison of EMF of two cells using BG Comparison of capacitance using BG.
9. Young's Modulus- Cantilever (Scale and Telescope).
10. Young's Modulus –Cantilever (Pin and Microscope).
11. Rigidity Modulus – Static Torsion.
12. Specific heat capacity of a given liquid-Joule's calorimeter.
13. Specific heat capacity of a given solid –Method of mixtures.
14. Spectrometer- Grating- Normal Incidence method.
15. Tan A and Tan B position- Magnetic moments of a given magnet.
16. Transistor characteristics – CB Configuration.
17. Verification of De Morgan's Theorems.

OUTCOMES

1. To understand the fundamentals of physics.
2. Verify the theoretical concepts in physics through experiments.
3. Understand the behavior of thermal properties of materials.
4. Apply the knowledge of the fundamentals of physics in electronics and electricity through experiments.
5. Understand the magnetic behavior of bar magnet in Tan A and Tan B positions.

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Course Outcomes (COs)↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	2	2	2	3	3	3	2	2	2	2.4
CO-2	3	2	3	2	3	3	3	2	2	2	2.5
CO-3	3	3	2	2	2	3	3	2	2	2	2.4
CO-4	3	2	3	2	2	3	3	2	2	3	2.5
CO-5	3	2	2	3	3	3	3	2	3	3	2.7
Mean Overall Score											2.5 (High)

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	75	100	

HOD
HEAD
PG and Research Department of Physics,
Rajah Serfoji Govt. College (Autonomous),
Thanjavur-613 005.

COE
CONTROLLER OF EXAMINATIONS
RAJAH SERFOJI GOVT. COLLEGE (AUTONOMOUS)
THANJAVUR-613 005.

(For the candidates admitted from 2023 – 2024 onwards)

Course	CC 7	Semester - IV	Course Code: T4PH7
Course Title	OPTICS AND LASER PHYSICS		
Credits	4	Instruction Hours - 4	Medium: English and Tamil
Course Objectives	To provide an in-depth understanding the various phenomena in geometrical and wave optics; To explain the behaviour of light in different mediums; To understand the differences in the important phenomena namely interference, diffraction and Polarization. To solve problems in optics by selecting the appropriate equations and performing numerical or analytical calculations.		

UNITS	COURSE DETAILS
Unit - I	**LENS , PRISMS AND EYEPIECE:** *Lens*: lens makers formula (no derivation) – aberrations: spherical aberration, chromatic aberrations, coma, and astigmatism– curvature of the field – distortion. *Prism*: dispersion, deviation, aberrations - applications rainbows and halos, constant deviation spectroscope. *Eyepieces*: advantage of an eyepiece over a simple lens – Huygen's and Ramsden's eyepieces, construction and working – merits and demerits of the eyepiece.
Unit - II	**INTERFERENCE:** division of wave front, Fresnel's biprism – fringes with white light – division of amplitude: interference in thin films due to, (i) reflected light, (ii) transmitted light – colours of thin films applications – air wedge – Newton's rings. *Interferometers* : Michelson's interferometer – applications, (i) determination of the wavelength of a monochromatic source of light, (ii) determination of the wavelength and separation D_1 and D_2 lines of sodium light, (iii) determination of a thickness of a mica sheet.
Unit - III	**DIFFRACTION:** Fresnel's assumptions – zone plate – action of zone plate for an incident spherical wave front – differences between a zone plate and a convex lens –Fresnel type of diffraction – diffraction pattern due to a straight edge – positions of maximum and minimum intensities – diffraction due to a narrow slit – Fraunhofer type of diffraction – Fraunhofer diffraction at a single slit – plane diffraction grating– experiment to determine wavelengths – width of principal maxima.
Unit - IV	**POLARISATION:** optical activity – optically active crystals –polarizer and analyser–double refraction – optic axis, principal plane – Huygens's explanation of double refraction in uniaxial crystals – polaroids – circularly and elliptically polarized light –quarter wave plate – half wave plate – production and detection of circularly and elliptically polarized lights – Fresnel's explanation – specific rotation – Laurent half shade polarimeter – experiment to determine specific rotatory power.
Unit - V	**LASERS:** general principles of lasers – properties of lasers action – spontaneous and stimulated emission – population inversion – optical pumping – He-Ne laser (principle and working) – CO_2 laser (principle and working) semiconductor laser – laser applications – holography.
Unit - VI	**PROFESSIONAL COMPONENTS:** expert lectures –seminars – webinars – industry inputs – social accountability – patriotism
Text Books	1. Subramaniam. N andBrijlal, 2014, Optics, 25thEd,S.Chandand Co. 2. P.R.Sasikumar, 2012, Photonics, PHIPvt Ltd, New Delhi. 3. V.Rajendran, 2012, Engineering Physics, Tata McGraw Hill.

(For the candidates admitted from 2023 – 2024 onwards)

Course	CC 9	Semester - V	Course Code: T5PH9
Course Title	ELECTRICITY, MAGNETISM AND ELECTROMAGNETISM		
Credits	4	Instruction Hours - 5	Medium: English and Tamil
Course Objectives	To classify materials based on their electrical and magnetic properties. To analyse the working principles of electrical gadgets. To understand the behaviour of dc, ac and transient currents. To know about the communication by electromagnetic waves.		

UNITS	COURSE DETAILS
Unit - I	**CAPACITORS AND THERMO ELECTRICITY**: capacitor –principle – capacitance of spherical and cylindrical capacitors – capacitance of a parallel plate capacitor (with and without dielectric slab) – Seebeck effect – laws of thermo emf – Peltier effect – Thomson effect – thermoelectric diagrams –uses of thermoelectric diagrams – thermodynamics of thermo couple - determination of Peltier and Thomson coefficients.
Unit - II	**MAGNETISM AND MAGNETIC EFFECTS OF CURRENT**: magnetic induction B – magnetization M - relation between B, H and M – magnetic susceptibility – magnetic permeability – experiment to draw B-H curve – energy loss due to hysteresis - Importance of hysteresis curves. Biot and Savart's law – magnetic induction due to circular coil – magnetic induction due to solenoid – moving coil galvanometer – damping correction – Ampere's circuital law – differential form – divergence of magnetic field – magnetic induction due to toroid.
Unit - III	**ELCTROMAGNETIC INDUCTION:** – Faraday and Lenz laws –vector form – self-induction – coefficient of self-inductance of solenoid – Experimental determination of self inductance - Rayleigh's method – mutual induction – coefficient of mutual inductance between two coaxial solenoids – Experimental determination of mutual inductance between two coils – coefficient of coupling - earth inductor-determination of angle of dip(Φ)
Unit - IV	**TRANSIENT AND ALTERNATING CURRENTS**: growth and decay of current in a circuit containing resistance and inductance – growth and decay of charge in a circuit containing resistance and capacitor – growth and decay of charge in an LCR circuit (expressions for charge only) – peak, average and rms values of ac – LCR series and parallel circuits – resonance condition – Q factor – power factor.
Unit - V	**MAXWELLS EQUATIONS AND ELECTROMAGNETIC WAVES**: Maxwell's equations in vacuum, material media– physical significance of Maxwell's equations –displacement current – plane electromagnetic waves in free space – velocity of light – Poynting vector–electromagnetic waves in a linear homogenous media – refractive index.
Unit - VI	**PROFESSIONAL COMPONENTS:** expert lectures –seminars — webinars – industry inputs – social accountability – patriotism

Text Books	1. Murugeshan. R., - Electricity and Magnetism, 8thEdn, 2006, S.Chandand Co, New Delhi. 2. Sehgal D.L., Chopra K.L, Sehgal N.K., - Electricity and Magnetism, 3. Sultan Chand and Sons, New Delhi. 4. M. Narayanamurthy and N. Nagarathnam, Electricity and Magnetism, 4th Edition. 5. National Publishing Co., Meerut.
Ref. books	1. Brijlal and Subramanian, Electricity and Magnetism, 6th Edn.,Ratanand Prakash, Agra. 2. Brijlal, N.Subramanyan and JivanSeshan, Mechanics and Electrodynamics (2005), 3. Eurasia Publishing House (Pvt.) Ltd., New Delhi. 4. David J. Griffiths, Introduction to Electrodynamics, 2ndEdn. 1997, Prentice Hall of India Pvt. Ltd., New Delhi
Web Resources	1. https://www.edx.org/course/electricity 2. https://www.udemy.com/courses/ electricity 3. https://www.edx.org/course/magnetism 4. http://www.hajim.rochester.edu/optics/undergraduate/courses.html

COURSE OUTCOMES:

At the end of the course, the student will be able to:

CO1	Describe various thermo-electric effects and their properties.
CO2	Apply Biot and Savart law to study the magnetic effect of electric current.
CO3	Use Faraday and Lenz laws in explaining self and mutual inductance.
CO4	Analyze the time variation of current and potential difference in AC circuits.
CO5	Describe Maxwell's equations and electromagnetic waves.

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Course Outcomes (COs)↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	3	2	3	2	3	2	1	2.3
CO-2	3	3	2	2	3	3	2	2	2	1	2.3
CO-3	3	2	2	3	3	2	3	3	2	1	2.4
CO-4	3	2	2	3	3	2	2	3	2	1	2.3
CO-5	3	3	2	3	3	2	2	3	2	1	2.3
										Mean Overall Score	**2.32(High)**

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	75	100	

Question Paper Pattern

Maximum Marks: 75 Marks **Exam Duration: 3 Hrs**

Part-A 10×2=20 Marks Answer ALL Questions (Two questions from each unit)

Part-B 5×5=25 Marks Answer ALL Questions (Either or Type-Two questions from each unit)

Part-C 3×10=30 Marks Answer Any Three Questions (Three out of Five-one question from each unit)

HOD

HEAD
PG and Research Department of Physics,
Rajah Serfoji Govt. College (Autonomous),
Thanjavur-613 005.

COE

CONTROLLER OF EXAMINATIONS,
RAJAH SERFOJI GOVT. COLLEGE (AUTONOMOUS)
THANJAVUR-613 005.

(For the candidates admitted from 2023 – 2024 onwards)

Course	CC 10	Semester - V	Course Code: T5PH10
Course Title	ATOMIC AND NUCLEAR PHYSICS		
Credits	4	Instruction Hours - 5	Medium: English and Tamil
Course Objectives	To make students understand the development of atom models, quantum numbers, coupling schemes and analysis of magnetic moments of an electrons; To gain knowledge on excitation and ionization potentials, splitting of spectral lines in magnetic and electric fields; To get knowledge on radioactive decay; To know the concepts used in nuclear reaction; to understand the quark model of classification of elementary particles.		

UNITS	COURSE DETAILS
Unit - I	**VECTOR ATOM MODEL:** introduction to atom model – vector atom model – electron spin –spatial quantisation– quantum numbers associated with vector atom model – L-S and J-J coupling – Pauli's exclusion principle – magnetic dipole moment due to orbital motion and spin motion of the electron – Bohr magnetron – Stern-Gerlach experiment.
Unit - II	**ATOMIC SPECTRA:** origin of atomic spectra – excitation and ionization potentials – Davis and Goucher's method – spectral terms and notations – fine structure of sodium D-lines – Zeeman effect –Larmor's theorem – quantum mechanical explanation of normal Zeeman effect – anomalous Zeeman effect (qualitative explanation) –Paschen-Back effect – Stark effect.
Unit - III	**RADIOACTIVITY:** discovery of radioactivity – natural radio activity – properties of alpha rays, beta rays and gamma rays – Geiger-Nuttal law – alpha particle spectra –Gammow's theory of alpha decay (qualitative study) – beta ray spectra – neutrino theory of beta decay – nuclear isomerism – internal conversion.
Unit - IV	**NUCLEAR REACTIONS:** conservation laws of nuclear reaction – Q-value equation for a nuclear reaction – threshold energy – scattering cross section – artificial radio activity – application of radio isotopes – classification of neutrons – models of nuclear structure – liquid drop model – shell model.
Unit - V	**ELEMENTARY PARTICLES:** classification of elementary particles – fundamental interactions – elementary particle quantum numbers –iIsospin and strangness quantum number – Conservation laws and symmetry – quarks – quark model (elementary ideas only) – discovery of cosmic rays – primary and secondary cosmic rays.
Unit - VI	**PROFESSIONAL COMPONENTS:** expert lectures –seminars — webinars – industry inputs – social accountability – patriotism
Text Books	1. R. Murugesan, Modern Physics, S. Chand and Co. (All units) (Units IandII-Problems) 2. Brijlaland N. Subrahmanyam, Atomic and Nuclear Physics, S. Chand and Co. (All units) 3. J. B. Rajam, Modern Physics, S. Chand and Co. 4. SehgalandChopra, Modern Physics, Sultan Chand, New Delhi 5. Arthur Beiser– Concept of Modern Physics, McGraw Hill Publication, 6th Edition.
Ref. books	1. Perspective of Modern Physics, Arthur Beiser, McGraw Hill. 2. Modern Physics, S. Ramamoorthy, National Publishing and Co. 3. Laser and Non-Linear Optics by B.B.Laud, Wiley Easter Ltd.,New

	York,1985. 4. Tayal, D.C.2000 – Nuclear Physics, Edition, Himalaya Publishing House, Mumbai.
Web Resources	1. http://hyperphysics.phy-astr.gsu.edu/hbase/hframe.html 2. https://makingphysicsfun.files.wordpress.com/2015/01/photoelectric-effect.pptx 3. https://www.khanacademy.org/science/in-in-class-12th-physics-india/nuclei

COURSE OUTCOMES:

At the end of the course, the student will be able to:

CO1	Describe various models that explain about the nuclear structures
CO2	Understand atomic spectra.
CO3	Give reason for various kinds of radioactivity and also know laws governing them
CO4	Discuss the concepts used in nuclear reaction.
CO5	Classify various elementary particles and study the effect of cosmic rays.

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Course Outcomes(COs)↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	2	2	2	2	3	3	2	3	2	2.4
CO-2	3	1	3	1	2	3	2	3	3	2	2.3
CO-3	3	2	2	2	2	3	2	3	2	2	2.3
CO-4	3	2	3	2	2	3	3	2	2	2	2.4
CO-5	2	2	2	2	2	3	3	2	3	2	2.3
									Mean Overall Score		2.34 (High)

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	75	100	

Question Paper Pattern

Maximum Marks: 75 Marks **Exam Duration: 3 Hrs**

Part-A 10×2=20 Marks Answer ALL Questions (Two questions from each unit)

Part-B 5×5=25 Marks Answer ALL Questions (Either or Type-Two questions from each unit)

Part-C 3×10=30 Marks Answer Any Three Questions (Three out of Five-one question from each unit)

HOD

HEAD
PG and Research Department of Physics,
Rajah Serfoji Govt. College (Autonomous),
Thanjavur-613 005.

COE

CONTROLLER OF EXAMINATIONS,
RAJAH SERFOJI GOVT. COLLEGE (AUTONOMOUS)
THANJAVUR-613 005.

(For the candidates admitted from 2023 – 2024 onwards)

Course	**CC 11**	**Semester - V**	**Course Code: T5PH11**
Course Title	**ANALOG AND COMMUNICATION ELECTRONICS**		
Credits	**4**	**Instruction Hours - 4**	**Medium: English and Tamil**
Course Objectives	To study the design, working and applications of semiconducting devices. To construct various electronic circuits. To study them in details. To study the basis of audio and video communication systems and the aspects of satellite and Fibre Optic Communications.		

UNITS	COURSE DETAILS
Unit - I	**DIODES:** Diode characteristics – rectifiers - half wave rectifier, center tapped and bridge full wave rectifiers, calculation of efficiency and ripple factor. DC power supply: Block diagram of a power supply and its working - Zener diode as voltage regulator.
Unit - II	**TRANSISTOR AMPLIFIERS:** Transistor configurations: CB, CE CC modes – I-V characteristics and hybrid parameters – DC load line – Q point self-bias – RC coupled CE amplifier – power amplifiers – classification of power amplifiers: A, B, C – push pull amplifiers.
Unit - III	**TRANSISTOR OSCILLATORS:** Feedback amplifier - principle of feedback, positive and negative feedback of voltage and current gain, advantages of negative feedback - Barkhausen's criterion. Transistor oscillators: Hartely, Colpitt, Phase shift oscillators with mathematical analysis.
Unit - IV	**INTEGRATED CIRCUITS AND OPERATIONAL AMPLIFIERS:** Integrated circuits – Classifications – Fabrication of basic monolithic IC. Differential amplifiers – OPAMP characteristics – IC 741 pin configuration – inverting and non-inverting amplifiers – unity follower –summing and difference amplifiers – differentiator and integrator – astable multivibrator (square wave generator).
Unit - V	**MODULATION AND DEMODULATION** Theory of amplitude modulation - frequency modulation – comparison of AM and FM – phase modulation – sampling theorem – pulse width modulation – pulse modulation systems: PAM, PPM, and PCM (Definitions only) – demodulation: AM and FM detection.
Unit - VI	**PROFESSIONAL COMPONENTS:** expert lectures –seminars — webinars – industry inputs – social accountability – patriotism
Text Books	1. V.K.Mehta - Principles of Electronics, S.Chand and Co. Ltd., 2004. 2. V.Vijayendran - Integrated Electronics, S.Vishwanathan Publishers. 3. B.L. Theraja - A Text Book of Electrical Technology. 4. John D. Ryder - Electronic fundamentals and Applications. 5. Malvino - Electronic Principles, Tata McGraw Hill.

Ref. books	1. B. Grob - Basic Electronics, 6th edition, McGraw Hill, NY, 1989. 2. Herbert Taub and Donald schilling - Digital Integrated Electronics, McGraw Hill, NY. 3. Ramakant A. – Op amp principles and linear integrated circuits, Gaykward 4. Bagde and S. P. Singh - Elements of Electronics. 5. Millman and Halkias- Integrated Electronics, Tata McGraw Hill.
Web Resources	1. https://www.queenmaryscollege.edu.in/eresources/undergraduateprogram/py157 2. www.ocw.mit.edu>...> Circuits and Electronics 3. www.ocw.mit.edu>...> Introductory Analog Electronics Laboratory 4. https:// www.elprocus.com> semiconductor devices 5. https:// www.britannica.com>technology

COURSE OUTCOMES:

At the end of the course, the student will be able to:

CO1	Explain the basic concepts of semiconductors devices.
CO2	know and classify the basic principles of biasing and transistor amplifiers
CO3	Acquire the fundamental concepts of oscillators.
CO4	Understand the working of operational amplifiers
CO5	Learn and analyze the theory of various modulations and demodulations.

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Course Outcomes (COs)↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	3	3	2	2	3	3	2	2	2	2.5
CO-2	3	3	2	2	2	3	3	3	3	2	2.6
CO-3	3	3	2	2	2	3	3	3	2	2	2.5
CO-4	3	3	2	2	2	3	3	3	2	2	2.5
CO-5	3	3	2	2	2	3	3	3	2	2	2.5
Mean Overall Score											**2.52 (High)**

Question Paper Pattern

Maximum Marks: 75 Marks **Exam Duration: 3 Hrs**

Part-A 10×2=20 Marks Answer ALL Questions (Two questions from each unit)
Part-B 5×5=25 Marks Answer ALL Questions (Either or Type-Two questions from each unit)
Part-C 3×10=30 Marks Answer Any Three Questions (Three out of Five-one question from each unit)

HOD

HEAD
PG and Research Department of Physics,
Rajah Serfoji Govt. College (Autonomous),
Thanjavur-613 005.

COE

CONTROLLER OF EXAMINATIONS,
RAJAH SERFOJI GOVT. COLLEGE (AUTONOMOUS)
THANJAVUR-613 005.

(For the candidates admitted from 2023 – 2024 onwards)

Course	**CC 12**	**Semester - V**	**Course Code: T5PH12**
Course Title	**PHYSICS PRACTICAL - V**		
Credits	**3**	**Instruction Hours - 6**	**Medium: English and Tamil**
Course Objectives	*Demonstrate various optical phenomena principles, working, apply with various materials and interpret the results.*		

Minimum of **Fifteen Experiments** from the list:

1. Specific rotation of sugar solution.
2. Bi-prism – Determination of μ.
3. Thickness of a thin film of Bi-prism
4. Brewster's law – polarization
5. Double refraction (μe and μo)
6. Diffraction a straight edge.
7. Kundt's tube – Velocity of sound, Adiabatic Young's modulus of the material of the rod.
8. Spectrometer – Narrow angled prism.
9. Potentiometer – E.M.F of a thermocouple.
10. Young's Modulus - Koenig's method-(Non-Uniform Bending).
11. Spectrometer – (i- i') curve.
12. Spectrometer – Cauchy's Constants A & B.
13. B.G- Absolute Capacitance.
14. Carey Foster's Bridge –Temperature co-efficient of resistance of a coil.
15. Potentiometer- Calibration of high range voltmeter.
16. Post office box – Temperature coefficient of resistance of a coil.
17. Transistor –Single Stage Amplifier.
18. Hartley Oscillator – Frequency and Self-inductance (L).
19. FET- Characteristics.
20. Regulated power supply using Zener diode – percentage of regulation.
21. Operational Amplifier – Adder and Subtractor.
22. NAND universal gate – Verification.
23. NOR as universal gate- verification.
24. Half Adder, Full Adder using basic logic gates-IC.
25. Multiplexer (4-1) and Demultiplexer (1-4).
26. Microprocessor – 8 bit addition and subtraction.
27. Microprocessor – Smallest and largest number in an array of data.

OUTCOMES

By the end of the course, the student will be able to

1. Verify the theoretical concepts in physics through experiments.
2. Understand the behavior of thermal properties of materials.
3. Understand the validity of basic laws and theories to determine various properties of materials.
4. Gain knowledge about FET characteristics.
5. Understand about the various digital circuits.

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Course Outcomes (COs)↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	3	3	2	2	3	3	3	3	2	2.7
CO-2	3	3	3	2	2	3	3	3	3	2	2.7
CO-3	3	3	3	2	2	3	3	3	3	2	2.7
CO-4	3	3	2	2	2	3	3	3	3	2	2.6
CO-5	3	3	2	2	2	3	3	3	3	2	2.6
Mean Overall Score											2.66 (High)

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	75	100	

HOD

HEAD
PG and Research Department of Physics,
Rajah Serfoji Govt. College (Autonomous),
Thanjavur-613 005.

COE

CONTROLLER OF EXAMINATIONS,
RAJAH SERFOJI GOVT. COLLEGE (AUTONOMOUS)
THANJAVUR-613 005.

(For the candidates admitted from 2023 – 2024 onwards)

Course	**CC 13**	**Semester - VI**	**Course Code: T6PH13**
Course Title	**QUANTUM MECHANICS AND RELATIVITY**		
Credits	**5**	**Instruction Hours - 6**	**Medium: English and Tamil**
Course Objectives	To understand the theory of relativity, its postulates and the consequences. To learn the importance of transformation equations and also to differentiate between special and general theory of relativity. To interpret the wave theory of matter with various theoretical and experimental evidences. To derive and use Schrodinger's wave equation and also learn about various operators. To solve Schrodinger's wave equation for simple problems and analyse to understand the solutions.		

UNITS	COURSE DETAILS
Unit - I	**PHOTONS AND MATTER WAVES:** difficulties of classical physics and origin of quantum theory – black body radiation – Planck's law – Einstein's photoelectric equation – Compton effect – De Broglie waves – phase velocity and group velocity – Davisson and Germer's experiment – uncertainty principle – consequences – illustration of Gamma ray microscope.
Unit - II	**OPERATORS AND SCHRÖDINGER EQUATION:** postulates of quantum mechanics – Wave function and its interpretation – Schrödinger's equation – linear operators – Eigen value – Hermitian operator – properties of Hermitian operator – operators for position, linear Momentum, angular momentum components – expectation values of position and momentum –Ehrenfest theorem.
Unit - III	**SOLVING SCHRÖDINGER EQUATION FOR SIMPLE PROBLEMS:** *one-dimensional problems*: (i) particle in a box, (ii) barrier penetration problem – quantum mechanical tunneling, (iii) linear harmonic oscillator. *higher dimensional problems*: (i) Rigid rotator (qualitative), (ii) Hydrogen atom (qualitative).
Unit - IV	**SPECIAL THEORY OF RELATIVITY:** Michelson-Morley experiment– frames of reference – Galilean Relativity – postulates of special theory of relativity – Lorentz transformation – consequences – time dilation–concept of simultaneity – Doppler effect – length contraction–variation of mass with velocity – Einstein's mass-energy relation– relativistic momentum – energy relation
Unit - V	**TRANSFORMATION RELATIONS:** transformation of velocity, mass, energy and momentum – four vector – invariance under transformation – Lorentz transformation and velocity addition equations in terms of hyperbolic functions. **GENERAL THEORY OF RELATIVITY:** Inertial and Gravitational mass – Principle of equivalence – Experimental evidences for General theory of Relativity
Unit - VI	**PROFESSIONAL COMPONENTS:** expert lectures –seminars — webinars – industry inputs – social accountability – patriotism
Text Books	1. Modern Physics, R. Murugeshan, Kiruthiga Sivaprasath,S. Chand and Co.,17th Revised Edition, 2014. 2. Concepts of Modern Physics, A.Beiser, 6th Ed., McGraw-Hill, 2003. 3. Special Theory of Relativity,S. P.Puri, Pearson Education, India, 2013. 4. Quantum mechanics–Satyaprakash and Swati Saluja. KedarNath Ram Nathand

Ref. books	1. Quantum Mechanics, V. Devanathan, Narosa Pub. House, Chennai, 2005. 2. Quantum Mechanics, V.K. Thangappan, New Age International, New Delhi. 3. A Text Book of Quantum Mechanics, Mathews and Venkatesan, Tata McGraw Hill, New Delhi. 4. Introduction to Quantum Mechanics, Pauling and Wilson, McGraw Hill Co., NewYork.
Web Resources	1. http://hyperphysics.phy-astr.gsu.edu/hbase/qapp.html 2. https://swayam.gov.in/nd2_arp19_ap83/preview 3. https://swayam.gov.in/nd1_noc20_ph05/preview 4. https://www.khanacademy.org/science/physics/special-elativity/minkowski-spacetime/v/introduction-to-special-relativity-and-minkowski-spacetime-diagrams

COURSE OUTCOMES:

At the end of the course, the student will be able to:

CO1	Realise the wave nature of matter and understand its importance
CO2	Understand the Schrodinger equation and also realize the use of operators.
CO3	Know the applications of Schrödinger equation to simple problems.
CO4	Understand various postulates of special theory of relativity.
CO5	Appreciate the importance of transformation equations and also the general theory of relativity.

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Course Outcomes (COs)↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	3	2	2	2	3	2	2	2	2	2.3
CO-2	3	3	3	2	2	3	2	2	2	1	2.3
CO-3	3	3	2	3	2	3	3	2	2	1	2.4
CO-4	3	3	3	3	2	3	3	2	2	1	2.5
CO-5	3	3	2	3	2	2	3	2	2	3	2.5
Mean Overall Score											**2.4 (High)**

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	75	**100**	

Question Paper Pattern

Maximum Marks: 75 Marks **Exam Duration: 3 Hrs**

Part-A 10×2=20 Marks Answer ALL Questions (Two questions from each unit)

Part-B 5×5=25 Marks Answer ALL Questions (Either or Type-Two questions from each unit)

Part-C 3×10=30 Marks Answer Any Three Questions (Three out of Five-one question from each unit)

HOD

HEAD
PG and Research Department of Physics,
Rajah Serfoji Govt. College (Autonomous),
Thanjavur-613 005.

COE

CONTROLLER OF EXAMINATIONS,
RAJAH SERFOJI GOVT. COLLEGE (AUTONOMOUS)
THANJAVUR-613 005.

(For the candidates admitted from 2023 – 2024 onwards)

Course	CC 14	Semester - VI	Course Code: T6PH14
Course Title	SOLID STATE PHYSICS		
Credits	5	Instruction Hours - 6	Medium: English and Tamil
Course Objectives	To understand constituents, properties and models of nucleus. To give reason for radioactivity and study their properties. To learn about the principles of various particle detectors and accelerators. To acquire knowledge on different types of nuclear reactions and their applications. To know the reason for cosmic rays and their effect on the surface of earth and also understand the classification of elementary particles.		

UNITS	COURSE DETAILS
Unit - I	**BONDING IN SOLIDS, CRYSTAL STRUCTURE:** Types of bonding –ionic bonding – bond energy of NaCl molecule –covalent bonding – metallic bonding – hydrogen bonding – Van-der-Waals bonding. Crystal lattice –vectors – lattice with basis – unit cell – Bravais' lattices – Miller indices – procedure for finding them –packing of BCC and FCC structures – structures of NaCl and diamond crystals –reciprocal lattice – reciprocal lattice vectors – properties – reciprocal lattices to SC, BCC and FCC structures –X-rays – Bragg's law(simple problems) – experimental methods: Laue method, powder crystal method.
Unit - II	**ELEMENTARY LATTICE DYNAMICS:** Lattice vibrations and phonons: linear monoatomic and diatomic chains. acoustical and optical phonons –qualitative description of the phonon spectrum in solids – Dulong and Petit's Law – T^3 law (qualitative only)–properties of metals – classical free electron theory of metals(Drude-Lorentz) – Ohm's law – electrical and thermal conductivities – Weidemann-Franz' law.
Unit - III	**MAGNETIC PROPERTIES OF SOLIDS:** Permeability, susceptibility, relation between them – classification of magnetic materials – properties of dia, para, ferro, ferri and anti ferromagnetism – Langevin's theory of diamagnetism – Langevin's theory of paramagnetism – Curie-Weiss law – Weiss theory of ferromagnetism(qualitative only) – Heisenberg's quantum theory of ferromagnetism – domains.
Unit - IV	**DIELECTRIC PROPERTIES OF MATERIALS:** Polarization and electric susceptibility –local electric field of an atom – dielectric constant and polarisability – polarization processes: electronic polarization– calculation of polarisability – ionic, orientational and space charge polarization – internal field – Clausius-Mosotti relation –frequency dependence of dielectric constant –dielectric loss – effect of temperature on dielectric constant – dielectric breakdown and its types.
Unit - V	**FERROELECTRIC & SUPERCONDUCTING PROPERTIES OF MATERIALS:** *ferroelectric effect*: Curie-Weiss Law – ferroelectric domains – conductor, semiconductor (P and N type) and insulator –conductivity of semiconductor – mobility – Hall effect – measurement of conductivity (four probe method) - Hall coefficient. *Superconductivity:* experimental results –critical temperature –critical magnetic field – Meissner effect –type-I and type-II superconductors – London's equation and penetration depth – isotope effect – idea of BCS theory (no derivation)

Unit - VI	**PROFESSIONAL COMPONENTS:** expert lectures –seminars — webinars – industry inputs – social accountability – patriotism
Text Books	1. Introduction to Solid State Physics,Kittel, Willey Eastern Ltd (2003). 2. Solid state Physics, Rita John,1st edition, TataMcGraw Hill publishers (2014). 3. Solid State Physics , R L Singhal, Kedarnath Ram Nath& Co., Meerut (2003) 4. Elements of Solid State Physics, J.P. Srivastava, 2nd Edition, 2006, Prentice-Hall of India 5. Introduction to Solids, Leonid V. Azaroff, 2004, Tata Mc-Graw Hill 6. Solid State Physics, N.W. Ashcroft and N.D. Mermin, 1976, Cengage Learning 7. Solid-state Physics, H. Ibach and H. Luth, 2009, Springer 8. Elementary Solid State Physics, 1/e M. Ali Omar, 1999, Pearson India 9. Solid State Physics, M.A. Wahab, 2011, Narosa Publishing House, ND
Ref. books	1. Puri&Babber – Solid State Physics – S.Chand&Co. New Delhi. 2. Kittel - Introduction to solid state physics, Wiley and Sons, 7th edition. 3. Raghavan - Materials science and Engineering, PHI 4. Azaroff - Introduction to solids, TMH 5. S. O. Pillai - Solid State Physics, Narosa publication 6. A.J. Dekker - Solid State Physics, McMillan India Ltd. 7. Elements of Solid State Physics, J.P. Srivastava, 2nd Edition, 2006, Prentice-Hall of India
Web Resources	1. https://nptel.ac.in/courses/115105099/ 2. https://nptel.ac.in/courses/115106061/

COURSE OUTCOMES:

At the end of the course, the student will be able to:

CO1	Classify the bonding &crystal structure also learn about the crystal structure analysis using X ray diffraction.
CO2	Understand the lattice dynamics and thus learn the electrical and thermal properties of materials.
CO3	Give reason for classifying magnetic material on the basis of their behaviour.
CO4	Comprehend the dielectric behavior of materials.
CO5	Appreciate the ferroelectric and super conducting properties of materials.

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Course Outcomes (COs)↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	2	2	2	2	3	3	2	3	2	2.4
CO-2	3	1	3	1	2	3	2	3	3	2	2.3
CO-3	3	2	2	2	2	3	2	3	2	2	2.3
CO-4	3	2	3	2	2	3	3	2	2	2	2.4
CO-5	2	2	2	2	2	3	3	2	3	2	2.3
										Mean Overall Score	**2.34 (High)**

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	75	100	

Question Paper Pattern

Maximum Marks: 75 Marks **Exam Duration: 3 Hrs**

Part-A 10×2=20 Marks Answer ALL Questions (Two questions from each unit)
Part-B 5×5=25 Marks Answer ALL Questions (Either or Type-Two questions from each unit)
Part-C 3×10=30 Marks Answer Any Three Questions (Three out of Five-one question from each unit)

HOD

HEAD
PG and Research Department of Physics,
Rajah Serfoji Govt. College (Autonomous),
Thanjavur-613 005.

COE

CONTROLLER OF EXAMINATIONS,
RAJAH SERFOJI GOVT. COLLEGE (AUTONOMO
THANJAVUR-613 005.

(For the candidates admitted from 2023 – 2024 onwards)

Course	CC 15	Semester - VI	Course Code: T6PH15
Course Title	PHYSICS PRACTICAL - VI		
Credits	4	Instruction Hours - 6	Medium: English and Tamil
Course Objectives	To perform basic experiments on characteristics of electronic devices and then get into the applications such as amplifiers, oscillators, counters, multivibrators. Perform fundamental experiments on microprocessor 8085 and learn to write C programs by themselves.		

Minimum of **Fifteen Experiments** from the list:

1. Bridge rectifier using diodes
2. Clipping and clamping circuits using diodes.
3. RC coupled CE transistor amplifier - single stage.
4. Transistor Emitter follower.
5. Colpitt's oscillator -transistor.
6. Astable multivibrator - transistor.
7. Bistable multivibrator - transistor.
8. FET - amplifier (common drain)
9. Operational amplifier – differentiator, integrator and comparator.
10. Construction of seven segment display.
11. Half subtractor and full subtractor using basic logic gate ICs
12. Microprocessor 8085 – multiplication (8 bit only)
13. Microprocessor 8085 – division (8 bit only)
14. Microprocessor 8085 – square (8 bit only)
15. Microprocessor 8085 – square root (8 bit only)
16. Microprocessor 8085 –ascending/descending order
17. Spectrometer – Dispersive power of grating.
18. B.G. – Comparison of capacitances.
19. B.G. – Comparison of mutual inductances.
20. Potentiometer – EMF of a Thermocouple.
21. Potentiometer – Temperature coefficient of Thermistor.
22. Simplification of Boolean expressions by Karnaugh map.
23. Study of Flip Flops.
24. C - Programming – Conversion of Centigrade to Fahrenheit.
25. C - Programming – Calculation of Simple Interest.
26. C - Programming – Factorial of N numbers.
27. C- Programming – Biggest and Smallest number from the given array.
28. C - Programming – Ascending and descending order of an array.

OUTCOMES

By the end of the course, the student will be able to

1. Verify the theoretical concepts in physics through experiments.
2. Understand the behavior of thermal properties of materials.
3. Understand the validity of basic laws and theories to determine various properties of materials.
4. Understand the application of various experiments in our day to day life.
5. Apply the knowledge of the fundamentals of physics and instrumentation to arrive at a solution for various problems.
6. Acquire programming skills in C language.

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Course Outcomes (COs)↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	3	2	2	2	3	2	2	1	2	2.2
CO-2	3	3	3	2	2	3	2	2	1	1	2.2
CO-3	3	3	2	2	2	3	3	2	1	1	2.2
CO-4	3	3	3	2	2	3	3	2	1	1	2.3
CO-5	3	3	2	2	2	3	3	2	1	2	2.3
									Mean Overall Score		2.24 (High)

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	75	100	

HOD
HEAD
PG and Research Department of Physics,
Rajah Serfoji Govt. College (Autonomous),
Thanjavur-613 005.

COE
CONTROLLER OF EXAMINATIONS,
RAJAH SERFOJI GOVT. COLLEGE (AUTONOMOUS)
THANJAVUR-613 005.

ELECTIVE COURSES (EC)
(COMPULSORY ELECTIVE)

(For the candidates admitted from 2023 – 2024 onwards)

Course	**EC 9**	**Semester - VI**	**Course Code: PHECA**
Course Title	**DIGITAL ELECTRONICS AND MICROPROCESSOR 8085**		
Credits	**3**	**Instruction Hours - 6**	**Medium: English and Tamil**
Course Objectives	To learn all types of number systems, Boolean algebra and identities, digital circuits for addition and subtraction, flip-flops, registers, counters. To get the knowledge on fundamentals of 8085 architecture, instruction sets and simple programs.		

UNITS	COURSE DETAILS
Unit - I	Decimal, binary, octal, hexadecimal numbers systems and their conversions codes: BCD, gray and excess-3 codes – ASCII codes - complements (1's, 2's) – binary addition, binary subtraction using 1's & 2's complement methods – Boolean laws – De-Morgan's theorem –basic logic gates -universal logic gates (NAND & NOR) – Karnaugh map (SOP).
Unit - II	Adders: half & full adder – Subtractors: half & full subtractor – magnitude comparator (basics only) – multiplexers (4:1) & demultiplexers (1:4), encoder (8-line-to-3- line) and decoder (3-line-to-8-line), BCD to seven segment decoder.
Unit - III	flip-flops: S-R Flip-flop , J-K Flip-flop, T and D type flip-flops, master-slave flip-flop, truth tables, registers:- serial in serial out and parallel in and parallel out – counters asynchronous:- mod-10, synchronous - 4-bit & ring counter.
Unit - IV	8085 Microprocessor: introduction to microprocessor – INTEL 8085 architecture – register organization –pin configuration of 8085, interrupts and its priority – Program Status Word (PSW) –instruction set of 8085 –addressing modes of 8085.
Unit - V	Assembly language programming using 8085 – programmes for addition (8-Bit & 16-Bit), subtraction (8-Bit & 16-Bit), multiplication (8- Bit), division (8- Bit) – largest and smallest number in an array – Square of a number (8-bit) – Square root of a number (8-bit) – Ascending and Descending order of an array (8-bit).
Unit - VI	**PROFESSIONAL COMPONENTS:** expert lectures –seminars — webinars – industry inputs – social accountability – patriotism.
Text Books	1. M.Morris Mano, "Digital Design "3rd Edition, PHI, NewDelhi. 2. Ronald J. Tocci. "Digital Systems-Principles and Applications" 6/e. PHI. New Delhi. 1999.(UNITS I to IV) 3. S.Salivahana& S. Arivazhagan-Digital circuits and design 4. Microprocessor Architecture, Programming and Applications with the 8085 – Penram International Publishing, Mumbai.- Ramesh S.Gaonakar 5. Fundamentals of Microprocessor and Microcomputers – B. RAM, Danpat Ray.
Ref. books	1. Herbert Taub and Donald Schilling. "Digital Integrated Electronics" . McGraw Hill. 1985. 2. S.K. Bose. "Digital Systems". 2/e. New Age International.1992. 3. D.K. Anvekar and B.S. Sonade. "Electronic Data Converters: Fundamentals

	&Applications". TMH.1994. 4. Malvino and Leach. "Digital Principles and Applications". TMG HillEdition 5. Microprocessors and Interfacing – Douglas V.Hall 6. Microprocessor and Digital Systems – Douglas V.Hall
Web Resources	1. https://youtu.be/-paFaxtTCkI 2. https://youtu.be/s1DSZEaCX_g

COURSE OUTCOMES:

At the end of the course, the student will be able to:

CO1	Learn about number systems, Boolean algebra, logical operation and logic gates
CO2	Understand the working of adder, subractors, multiplexers and demultiplexers.
CO3	Get knowledge on flip-flops, registers and counters.
CO4	Gain inputs on architecture of microprocessor 8085.
CO5	Develop program writing skills .on microprocessor 8085.

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Course Outcomes (COs)↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	3	2	3	2	3	3	2	3	2	2.6
CO-2	3	3	3	2	2	3	3	3	3	2	2.7
CO-3	3	3	3	2	2	3	3	3	3	2	2.7
CO-4	3	3	3	2	2	3	3	2	3	2	2.6
CO-5	3	3	2	2	2	3	3	3	2	2	2.5
									Mean Overall Score		2.62 (High)

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	75	100	

Question Paper Pattern

Maximum Marks: 75 Marks **Exam Duration: 3 Hrs**

Part-A 10×2=20 Marks Answer ALL Questions (Two questions from each unit)

Part-B 5×5=25 Marks Answer ALL Questions (Either or Type-Two questions from each unit)

Part-C 3×10=30 Marks Answer Any Three Questions (Three out of Five-one question from each unit)

HOD

HEAD

PG and Research Department of Physics,
Rajah Serfoji Govt. College (Autonomous),
Thanjavur-613 005.

COE

CONTROLLER OF EXAMINATIONS,
RAJAH SERFOJI GOVT. COLLEGE (AUTONOMOUS)
THANJAVUR-613 005.

DISCIPLINE SPECIFIC ELECTIVE COURSES

STUDENTS CAN CHOOSE ANY OF THESES SUBJECTS IN SEM V AND VI

(For the candidates admitted from 2023 – 2024 onwards)

Course	**EC**	**Semester – V/VI**	**Course Code: TPHECB**
Course Title	**COMMUNICATION PHYSICS**		
Credits	**3**	**Instruction Hours - 4**	**Medium: English and Tamil**
Learning Objective	To get a thorough knowledge on transmission and reception of radio waves, the different types of communication like fibre optic, radar, satellite, cellular		

UNITS	COURSE DETAILS
Unit - I	**RADIO TRANSMISSION AND RECEPTION:** transmitter – modulation types of modulation – amplitude modulation – limitations of amplitude modulation – frequency modulation – comparison of FM and AM – demodulation- essentials in demodulation – receivers: AM radio receivers – types of AM radio receivers – stages of superheterodyne radio receiver, advantages – FM receiver – difference between FM and AM receivers.
Unit - II	**FIBER OPTIC COMMUNICATION:** introduction – basic principle of fiber optics – advantages – construction of optical fiber – classification based on the refractive index profile – classification based on the number of modes of propagation – losses in optical fibers – attenuation–advantages of fiberoptic communication
Unit - III	**RADAR COMMUNICATION:** introduction - basic radar system –radar range – antenna scanning –pulsed radar system – search radar –tracking radar – moving target indicator Doppler effect-MTI principle – CW Doppler radar
Unit - IV	**SATELLITE COMMUNICATION:** introduction history of satellites – satellite communication system – satellite orbits – basic components of satellite communication system – commonly used frequency in satellite – communication –multiple access communication – satellite communication in India
Unit - V	**MOBILE COMMUNICATION:** introduction – concept of cell –basic cellular mobile radio system – cellphone – facsimile – important features of fax machine – application of facsimile – VSAT (very small aperture terminals) modem IPTV (internet protocol television) -Wi-Fi-4G (basic ideas)
Text Books	1. V.K.Metha, Principles of Electronics, S. Chand & CoLtd., 2013 2. Anokh Singh and Chopra A.K., Principles of communication Engineering, S.Chand& Co, 2013
Ref. books	1. J.S. Chitode, Digital Communications, 2020, Unicorn publications 2. Senior John. M, Optical Fiber Communications: Principles and Practice, 2009, Pearson Education.

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	75	100	

Question Paper Pattern

Maximum Marks: 75 Marks **Exam Duration: 3 Hrs**

Part-A 10×2=20 Marks Answer ALL Questions (Two questions from each unit)

Part-B 5×5=25 Marks Answer ALL Questions (Either or Type-Two questions from each unit)

Part-C 3×10=30 Marks Answer Any Three Questions (Three out of Five-one question from each unit)

HOD

HEAD
PG and Research Department of Physics,
Rajah Serfoji Govt. College (Autonomous),
Thanjavur-613 005.

COE

CONTROLLER OF EXAMINATIONS
RAJAH SERFOJI GOVT. COLLEGE (AUTONOMOUS)
THANJAVUR-613 005.

(For the candidates admitted from 2023 – 2024 onwards)

Course	**EC**	**Semester – V/VI**	**Course Code: TPHECC**
Course Title	**ENERGY PHYSICS**		
Credits	**3**	**Instruction Hours - 4**	**Medium: English and Tamil**
Learning Objective	To get the understanding of the conventional and non-conventional energy sources, their conservation and storage systems.		

UNITS	COURSE DETAILS
Unit - I	**INTRODUCTION TO ENERGY SOURCES:** energy consumption as a measure of prosperity – world energy future – energy sources and their availability – conventional energy sources – non-conventional and renewable energy sources – comparison – merits and demerits.
Unit - II	**SOLAR ENERGY:**solar energy Introduction – solar constant – solar radiation at the Earth's surface – solar radiation geometry – Solar radiation measurements – solar radiation data –solar energy storage and storage systems – solar pond – solar cooker – solar water heater – solar greenhouse – types of greenhouses – solar cells.
Unit - III	**WIND ENERGY:**introduction –nature of the wind – basic principle of wind energy conversion – wind energy data and energy estimation – basic components of Wind Energy Conversion Systems (WECS) – advantages and disadvantages of WECS – applications – tidal energy
Unit - IV	**BIOMASS ENERGY:** introduction – classification – biomass conversion technologies –photosynthesis – fermentation - biogas generation –classification of biogas plants – anaerobic digestion for biogas – wood gasification – advantages & disadvantages.
Unit - V	**ENERGY STORAGE:**importance of energy storage- batteries - lead acid battery -nickel-cadmium battery – fuel cells – types of fuel cells – advantages and disadvantages of fuel cells – applications of fuel cells - hydrogen storage.
Text Books	1. G.D.Rai, Non-Conventional Sources of Energy, Khanna Publishers, 2009. 2. S P Sukhstme, J K Nayak, Solar Energy, Principles of Thermal Collection and Storage, McGraw Hill, 2008, 3rd Edn. 3. D P Kothari, K P Singal, RakeshRajan, PHI Learning Pvt Ltd, 2011, 2nd Edn.
Ref. books	1. John Twidell& Tony Weir, Renewable Energy Resources, Taylor & Francis, 2005, 2nd Edn. 2. M. P. Agarwal, Solar Energy, S. Chand & Co. Ltd., New Delhi,1982 3. H. C. Jain, Non-Conventional Sources of Energy, Sterling Publishers,1986.

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	75	**100**	

Question Paper Pattern

Maximum Marks: 75 Marks **Exam Duration: 3 Hrs**

Part-A 10×2=20 Marks Answer ALL Questions (Two questions from each unit)

Part-B 5×5=25 Marks Answer ALL Questions (Either or Type-Two questions from each unit)

Part-C 3×10=30 Marks Answer Any Three Questions (Three out of Five-one question from each unit)

HOD

HEAD
PG and Research Department of Physics,
Rajah Serfoji Govt. College (Autonomous),
Thanjavur-613 005.

COE

CONTROLLER OF EXAMINATIONS,
RAJAH SERFOJI GOVT. COLLEGE (AUTONOMOUS)
THANJAVUR-613 005.

(For the candidates admitted from 2023 – 2024 onwards)

Course	**EC**	**Semester – V/VI**	**Course Code: TPHECD**
Course Title	**MATHEMATICAL PHYSICS**		
Credits	**3**	**Instruction Hours - 4**	**Medium: English and Tamil**
Learning Objective	To understand higher mathematical concepts which are applied to solve problems in Physics and similar situations		

UNITS	COURSE DETAILS
Unit - I	**MATRICES:** types of matrices – symmetric, Hermitian, unitary and orthogonal matrices– characteristic equation of a matrix – Eigen values and Eigen vectors of a matrix – Cayley-Hamilton theorem – inverse of matrix by Cayley-Hamilton theorem – similarity transformations – diagonalization of 2x2 real symmetric matrices.
Unit - II	**VECTOR CALCULUS:** vector differentiation – directional derivatives – definitions & Physical significance of gradient, divergence, curl – Laplace operators– vector identities – line, surface and volume integrals – statement, proof and simple problems for Gauss's divergence theorem, Stoke's theorem.
Unit - III	**ORTHOGONAL CURVILINEAR COORDINATES:** tangent basis vectors – scale factors – unit vectors in cylindrical and spherical coordinate systems –gradient of a scalar –divergence and curl of a vector – Laplacian in these coordinate systems.
Unit - IV	**FOURIER SERIES:** periodic functions – Dirichlet's conditions – general Fourier series – even and odd functions and their Fourier expansions – Fourier cosine and sine – half range series – change of length of interval. Fourier analysis of square wave, saw-tooth wave, half wave/full wave rectifier wave forms. **FOURIER TRANSFORMS**: Fourier Integral theorem(Statement only)–Fourier, Fourier sine and Fourier cosine transforms,– Fourier transform ofsingle pulse – trigonometric,exponential and Gaussianfunctions – inverse Fourier transform – convolution theorem.
Unit - V	**APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS (PDE):** PDE for transverse vibrations in elastic strings (one dimensional wave equation) –one dimensional heat flow equation – solutions to these PDE's by method of separation of variables – problems based on boundary conditions and initial conditions.
Text Books	1. Advanced Engineering Mathematics, Erwin Kreyszig, 2008, Wiley India. 2. Mathematical Physics – P. K. Chattopadhyay, New Age International Publishers. 3. Mathematical Physics – B. D. Gupta. 4. Mathematical Physics – H. K. Das, S. Chand & Co, New Delhi.
Ref. books	1. Fourier Analysis by M.R. Spiegel, 2004, Tata McGraw-Hill. 2. Engineering Mathematics III- B, M. K. Venkataraman, 3. Vector space & Matrices – J. C. Jain, Narosa Publishing House Pvt. Ltd.

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	75	100	

Question Paper Pattern

Maximum Marks: 75 Marks **Exam Duration: 3 Hrs**

Part-A 10×2=20 Marks Answer ALL Questions (Two questions from each unit)

Part-B 5×5=25 Marks Answer ALL Questions (Either or Type-Two questions from each unit)

Part-C 3×10=30 Marks Answer Any Three Questions (Three out of Five-one question from each unit)

HOD

HEAD
PG and Research Department of Physics,
Rajah Serfoji Govt. College (Autonomous),
Thanjavur-613 005.

COE

CONTROLLER OF EXAMINATIONS
RAJAH SERFOJI GOVT. COLLEGE (AUTONOMOUS)
THANJAVUR-613 005.

(For the candidates admitted from 2023 – 2024 onwards)

Course	**EC**	**Semester – V/VI**	**Course Code: TPHECE**
Course Title	**ADVANCED MATHEMATICAL PHYSICS**		
Credits	**3**	**Instruction Hours - 4**	**Medium: English and Tamil**
Learning Objective	The fundamentals of matrices and vector calculus learnt in earlier course will enable students to learn advanced topics and theorems. The special functions and applications of partial differential equations will be of use in research.		

UNITS	COURSE DETAILS
Unit - I	**MATRICES:** introduction – special types of matrices – transpose – conjugate– conjugate transpose– symmetric & anti symmetric – Hermitian and skew Hermitian – orthogonal and unitary – characteristic equation – roots and characteristic vectors – diagonalization– Cayley–Hamilton theorem –simple problems
Unit - II	**VECTOR CALCULUS:**∇operator – divergence – second derivative of vector functions or fields –Laplacian operator – curl of a vector – line integral – line Integral of a vector field around an infinitesimal rectangle – curl of conservative field – surface integral – volume integral (without problem) – Gauss's divergence theorem and proof – Stroke's theorem and proof –simple problems.
Unit - III	**SPECIAL FUNCTIONS:** definition –Beta function – Gamma function – evaluation of Beta function – other forms of Beta function – evaluation of Gamma function – other forms of Gamma function – relation between Beta and Gamma functions – simple problems.
Unit - IV	**FROBENIUS METHOD AND SPECIAL FUNCTIONS:**singular points of second order linear differential equations and importance –singularities of Bessels and Laguerre equations, Frobenius method and applications to differential equations: Legendre and Hermite differential equations – Legendre and Hermite polynomials – Rodrigues formula –generating function – orthogonality
Unit - V	**PARTIAL DIFFERENTIAL EQUATIONS:**solutions to partial differential equations using separation of variables - Laplace's equation in problems of rectangular – cylindrical and spherical symmetry – conducting and dielectric sphere in an external uniform electric field – wave equation and its solution for vibrational modes of a stretched string
Text Books	1. Mathematical Physics, B.D. Gupta-Vikas Publishing House, 4 th Edition (2006) 2. Mathematical Physics, SatyaPrakash (Sultan Chand)
Ref. books	1. Mathematical MethodsorPhysicists,G.B.Arfken,H.J.Weber,F.E.Harris (2013, 7th Edn., Elsevier) 2. Mathematical Physics–H. K. Dass, Dr. Rama Verma (S. Chand Publishing) 3. Advanced Engineering Mathematics, Erwin Kreyszig (Wiley India)

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	75	100	

Question Paper Pattern

Maximum Marks: 75 Marks **Exam Duration: 3 Hrs**

Part-A 10×2=20 Marks Answer ALL Questions (Two questions from each unit)

Part-B 5×5=25 Marks Answer ALL Questions (Either or Type-Two questions from each unit)

Part-C 3×10=30 Marks Answer Any Three Questions (Three out of Five-one question from each unit)

HOD

HEAD
PG and Research Department of Physics,
Rajah Serfoji Govt. College (Autonomous),
Thanjavur-613 005.

COE

CONTROLLER OF EXAMINATIONS,
RAJAH SERFOJI GOVT. COLLEGE (AUTONOMOUS)
THANJAVUR-613 005.

(For the candidates admitted from 2023 – 2024 onwards)

Course	**EC**	**Semester – V/VI**	**Course Code: TPHECF**
Course Title	**NUMERICAL METHODS AND C PROGRAMMING**		
Credits	**3**	**Instruction Hours - 4**	**Medium: English and Tamil**
Learning Objective	To understand the methods in numerical differentiation and integration andto develop the problem solving skills of the student. To introduce and explain the basic structure, rules of compiling and execution of C programming.		

UNITS	COURSE DETAILS
Unit - I	**NUMERICAL SOLUTIONS:** determination of zeros of polynomials – roots of linear and nonlinear algebraic and transcendental equations – bisection and Newton-Raphson methods.
Unit - II	**NUMERICAL DIFFERENTIATION, INTEGRATION AND CURVE FITTING:** Newton's forward and backward interpolation – Lagrange's interpolation – Newton-Raphson method to find square root – principle of least squares – fitting a straight line and exponential curve – trapezoidal rule – Simpson's 1/3.
Unit - III	**INTRODUCTION TO C:** importance of C – basic structure of C programming – constants, variables and data types – character set, key words and identifiers – declaration of variables and data types – operators – expressions: arithmetic, relational, logical, assignment – increment and decrement – conditional – comma operators
Unit - IV	**CONTROL STRUCTURE:** decision making with if, if-else, nested if – switch – go to – break – continue –while, do while, for statements – arrays, one dimensional and two dimensional arrays – simple programs.
Unit - V	**ALGORITHM, FLOW CHART AND PROGRAM:** development of algorithm – flow chart for solving simple problems– average of set of numbers – greatest, smallest – conversion of Fahrenheit to Celsius and Celsius to Kelvin– sorting set of numbers in ascending and descending order – addition, subtraction and multiplication of order (2x2) using arrays.
Text Books	1. Numerical methods,Singaravelu,Meenakshipublication,4th Edn., 1999. 2. Numerical methods P.Kandasamy, K.Thilagavathy, K. Gunavathi, S.Chand. 3. Programming in C, Balagurusamy, TMG, ND, 2012 4. Numerical Analysis,,M.K.Venkatraman, NPH, 2013
Ref. books	1. Schaum's outline series, Theory and Problems of programming in C, C.Byron& S. Gottfried, Tata McGraw Hill 2003 3. Numerical methods and C Programming, Veerarajan, 2015.

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	75	**100**	

Question Paper Pattern

Maximum Marks: 75 Marks **Exam Duration: 3 Hrs**

Part-A 10×2=20 Marks Answer ALL Questions (Two questions from each unit)

Part-B 5×5=25 Marks Answer ALL Questions (Either or Type-Two questions from each unit)

Part-C 3×10=30 Marks Answer Any Three Questions (Three out of Five-one question from each unit)

HOD

HEAD
PG and Research Department of Physics,
Rajah Serfoji Govt. College (Autonomous),
Thanjavur-613 005.

COE

CONTROLLER OF EXAMINATIONS,
RAJAH SERFOJI GOVT. COLLEGE (AUTONOMOUS)
THANJAVUR-613 005.

(For the candidates admitted from 2023 – 2024 onwards)

Course	**EC**	**Semester – V/VI**	**Course Code: TPHECG**
Course Title	**MATERIALS SCIENCE**		
Credits	**3**	**Instruction Hours - 4**	**Medium: English and Tamil**
Learning Objective	To learn imperfections in crystals, deformation of materials and testing of materials. To get knowledge on behavior of a material, under the action of light and their applications. To know the applications of crystal defects.		

UNITS	COURSE DETAILS
Unit - I	**CRYSTAL IMPERFECTIONS:** introduction – point defects: vacancies(*problems*), interstitials, impurities, electronic defects – equilibrium concentration of point imperfections (*problems*)–line defects: edge dislocation(*problems*), screw dislocation – surface defects: extrinsic defects – intrinsic defects: grain boundaries, tilt &twist boundaries,twin boundaries, stacking faults – volume defects – effect of imperfections.
Unit - II	**MATERIAL DEFORMATION:** introduction – elastic behavior of materials – modulus as a parameter in design – rubber like elasticity – inelastic behavior of materials – relaxation process – viscoelastic behavior of materials – spring-Dash pot models of viscoelastic behavior of materials.
Unit - III	**PERMANENT DEFORMATION AND STRENGTHENING METHODS OF MATERIALS:** introduction –plastic deformation: tensile stress-strain curve – plastic deformation by slip – creep: mechanism of creep – creep resistant materials – strengthening methods: strain hardening, grain refinement – solid solution strengthening – precipitation strengthening.
Unit - IV	**OPTICAL MATERIALS:** introduction – optical absorption in metals, semiconductors and insulators – NLO materials and their applications – display devices and display materials: fluorescence and phosphorescence – light emitting diodes –liquid crystal displays.
Unit - V	**MECHANICAL TESTING:** destructive testing: tensile test, compression test, hardness test – nondestructive testing (NDT): – thermal methods of NDT: thermography – equipment used for NDT: metallurgical microscope
Text Books	1. Material science and Engineering, Raghavan V, Prentice Hall of India, Sixth Edition, 2015 2. Materials science, V. Rajendran, McGraw Hill publications2011
Ref. books	1. William D. Callister, Jr., Material Science & Engineering – An Introduction, 8th Edition, John Wiley & Sons, Inc., 2007 2. W. Bolton, "Engineering materials technology", 3rd Edition, Butterworth & Heinemann, 2001.

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	75	100	

Question Paper Pattern

Maximum Marks: 75 Marks **Exam Duration: 3 Hrs**

Part-A 10×2=20 Marks Answer ALL Questions (Two questions from each unit)

Part-B 5×5=25 Marks Answer ALL Questions (Either or Type-Two questions from each unit)

Part-C 3×10=30 Marks Answer Any Three Questions (Three out of Five-one question from each unit)

HOD

HEAD
PG and Research Department of Physics,
Rajah Serfoji Govt. College (Autonomous),
Thanjavur-613 005.

COE

CONTROLLER OF EXAMINATIONS,
RAJAH SERFOJI GOVT. COLLEGE (AUTONOMOUS)
THANJAVUR-613 005.

(For the candidates admitted from 2023 – 2024 onwards)

Course	**EC**	**Semester – V/VI**	**Course Code: TPHECH**
Course Title	**LASERS AND FIBER OPTICS**		
Credits	**3**	**Instruction Hours - 4**	**Medium: English and Tamil**
Learning Objective	The students will learn the fundamentals, types of lasers, laser instrumentation and their applications also the interconnect between optics with lasers.		

UNITS	COURSE DETAILS
Unit - I	**FUNDAMENTALSOFLASER:** basic principles: spontaneous and stimulated emission – Einstein's coefficient – pumping mechanism: optical, electrical and laser pumping – population inversion – two and three level laser system – resonator configuration – quality factor – threshold condition – concept of Q switching–Theory of mode locking– cavity dumping.
Unit - II	**TYPESOFLASER:** solid state laser: ruby laser, Nd: YAG laser, Nd: Glass laser– semiconductor laser: intrinsic semiconductor laser, doped semiconductorlaser, injection laser – dye laser – chemical laser: HCL laser, DF- CO_2, CO chemical laser. Ga S laser: neutral atom gas laser (He-Ne laser), CO_2laser, Copper vapour laser.
Unit - III	**APPLICATIONSOFLASER:** application of laser in metrology – optical communication – material processing: laser instrumentation of material processing, powder feeder, laser heating, laser welding, laser melting – medical application – Laser instrumentation for surgeries–laser in astronomy
Unit - IV	**FIBEROPTICS:** basic components of optical fiber communication – principles of light propagation through fiber – total internal reflection – optical fiber – coherent bundle – numerical aperture and skew mode – phase shift and attenuation during total internal reflection – types of fiber: single mode and multi-mode fiber – step index and graded index fiber – fiber optic sensors – application of fiber optics.
Unit - V	**CHARACTERISTICSANDFABRICATIONOFOPTICALFIBER:** fiber characteristics: mechanical and transmission characteristics – absorption loss and scattering loss measurements – dispersion – connectors and splicers – fiber termination – optical time domain reflecto meter(OTDR) and its uses – fiber material – fiber fabrication – fiber optic cables design.
Text Books	1. B.B. Laud - Laser and Non-linear Optics, New Age International Publications Third Edition, NewDelhi. 2. An Introduction to laser,theoryandapplicationsbyAvadhunulu, M.N.S.,Chand&Co,NewDelhi 3. J.WilsonandJ.F.B. Hawkes.'IntroductiontoOptoElectronics', PearsonEducation, 2018.
Ref. books	1. A.Sennaroglu,"PhotonicsandLaserEngineering:Principles,DevicesandApplications"McGraw-HillEducation,2010. 2. K.R.Nambiar,"Lasers:Principles,TypesandApplications",NewAgeInternational,2004.

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	75	**100**	

Question Paper Pattern

Maximum Marks: 75 Marks **Exam Duration: 3 Hrs**

Part-A 10×2=20 Marks Answer ALL Questions (Two questions from each unit)

Part-B 5×5=25 Marks Answer ALL Questions (Either or Type-Two questions from each unit)

Part-C 3×10=30 Marks Answer Any Three Questions (Three out of Five-one question from each unit)

HOD

HEAD
PG and Research Department of Physics,
Rajah Serfoji Govt. College (Autonomous),
Thanjavur-613 005.

COE

CONTROLLER OF EXAMINATIONS,
RAJAH SERFOJI GOVT. COLLEGE (AUTONOMOUS)
THANJAVUR-613 005.

(For the candidates admitted from 2023 – 2024 onwards)

Course	EC	Semester – V/VI	Course Code: TPHECI
Course Title	DIGITAL PHOTOGRAPHY		
Credits	3	Instruction Hours - 4	Medium: English and Tamil
Learning Objective	To understand the principles of photography and image formation and the science and arts behind it. To understand the essential components of conventional and digital cameras and also the different image processing techniques.		

UNITS	COURSE DETAILS
Unit - I	**PHOTOGRAPHY AND BASIC PRINCIPLE OF IMAGE FORMATION:** principle –chemical route and digital route –light, wavelengths, colours – shadows – light intensity and distance – making light form images –pin-hole images – practical limitations to pin-hole images – lens instead of pin-hole – focal length and image size – imaging of closer subjects.
Unit - II	**LENSES – CONTROLLING THE IMAGES:** photographic lens – focal length and angle of view (*problems*) – focusing movement – aperture and f-numbers (*problems*) – depth of field– depth of focus – image stabilization – lenses for digital cameras – lens and camera care
Unit - III	**CAMERA USING FILMS AND ITS TYPES:** camera and its essential components– shutter – aperture – light measurement – film housing – camera types: view camera– view finder camera – Reflex camera– single lens reflex (SLR) camera
Unit - IV	**DIGITAL CAMERAS PRINCIPLE AND TYPES:** principle of digital image capturing –comparison of digital and analog picture information – megapixel – grain, noise and pixel density – optical and digital zooming – image stabilizer – bit depth – white balance – colour modes – file formats (TIFF, RAW & JPEG) – storage cards and types – digital cameras: camera phones – compact camera – hybrid camera – digital SLR.
Unit - V	**THE DIGITAL IMAGE – POSTPRODUCTION:** hardware: computer and its peripherals – software: saving digital file – basic editing: navigating the image – undo/redo/history – crop – rotate – brightness &contrast – colour balance – hue/saturation – dodge/burn –removing an element in an image – advanced editing: histogram/levels – curves – selection tools: magic wand – printing digital images: inkjet printer – laser printer – dye sub printer – lambda/light jet printers.
Text Books	1. Michel J.Langford , Anna Fox & Richard Sawdon Smith, Basic photography, 9th Edition, , 2010-NL, Focal press, London 2. Henry Carroll, Read this if you want to take great photographs of people, Laurence King Publishing
Ref. books	1. Mark Galer, Digital Photography in Available Light essential skills, 2006, Focal press, London 2. Paul Harcourt Davies, The Photographer's practical handbook, 2005, UK PRESS

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	75	100	

Question Paper Pattern

Maximum Marks: 75 Marks **Exam Duration: 3 Hrs**

Part-A 10×2=20 Marks Answer ALL Questions (Two questions from each unit)

Part-B 5×5=25 Marks Answer ALL Questions (Either or Type-Two questions from each unit)

Part-C 3×10=30 Marks Answer Any Three Questions (Three out of Five-one question from each unit)

HOD

HEAD
PG and Research Department of Physics,
Rajah Serfoji Govt. College (Autonomous),
Thanjavur-613 005.

COE

CONTROLLER OF EXAMINATIONS,
RAJAH SERFOJI GOVT. COLLEGE (AUTONOMOUS)
THANJAVUR-613 005.

(For the candidates admitted from 2023 – 2024 onwards)

Course	EC	Semester – V/VI	Course Code: TPHECJ
Course Title	NANOSCIENCE AND NANO TECHNOLOGY		
Credits	3	Instruction Hours - 4	Medium: English and Tamil
Learning Objective	This course aims to provide an overall understanding of Nanoscience and Nanotechnology and introduces different types of nanomaterials, their properties, fabrication methods, characterization techniques and a range of applications.		

UNITS	COURSE DETAILS
Unit - I	**NANOSCIENCE AND NANOTECHNOLOGY:** nanoscale– nature and nanostructures – nanostructures: 0D, 1D,2D– surface to volume ratio– size effect – excitons – quantum confinement– metal based nanoparticles (metal and metal oxide) – nanocomposites (non-polymer based) – carbon nanostructures – fullerene – SWCNT and MWCNT
Unit - II	**PROPERTIES OF NANOMATERIALS:** Introduction –mechanical behavior – elastic properties – hardness and strength – ductility and toughness –superplastic behavior – optical properties – surface plasmon resonance – electrical properties – dielectric materials and properties – magnetic properties – super paramagnetism – electrochemical properties – properties of CNTs.
Unit - III	**FABRICATION METHODS AND VACUUM TECHNIQUES:** top-down and bottom-up approaches – electrochemical method – chemical & physical vapour depositions (CVD & PVD) – plasma arc discharge – sputtering – thermal evaporation – pulsed laser deposition – ball milling – lithography: photolithography – e-beam lithography – sol-gel methods – synthesis of CNT.
Unit - IV	**CHARACTERIZATION TECHNIQUES:** scanning probe microscopy – scanning tunneling microscopy – atomic force microscopy – scanning electron microscopy – transmission electron microscopy –powder XRD method: determination of structure and grain size analysis – UV-visible and photoluminescence spectroscopy.
Unit - V	**APPLICATIONS OF NANOMATERIALS:** medicine: drug delivery – photodynamic therapy – molecular motors –energy: fuel cells –rechargeable batteries – supercapacitors– photovoltaics. sensors: nanosensors based on optical and physical properties – electrochemical sensors – nanobiosensors. nanoelectronics: CNTFET – display screens – GMR read/write heads – nanorobots –applications of CNTs
Text Books	1. K.K.Chattopadhyay and A.N.Banerjee, (2012), Introduction to Nanoscience and Nanotechnology, PHI Learning Pvt. Ltd., 2. M.A. Shah, Tokeer Ahmad (2010), Principles of Nanoscience and Nanotechnology, Narosa Publishing House Pvt Ltd. 3. Mick Wilson, et al (2005) Nanotechnology, Overseas Press.
Ref. books	1. Richard Booker and Earl Boysen, (2005) Nanotechnology, Wiley Publishing Inc. 2. J.H.Fendler (2007) Nano particles and nano structured films; Preparation, Characterization and Applications, John Wiley & Sons

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	75	100	

Question Paper Pattern

Maximum Marks: 75 Marks **Exam Duration: 3 Hrs**

Part-A 10×2=20 Marks Answer ALL Questions (Two questions from each unit)

Part-B 5×5=25 Marks Answer ALL Questions (Either or Type-Two questions from each unit)

Part-C 3×10=30 Marks Answer Any Three Questions (Three out of Five-one question from each unit)

HOD

HEAD
PG and Research Department of Physics,
Rajah Serfoji Govt. College (Autonomous),
Thanjavur-613 005.

COE

CONTROLLER OF EXAMINATIONS,
RAJAH SERFOJI GOVT. COLLEGE (AUTONOMOUS)
THANJAVUR-613 005.

(For the candidates admitted from 2023 – 2024 onwards)

Course	**EC**	**Semester – V/VI**	**Course Code: TPHECK**
Course Title	**MEDICAL INSTRUMENTATION**		
Credits	**3**	**Instruction Hours - 4**	**Medium: English and Tamil**
Learning Objective	This course aims to provide background of the Physics principles in medical instrumentation technologies through theoretical & practical learning.		

UNITS	COURSE DETAILS
Unit - I	**BIOMETRICS:**introduction to man-instrument system and its components – problems encountered in measuring living systems – transducers– force, motion, pressure transducers. **AUDIOMETRY:**mechanism of hearing – air and bone conduction – threshold of hearing –audiometer – masking in audiometry – pure tone and speech audiometer – evoked response audiometry – hearing aids
Unit - II	**BIOELECTRIC POTENTIALS AND ELECTRODES:**biomedical signals – sources of bioelectric potentials – resting, action and propagation of bioelectric potentials –bio-potential electrodes – skin surface, needle electrodes. **BIOMEDICAL RECORDERS:**electro-conduction system of heart – electro cardiogram (ECG) – Einthoven's triangle — electro encephalogram (EEG) –brain waves – EEG instrumentation – recording of evoked potentials – electro myogram (EMG)–pulse oximeter.
Unit - III	**DIAGNOSTIC RADIOLOGY:** radiography – primary radiological image – contrast agents, filters– beam restrictor, grid –image quality **COMPUTED TOMOGRAPHY:**linear tomography – computed tomography – helical and multi slice –image quality– radiation dose. **RADIOISOTOPES AND NUCLEAR MEDICINE:**radioisotopes – radiopharmaceuticals – technetium generator – gamma camera – positron emission tomography – disposal of radioactive waste.
Unit - IV	**ULTRASOUND IMAGING:** ultrasound transducer – ultrasound imaging– Doppler ultrasound – ultrasound image quality & bio-effects. **MAGNETIC RESONANCE IMAGING:**proton & external magnetic field – precession – radiofrequency and resonance – MRI signal – relaxation time – MRI instrumentation – imaging sequences – biosafety
Unit - V	**PROJECT ASSIGNMENT:**clinical practice of *one* of the following: electro cardiogram, electro encephalogram, electro myogram, electro oculogram, computed tomography, positron emission tomography, ultrasound
Text Books	1. Leslie Cromwell, Fred Weibell, Erich Pfieffer(2002) Biomedical Instrumentation & Measurements Prentice Hall of India, New Delhi. 2. R. S. Khandpur (2003)Handbook of Biomedical Instrumentation 2nd Edn. Tata McGraw Hill, New Delhi.
Ref. books	1. John Webster (2004) Bioinstrumentation John Wiley and Sons, Singapore. 2. John Enderle, Susan Blanchard, Joseph Bronzino (2005) Introduction to Biomedical Engineering, 2nd ed. Elsevier, San Deigo

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	75	100	

Question Paper Pattern

Maximum Marks: 75 Marks **Exam Duration: 3 Hrs**

Part-A 10×2=20 Marks Answer ALL Questions (Two questions from each unit)

Part-B 5×5=25 Marks Answer ALL Questions (Either or Type-Two questions from each unit)

Part-C 3×10=30 Marks Answer Any Three Questions (Three out of Five-one question from each unit)

HEAD
PG and Research Department of Physics,
Rajah Serfoji Govt. College (Autonomous),
Thanjavur-613 005.

COE
CONTROLLER OF EXAMINATIONS,
RAJAH SERFOJI GOVT. COLLEGE (AUTONOMOUS)
THANJAVUR-613 005.

(For the candidates admitted from 2023 – 2024 onwards)

Course	**EC**	**Semester – III**	**Course Code: T3GPH1**
Course Title	**INTEGRATED PHYSICS – I**		
Credits	**3**	**Instruction Hours - 3**	**Medium: English and Tamil**
Learning Objective	To impart basic principles of Physics that which would be helpful for students who have taken programmes other than Physics.		

UNITS	COURSE DETAILS
Unit - I	**WAVES, OSCILLATIONS AND ULTRASONICS:** Simple harmonic motion (SHM) – composition of two SHMs at right angles – Lissajous figures – uses – laws of transverse vibrations of strings – determination of AC frequency using sonometer – ultrasound – production – piezoelectric method – application of ultrasonics: medical field – ultrasonography – ultrasonics in dentistry – physiotheraphy – advantages of noninvasive surgery.
Unit - II	**PROPERTIES OF MATTER:** *Elasticity*: elastic constants – bending of beam – theory of non- uniform bending – determination of Young's modulus by non-uniform bending – torsion of a wire – determination of rigidity modulus by torsional pendulum *Viscosity*: streamline and turbulent motion – critical velocity – coefficient of viscosity – Poiseuille's formula. *Surface tension*: definition – molecular theory – droplets formation–shape, size and lifetime – COVID transmission through droplets, saliva – drop weight method.
Unit - III	**HEAT AND THERMODYNAMICS:** Joule-Kelvin effect – Joule-Thomson porous plug experiment – theory – temperature of inversion – liquefaction of Oxygen– Linde's process of liquefaction of air – thermodynamic system – thermodynamic equilibrium – laws of thermodynamics – heat engine – Carnot's cycle – efficiency – entropy – change of entropy in reversible and irreversible process.
Unit - IV	**ELECTRICITY AND MAGNETISM:** Potentiometer – principle – measurement of thermo emf using potentiometer – magnetic field due to a current carrying conductor – Biot-Savart's law – field along the axis of the coil carrying current – peak, average and RMS values of ac current and voltage – power factor– types of switches in household and factories– Smart wifi switches – fuses and circuit breakers in houses.
Unit - V	**DIGITAL ELECTRONICS AND DIGITAL INDIA:** logic gates, OR, AND, NOT, NAND, NOR , EXOR logic gates – universal building blocks – Boolean algebra – De Morgan's theorem – verification – overview of Government initiatives: software technological parks under MeitY– an introduction to Digital India.
Unit - VI	**PROFESSIONAL COMPONENTS:** expert lectures –seminars — webinars – industry inputs – social accountability – patriotism.

Text Books	1. R.Murugesan (2001), Allied Physics, S. Chand & Co, NewDelhi. 2. Brijlal and N.Subramanyam (1994), Wave sand Oscillations, Vikas Publishing House, New Delhi. 3. Brijlal and N.Subramaniam (1994), Poperties of Matter, S.Chand & Co., NewDelhi. 4. J.B.Rajam and C.L.Arora (1976). Heat and Thermodynamics (8^{th} edition), S.Chand & Co., New Delhi. 5. R.Murugesan (2005), Optics and Spectroscopy, S.Chand & Co, NewDelhi. 6. A.Subramaniyam, AppliedElectronics2^{nd}Edn.,NationalPublishingCo.,Chennai.
Ref. books	1. ResnickHallidayandWalker(2018).FundamentalsofPhysics(11^{th}edition),John Willeyand Sons, Asia Pvt. Ltd., Singapore. 2. V.R.Khannaand R.S.Bedi (1998), TextbookofSound1^{st}Edn. Kedharnaath Publish &Co, Meerut. 3. N.S.KhareandS.S.Srivastava (1983), Electricity and Magnetism 10^{th}Edn., Atma Ram & Sons, New Delhi.
Web Resources	1. https://youtu.be/M_5KYncYNyc 2. https://youtu.be/ljJLJgIvaHY 3. https://youtu.be/7mGqd9HQ_AU 4. https://youtu.be/h5jOAw57OXM 5. https://learningtechnologyofficial.com/category/fluid-mechanics-lab/

COURSE OUTCOMES:

At the end of the course, the student will be able to:

CO1	Explain types of motion and extend their knowledge in the study of various dynamic motions analyze and demonstrate mathematically. Relate theory with practical applications in medical field.
CO2	Explain their knowledge of understanding about materials and their behaviors and apply it to various situations in laboratory and real life. Connect droplet theory with Corona transmission.
CO3	Comprehend basic concept of thermodynamics concept of entropy and associated theorems able to interpret the process of flow temperature physics in the background of growth of this technology.
CO4	Articulate the knowledge about electric current resistance, capacitance in terms of potential electric field and electric correlate the connection between electric field and magnetic field and analyze them mathematically verify circuits and apply the concepts to construct circuits and study them.
CO5	Interpret the real life solutions using AND, OR, NOT basic logic gates and intend their ideas to universal building blocks. Inferoperations using Boolean algebra and acquire elementary ideas of IC circuits. Acquire information about various Govt. programs/ institutions in this field.

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Course Outcomes (COs)↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	2	2	2	2	3	3	2	2	3	2.4
CO-2	2	3	2	1	2	3	3	2	2	3	2.3
CO-3	1	2	3	2	3	2	3	2	3	3	2.4
CO-4	2	2	2	3	2	2	3	2	2	3	2.3
CO-5	2	2	2	2	3	1	3	2	2	3	2.2
										Mean Overall Score	2.32 (High)

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	75	100	

Question Paper Pattern

Maximum Marks: 75 Marks **Exam Duration: 3 Hrs**

Part-A 10×2=20 Marks Answer ALL Questions (Two questions from each unit)

Part-B 5×5=25 Marks Answer ALL Questions (Either or Type-Two questions from each unit)

Part-C 3×10=30 Marks Answer Any Three Questions (Three out of Five-one question from each unit)

HOD

HEAD
PG and Research Department of Physics,
Rajah Serfoji Govt. College (Autonomous),
Thanjavur-613 005.

COE

CONTROLLER OF EXAMINATIONS,
RAJAH SERFOJI GOVT. COLLEGE (AUTONOMOUS)
THANJAVUR-613 005

(For the candidates admitted from 2023 – 2024 onwards)

Course	**EC**	**Semester –III & IV**	**Course Code: T4GPH2P**
Course Title	**INTEGRATED PHYSICS PRACTICALS**		
Credits	**4**	**Instruction Hours - 3**	**Medium: English and Tamil**
Learning Objective	Apply various physics concepts to understand Properties of Matter and waves, set up experimentation to verify theories, quantify and analyse, able to do error analysis and correlate results		

Fourteen Experiments only

List-1 (Any Seven)

1. Young's modulus by non-uniform bending using pin and microscope
2. Young's modulus by non-uniform bending using optic lever,scale and telescope
3. Rigidity modulus by static torsion method.
4. Rigidity modulus by torsional oscillations without mass
6. Surface tension and interfacial Surface tension – drop weight method
7. Comparison of viscosities of two liquids – burette method
8. Specific heat capacity of a liquid – half time correction
9. Verification of laws of transverse vibrations using sonometer
10. Calibration of low range voltmeter using potentiometer
11. Determination of thermo emf using potentiometer
12. Verification of truth tables of basic logic gates using ICs
13. Verification of De Morgan's theorems using logic gate ICs.
14. Use of NAND as universal building block.

List-2 (Any Seven)

15. Radius of curvature of lens by forming Newton's rings
16. Thickness of a wire using air wedge
17. Wavelength of mercury lines using spectrometer and grating
18. Refractive index of material of the lens by minimum deviation
19. Refractive index of liquid using liquid prism
20. Determination of AC frequency using sonometer
21. Specific resistanceof a wire using PO box
22. Thermal conductivity of poor conductor using Lee's disc
23. Determination of figure of merit table galvanometer
24. Determination of Earth's magnetic field using field along the axis of a coil
25. Characterisation of Zener diode
26. Construction of Zerner/IC regulated power supply
27. Construction of AND, OR, NOT gates using diodes and transistor
28. NOR gate as a universal building block

Note : Use of digital balance permitted

OUTCOMES

By the end of the course, the student will be able to

1. Verify the theoretical concepts in physics through experiments.
2. Understand the behavior of thermal properties of materials.
3. Understand the of basic laws and theories to determine various properties of materials.
4. Understand the application of various experiments in our day to day life.

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Course Outcomes (COs)↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	3	2	2	2	3	2	2	1	2	2.2
CO-2	3	3	3	2	2	3	2	2	1	1	2.2
CO-3	3	3	2	2	2	3	3	2	1	1	2.2
CO-4	3	3	3	2	2	3	3	2	1	1	2.3
CO-5	3	3	2	2	2	3	3	2	1	2	2.3
									Mean Overall Score		2.24 (High)

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	75	100	

HOD

HEAD
PG and Research Department of Physics,
Rajah Serfoji Govt. College (Autonomous),
Thanjavur-613 005.

COE

CONTROLLER OF EXAMINATIONS,
RAJAH SERFOJI GOVT. COLLEGE (AUTONOMOUS)
THANJAVUR-613 005.

(For the candidates admitted from 2023 – 2024 onwards)

Course	**EC**	**Semester – IV**	**Course Code: T4GPH3**
Course Title	**INTEGRATED PHYSICS –II**		
Credits	**3**	**Instruction Hours - 3**	**Medium: English and Tamil**
Learning Objective	To understand the basic concepts of optics, modern Physics, concepts of relativity and quantum physics, semiconductor physics, and electronics.		

UNITS	COURSE DETAILS
Unit - I	**OPTICS:** Interference – interference in thin films –colors of thin films – air wedge – determination of diameter of a thin wire by air wedge – normal incidence – experimental determination of wavelength using diffraction grating (no theory) – polarization – polarization by double reflection – Brewster's law – optical activity – application in sugar industries
Unit - II	**ATOMIC PHYSICS:** Atom models – Bohr atom model – mass number – atomic number – nucleons – vector atom model – various quantum numbers – Pauli's exclusion principle – Stark effect –Zeeman effect (elementary ideas only) – photo electric effect – Einstein's photoelectric equation – applications of photoelectric effect.
Unit - III	**NUCLEAR PHYSICS:** Nuclear models – liquid drop model – magic numbers – shell model – nuclear energy – mass defect – binding energy – radioactivity – uses – half life – mean life - radio isotopes and uses –controlled and uncontrolled chain reaction – nuclear fission – energy released in fission – chain reaction – critical reaction – critical size- atom bomb – nuclear reactor – nuclear fusion – thermonuclear reactions – differences between fission and fusion.
Unit - IV	**INTRODUCTION TO RELATIVITY AND GRAVITATIONAL WAVES:** Frame of reference – postulates of special theory of relativity – Galilean transformation equations – Lorentz transformation equations – derivation – length contraction – time dilation – twin paradox – mass-energy equivalence.
Unit - V	**SEMICONDUCTOR PHYSICS:** p-n junction diode – forward and reverse biasing – characteristic of diode – zener diode – characteristic of zener diode – voltage regulator – full wave bridge rectifier – construction and working – USB cell phone charger –introduction to e-vehicles and EV charging stations.
Unit - VI	**PROFESSIONAL COMPONENTS:** expert lectures –seminars — webinars – industry inputs – social accountability – patriotism

Text Books	1. R. Murugesan (2005), Allied Physics, S.Chand & Co, NewDelhi. 2. K.Thangaraj and D.Jayaraman (2004), Allied Physics, Popular Book Depot, Chennai. 3. Brijlal and N.Subramanyam (2002), Text book of Optics, S.Chand & Co, NewDelhi. 4. R.Murugesan (2005), Modern Physics, S.Chand & Co, NewDelhi. 5. A. Subramaniyam Applied Electronics, 2nd Edn., National Publishing Co., Chennai.
Ref. books	1. Resnick Halliday and Walker (2018), Fundamentals of Physics, 11th Edn., John Willey and Sons, Asia Pvt. Ltd., Singapore. 2. D.R.Khannaand H.R. Gulati (1979).Optics, S.Chand & Co. Ltd., New Delhi. 3. A.Beiser (1997), Concepts of Modern Physics, Tata Mc Graw Hill Publication, NewDelhi. 4. Thomas L. Floyd (2017), Digital Fundamentals, 11th Edn., Universal Book Stall, NewDelhi. 5. V.K.Metha (2004), Principles of electronics, 6th Edn. ,S.Chand and Company, New Delhi.
Web Resources	1. https://www.berkshire.com/learning-center/delta-p-facemask/https://www.youtube.com/watch?v=QrhxU47gtj4https://www.youtube.com/watch?time_continue=318&v=D38BjgUdL5U&feature=emb_logo 2. https://www.youtube.com/watch?v=JrRrp5F-Qu4 3. https://www.validyne.com/blog/leak-test-using-pressure-transducers/ 4. https://www.atoptics.co.uk/atoptics/blsky.htm - 5. https://www.metoffice.gov.uk/weather/learn-about/weather/optical-effects

COURSE OUTCOMES:

At the end of the course, the student will be able to:

CO1	Explain the concepts of interference diffraction using principles of super position of waves and rephrase the concept of polarization based on wave patterns
CO2	Outline the basic foundation of different atom models and various experiments establishing quantum concepts. Relate the importance of interpreting improving theoretical models based on observation. Appreciate interdisciplinary nature of science and in solar energy related applications.
CO3	Summarize the properties of nuclei, nuclear forces structure of atomic nucleus and nuclear models. Solve problems on delay rate half-life and mean-life. Interpret nuclear processes like fission and fusion. Understand the importance of nuclear energy, safety measures carried out.
CO4	To describe the basic concepts of relativity like equivalence principle, inertial frames and Lorentz transformation. Extend their knowledge on concepts of relativity and vice versa.
CO5	Summarize the working of semiconductor devices like junction diode, Zener diode, transistors and practical devices we daily use like USB chargers and EV charging stations.

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Course Outcomes (COs)↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	2	2	2	3	1	3	2	2.2
CO-2	2	3	2	3	2	2	2	3	2	3	2.4
CO-3	2	3	2	2	2	2	2	3	3	1	2.2
CO-4	2	3	1	3	3	2	3	1	3	3	2.4
CO-5	2	3	1	2	1	2	3	3	3	2	2.2
									Mean Overall Score		2.28 (High)

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	75	100	

Question Paper Pattern

Maximum Marks: 75 Marks **Exam Duration: 3 Hrs**

Part-A 10×2=20 Marks Answer ALL Questions (Two questions from each unit)
Part-B 5×5=25 Marks Answer ALL Questions (Either or Type-Two questions from each unit)
Part-C 3×10=30 Marks Answer Any Three Questions (Three out of Five-one question from each unit)

HOD

HEAD
PG and Research Department of Physics,
Rajah Serfoji Govt. College (Autonomous),
Thanjavur-613 005.

COE

CONTROLLER OF EXAMINATIONS,
RAJAH SERFOJI GOVT. COLLEGE (AUTONOMOUS)
THANJAVUR-613 005.

(For the candidates admitted from 2023 – 2024 onwards)

Course	EC	Semester – III	Course Code: T3GPHCS1
Course Title	APPLIED PHYSICS –I		
Credits	3	Instruction Hours - 3	Medium: English
Learning Objective	To understand electrostatics, magneto statics and electro dynamics. To study the various laws and its application in current electricity. To acquire knowledge about electromagnetic induction and alternating current.		

UNITS	COURSE DETAILS
Unit - I	**ELECTROSTATICS:** Coulomb's law – Gauss theorem - Application -Mechanical force on the surface of a charged conductor- Potential energy stored per unit volume in an electric field - Capacitors-Principles of a capacitor -Capacity of spherical capacitor – cylindrical - Energy of a charged capacitor - Loss of energy due to sharing of charges.
Unit - II	**MAGNETOSTATICS:** Magnetic field- magnetic flux density – magnetization – Intensity of magnetization-Permeability – Susceptibility – relation between them – magnetic potential – potential due to a dipole – relation between potential and intensity – magnetic shell and its potential at any point – Properties of dia, Para and ferromagnetic materials.
Unit - III	**CURRENT ELECTRICITY:** Ohm's law – Laws of resistance in series and parallel - Kirchhoff's law- Wheatstone bridge –Meter bridge - Carrey Foster's bridge – Determination of specific resistance– Potentiometer – Measurement of current and resistance– Calibration of low range voltmeter.
Unit - IV	**ELECTROMAGNETIC INDUCTION:** Laws of electromagnetic induction- Relation between induced emf and mutual induction – self-induction by Rayleigh' method – mutual induction– absolute determination of M – coefficient of coupling – Transformer principle, construction and working.
Unit - V	**ALTERNATING CURRENT:** A/C circuits with single components- Circuit with RL, RC, and LC - measurement of current and voltages – power in an AC circuit – Power factor- LCR – Series and Parallel resonant circuits – Choke coil.
Unit - VI	**PROFESSIONAL COMPONENTS:** expert lectures –seminars — webinars – industry inputs – social accountability – patriotism
Text Books	1. Applied physics – Paper I –A.Sundaravelusamy – Priya publications Karur 2012. 2. Electricity and Magnetism – Brijlal and Subramanian, Ratan Prakashan Mandir, New Delhi, 2000. 3. Electricity and Magnetism – Narayanamurthy & Nagarathinam..
Ref. books	1. Electricity and Magnetism –D.L. Seghal, K.L. Chopra and N.K. Sehgal. 5th Edition S. Chand & Sons. New Delhi,1996.

COURSE OUTCOMES:

At the end of the course, the student will be able to:

CO1	Explain the concepts of Coulomb's law – Gauss theorem and Loss of energy due to sharing of charges
CO2	Outline the basic foundation of Magnetic field- magnetic flux density and about the types of magnets and Properties of dia, Para and ferromagnetic materials
CO3	Summarize about the Ohm's law and laws of resistance in series and parallel also Kirchhoff's law and about Wheatstone bridge
CO4	To describe the basic concepts of Laws of electromagnetic induction and the transformer principle, construction and working
CO5	Summarize the working of A/C circuits with single components and Choke coil.

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Course Outcomes (COs)↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	2	2	2	2	3	3	2	2	3	2.4
CO-2	2	3	2	1	2	3	3	2	2	3	2.3
CO-3	1	2	3	2	3	2	3	2	3	3	2.4
CO-4	2	2	2	3	2	2	3	2	2	3	2.3
CO-5	2	2	2	2	3	1	3	2	2	3	2.2
Mean Overall Score											2.32 (High)

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	75	100	

Question Paper Pattern

Maximum Marks: 75 Marks **Exam Duration: 3 Hrs**

Part-A 10×2=20 Marks Answer ALL Questions (Two questions from each unit)

Part-B 5×5=25 Marks Answer ALL Questions (Either or Type-Two questions from each unit)

Part-C 3×10=30 Marks Answer Any Three Questions (Three out of Five-one question from each unit)

HOD

HEAD

PG and Research Department of Physics,
Rajah Serfoji Govt. College (Autonomous),
Thanjavur-613 005.

COE

CONTROLLER OF EXAMINATIONS,
RAJAH SERFOJI GOVT. COLLEGE (AUTONOMOUS)
THANJAVUR-613 005.

(For the candidates admitted from 2023 – 2024 onwards)

Course	**EC**	**Semester – III & IV**	**Course Code: T4GPHCS2P**
Course Title	**APPLIED PHYSICS PRACTICALS**		
Credits	**4**	**Instruction Hours - 3**	**Medium: English**
Learning Objective	Apply various physics concepts to understand Properties of Matter and waves, set up experimentation to verify theories, quantify and analyse, able to do error analysis and correlate results		

Any Fourteen only

1. Carey Foster's Bridge – Resistance and specific resistance.
2. Potentiometer – Resistance and specific resistance.
3. Potentiometer – calibration of ammeter.
4. Potentiometer – Calibration of low range voltmeter
5. Potentiometer – Calibration of high range voltmeter.
6. Field along the axis of the coil-determination of magnetic flux using deflection Magnetometer.
7. Moment of a magnet using a coil carrying current.
8. LCR - Series resonant circuit – Self inductance and quality factor of a coil.
9. LCR – Parallel resonant circuit – Self inductance and quality factor of a coil.
10. Characteristic of a Junction diode.
11. Characteristics of Zener diode.
12. Static characteristic of transistor – common base configuration.
13. Characteristics of FET.
14. Half wave rectifier.
15. Zener controlled voltage regulator.
16. AND, OR, NOT, gates using discrete components
17. Basic logic gates using IC's.
18. Operational Amplifier – Adder, Subtractor.

OUTCOMES

By the end of the course, the student will be able to

1. Verify the theoretical concepts in physics through experiments.
2. Understand the behavior of thermal properties of materials.
3. Understand the validity of basic laws and theories to determine various properties of materials.

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Course Outcomes (COs)↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	2	3	2	1	3	3	1	2	3	2.3
CO-2	3	3	2	1	2	3	3	2	2	2	2.3
CO-3	3	2	3	1	2	2	3	2	3	2	2.3
CO-4	3	2	3	1	2	3	2	1	2	3	2.2
CO-5	3	3	3	2	2	2	3	1	2	3	2.4
									Mean Overall Score		2.3 (High)

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	75	100	

HOD

HEAD
PG and Research Department of Physics,
Rajah Serfoji Govt. College (Autonomous),
Thanjavur-613 005.

COE

CONTROLLER OF EXAMINATIONS
RAJAH SERFOJI GOVT. COLLEGE (AUTONOMOUS)
THANJAVUR-613 005.

(For the candidates admitted from 2023 – 2024 onwards)

Course	**EC**	**Semester – IV**	**Course Code: T4GPHCS3**
Course Title	**APPLIED PHYSICS –II**		
Credits	**3**	**Instruction Hours - 3**	**Medium: English**
Learning Objective	To understand basics of Electronics, Laser and Optoelectronics.		

UNITS	COURSE DETAILS
Unit - I	**SEMICONDUCTOR PHYSICS:** Theory of energy bands in crystals -Distinguish between Conductors - Insulators and semiconductors - Hall Effect in semiconduactors -Junction diode –Half wave rectifier – Zener diode - Zener diode as voltage regulators.
Unit - II	**TRANSISTORS:** PNP and NPN Transistors-Transistor Action- characteristics of transistor in CB and CE configuration - Transistors as an amplifier, Oscillator- FET - N channel and P channel FET -performance –Characteristics- FET Amplifier.
Unit - III	**MASER AND LASER:** Basic concepts of spontaneous and stimulated emission – Optical pumping - population inversion - Meta stable state - Maser – Ammonia maser. Lasers- Ruby laser and He - Ne laser – Applications of laser
Unit - IV	**OPTO ELECTRONIC DEVICES:** Photo electric effect - Laws of Photo electric effect - Photo electric cell - Photo voltaic cell - Applications - Light emitting diode - photo transistors - Electronic Watches - Seven segment display - LCD.
Unit - V	**OPERATIONAL AMPLIFIERS AND INTEGRATED CIRCUITS:** The Basic Operational amplifier - Inverting and Non inverting Operational amplifier - Differential Operational amplifier - CMRR- Basic uses of Operational amplifier - Adder - Subtractor -Differentiator – Integrator – Comparator. Integrated circuit – Classification – Fabrication of basic monolithic IC.
Unit - VI	**PROFESSIONAL COMPONENTS:** expert lectures –seminars — webinars – industry inputs – social accountability – patriotism
Text Books	1. Applied Physics - Paper II- A.Sundaravelusamy -Priya Publications Karur 2012 2. Basic Electronics (solid state) - B.L. Theraja, S.Chand (2007) 3. Principles of Electronics – V.K.Mehta, Rohit Mehta, S.Chand & Co New Delhi (2013) 4. Microelectronics –Jacob Millman –McGraw-Hill.
Ref. books	1. Functional Electronics – Ramanan –TMH, 1994. 2. The fundamentals of Solid state physics – Theraja Sultan Chand & Co.., Delhi.

COURSE OUTCOMES:

At the end of the course, the student will be able to:

CO1	Able to Distinguish between Conductors - Insulators and semiconductors
CO2	Outline the basic foundation of PNP and NPN Transistors and transistor action
CO3	Summarize about the basic concepts of spontaneous and stimulated emission and optical pumping, population inversion and Meta stable state
CO4	To describe the concepts of Photo electric effect and Laws of Photo electric effect, Photo electric cell and photo transistors
CO5	Summarize the Basic Operational amplifier, Inverting and Non inverting Operational amplifier.

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Course Outcomes (COs)↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	3	2	2	2	3	2	3	2	2	2.3
CO-2	3	3	3	2	2	3	2	2	2	1	2.3
CO-3	3	3	2	3	2	3	3	2	2	1	2.4
CO-4	3	3	3	3	2	3	3	2	2	1	2.5
CO-5	3	3	2	3	2	2	3	2	2	3	2.5
									Mean Overall Score		2.4 (High)

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	75	100	

Question Paper Pattern

Maximum Marks: 75 Marks **Exam Duration: 3 Hrs**

Part-A 10×2=20 Marks Answer ALL Questions (Two questions from each unit)
Part-B 5×5=25 Marks Answer ALL Questions (Either or Type-Two questions from each unit)
Part-C 3×10=30 Marks Answer Any Three Questions (Three out of Five-one question from each unit)

HOD

HEAD
PG and Research Department of Physics,
Rajah Serfoji Govt. College (Autonomous),
Thanjavur-613 005.

COE

CONTROLLER OF EXAMINATIONS
RAJAH SERFOJI GOVT. COLLEGE (AUT.)
THANJAVUR-613 005

(For the candidates admitted from 2023 – 2024 onwards)

Course	**SEC1**	**Semester - I**	**Course Code: T1PHSE1**
Course Title	**FIRST AID AND EMERGENCY CARE**		
Credits	**2**	**Instruction Hours - 2**	**Medium : English and Tamil**
Course Objectives	To understand their role as an emergency first aider. To understand the use of risk assessments for health and safety purposes. To understand how to respond to accidents and sudden illness. To gain the knowledge on poisoning and bites. To learn the first aid kids used in clinical.		

UNITS	COURSE DETAILS
Unit - I	**INTRODUCTION:** Rules of First Aid – Principles and objectives of first aid examination of patient – Assessment- Priorities of first aid – Patient management and care.
Unit - II	**FIRST AID ROOMS AND EQUIPMENTS:** First aid kits, cleaning of wounds and dressing injury assessment.
Unit - III	**MANAGEMENT:** Management of common illness and thermal illness – Risk assessment and risk reductions – Fainting, Anaphylaxis, Asthma, and Epilepsy, Diabetes, burns and Scalds.
Unit - IV	**INJURIES:** Internal and external bleeding injuries to muscles, back, chest abdomen, joints, and bones, strokes and head injury and eye irrigation – Sudden illness – poisoning, Bites and Stings.
Unit - V	**ACCIDENT REPORTING:** Breathing emergencies, cardiac emergencies – Oxygen therapy- resuscitation, defibrillation – Heart attack – Common gastrointestinal sickness.
Unit - VI	**PROFESSIONAL COMPONENTS:** expert lectures –seminars — webinars – industry inputs – social accountability – patriotism
Text Books	1. First Aid to the Injured-Authorized manual of St John's Ambulance, Red cross road John A Eastman, New Delhi . 2007 2. Manual of First Aid. Jaypee Brothers, Medical Publishers Pp-441 Abhitabh Gupta 2003.
Ref. books	1. Karesh Prasad, 2012. First Aid for Nurses. Jaypee Publishers, New Delhi.
Web Resources	1. https://www.indianredcross.org/fmr/Module2.pdf 2. https://www.ncbi.nlm.nih.gov/books/NBK222964/

COURSEOUTCOMES:

At the end of the course, the student will be able to:

CO1	Know what is first aid and able to examine the patient who is in need of first air.
CO2	Administer first aid to an adult casualty who is unconscious (including seizure) cardiopulmonary resuscitation to an adult, including using an AED.
CO3	Administering first aid to who is wounded and bleeding.
CO4	Administering first aid to an adult casualty who is suffering from heart attack and provide oxygen therapy.
CO5	Know the first aid room and equipments.

Course Outcomes (COs)↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	2	3	2	2	2	2	2	2	3	2.3
CO-2	3	2	2	2	3	2	2	3	2	2	2.3
CO-3	2	2	2	2	2	3	2	2	2	2	2.1
CO-4	3	3	3	2	3	2	2	2	2	3	2.5
CO-5	2	2	3	2	3	3	2	2	2	2	2.3
										Mean Overall Score	2.3 (High)

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	75	100	

Question Paper Pattern

Maximum Marks: 75 Marks **Exam Duration: 3 Hrs**

Part-A 5x6=30 Marks Answer ALL Questions (Either or Type-Two questions from each unit)
Part-B 3x15=45 Marks Answer Any Three Questions (Three out of Five-one question from each unit)

HOD

HEAD
PG and Research Department of Physics,
Rajah Serfoji Govt. College (Autonomous),
Thanjavur-613 005.

COE

CONTROLLER OF EXAMINATIONS,
RAJAH SERFOJI GOVT. COLLEGE (AUTONOMOUS)
THANJAVUR-613 005.

(For the candidates admitted from 2023 – 2024 onwards)

Course	**SEC2**	**Semester - II**	**Course Code: T2PHSE2**
Course Title	**DOMESTIC APPLIANCES**		
Credits	**2**	**Instruction Hours -2**	**Medium : English and Tamil**
Course Objectives	To get knowledge of how domestic electric devices work. To understand and acquire skills on the working of heating and lighting appliances.		

UNITS	COURSE DETAILS
Unit - I	**FUNDAMENTALS OF ELECTRICITY:** Electricity – Charge-Electric current –Direction of flow of current –Resistance – series and parallel -Ohms law-Kirchhoff's law.
Unit - II	**ELECTRIC COMPONENTS AND MEASURING INSTRUMENTS:** Conductor - Insulator - Resistor -Capacitor - Galvanometer -Ammeter - Voltmeter - Ohm meter-AVO meter (multimeter) - Watt - Watt hour meter - Commercial electrical billing(problem)-Line tester.
Unit - III	**HEATING AND LIGHTING APPLIANCES:** Electric iron box-Electric hotplate - Room Heater - Immersion heater-Geyser-CFL, LED lamps.
Unit - IV	**MODERN ELECTRICAL APPLIANCES:** Design and working of basic Water motors - Fan - Refrigerator - Air Conditioning –Wet grinder - Microwave oven - Hair drier- vacuum cleaner.
Unit - V	**STAND BY DEVICES AND SAFETY MEASURES** Switch - Fuse – Standard Wire Gauge - Miniature circuit breaker (MCB) - Earthing – Uninterrupted Power Supply - Inverter. Electric shock and its effects -Symptoms and first aid - Safety tips - Home repair safety tips - Tips for conserving electricity.
Unit - VI	**PROFESSIONAL COMPONENTS:** expert lectures –seminars — webinars.
Text Books	1. Basic Electrical Engineering - M.L.Anwani & I.Anwani Dhanpat Rai and Co. New Delhi , 2012 . 2. Domestic Electric Appliances - General Interest book from market shelf. 3. Electrical Appliances –Complete Guide to the maintenance and repair of Domestic Electrical Appliances- Graham Dixon.
Ref. books	1. Domestic Electrical Appliances-Thomas Anthony Buchanan Corley-Cape, 1996 2. Domestic Electrical Appliances (Motor type)-Ministry of Commerce & Industry-Govt. of India.
Web Resources	1. http://www.howstuffworks.com. 2. http://www.answers.com 3. http://www.wikipedia.org

COURSEOUTCOMES:
At the end of the course, the student will be able to:

CO1	Know the fundamentals of Electricity
CO2	Know various electrical components and measuring instruments.
CO3	Acquire knowledge on heating and lighting appliances.
CO4	Know the working of modern electrical appliances.
CO5	Understand the working of Stand by Devises. Know the methods to conserve Electricity

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Course Outcomes (COs)↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	2	3	2	3	2	3	2	2.4
CO-2	2	2	3	2	3	3	2	3	2	2	2.3
CO-3	2	3	2	3	2	2	3	2	3	2	2.4
CO-4	2	2	3	2	3	3	2	3	2	3	2.5
CO-5	2	2	2	3	2	2	2	3	2	2	2.2
									Mean Overall Score		2.36 (High)

Question Paper Pattern

Maximum Marks: 75 Marks **Exam Duration: 3 Hrs**

Part-A 5x6=30 Marks Answer ALL Questions (Either or Type-Two questions from each unit)
Part-B 3x15=45 Marks Answer Any Three Questions (Three out of Five-one question from each unit)

HOD

HEAD
PG and Research Department of Physics,
Rajah Serfoji Govt. College (Autonomous),
Thanjavur-613 005.

COE

CONTROLLER OF EXAMINATIONS
RAJAH SERFOJI GOVT. COLLEGE (AUTONOMOUS)
THANJAVUR-613 005.

(For the candidates admitted from 2023 – 2024 onwards)

Course	**SEC3**	**Semester - II**	**Course Code: T2PHSE3**
Course Title	**STRESS MANAGEMENT AND YOGA**		
Credits	**2**	**Instruction Hours - 2**	**Medium : English and Tamil**
Course Objectives	To instruct stress management methods. To impart knowledge on concepts of stress and yoga therapy.		

UNITS	COURSE DETAILS
Unit - I	Meaning and definition of Yoga – aims & objectives of yoga – misconception about yoga. Historical perceptive on yoga – yoga before the time of Patanjali Contributions of Patanjali and Thirumular to yoga. Yoga practices and other systems of exercises.
Unit - II	Impact of Yoga on Muscular system, Respiratory System, Circulatory system, Nervous system, Digestive system and Endocrine system
Unit - III	Yoga and development of Social qualities of personality – Co-operation – Simplicity – Tolerance – Social adjustments – Yoga and personal efficiency. Improvement of personal efficiency through yoga.
Unit - IV	Mechanism of Stress related diseases: Pshchic – physchomatic – Somatic phase – Organic phase – Role of Meditation & Pranayama on Stress – physiological aspect of Meditation – Constant stress & strain – anxiety – conflicts resulting in a fatigue among Executive – Contribution of Yoga to solve the stress related problems of Executive.
Unit - V	Meaning and definition of Health – various dimensions of health (Physical, Mental, Social and Spiritual) – Yoga and health – Yoga as therapy – Physical fitness – Stress control exercise – Sitting meditation – Progressive muscular relaxation – Gentle stretches and Massage.
Unit - VI	**PROFESSIONAL COMPONENTS:** expert lectures –seminars — webinars.
Ref. books	1. Andrews, Linda Wasmer., (2005), Stress control for peace of mind, London: Greenwich Editions. 2. Author's guide, (2003). Yoga – The Science of Holistic living. Chennai: Vivekananda Kendra Prakashana trust 3. Chandrasekaran, K., (1999) Sound Health through Yoga. Sedapatti: Prem Kalyan Publications. 4. Lalvani, Vimla., (1998), Yoga for stress. London: Hamlyn. 5. Nagendra H.R and Nagarathana R (2004), Yoga perspective in stress management. 6. Nagendra H.R and Nagarathana R (2004), Yoga practices for anxiety & depression, Bangalore: Swami Sukhabodenanda. 7. Sukhabodananda Swami (2002), Stress Management, Bangalore: Prasanna trust.

COURSE OUTCOMES:

At the end of the course, the student will be able to:

CO1	Understand yoga.
CO2	Demonstrate basic skills associated with stress and Yoga activities including strength and flexibility, balance and coordination.
CO3	Personality development through yoga.
CO4	Understand and apply the knowledge on contribution of yoga to solve stress related problems.
CO5	Discuss yoga and health.

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific

Course Outcomes (COs)↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	2	2	2	2	3	2	2	2	2	2.1
CO-2	3	2	2	2	3	2	2	3	2	2	2.3
CO-3	3	3	3	3	2	2	2	2	2	3	2.5
CO-4	3	2	2	3	2	2	3	2	2	2	2.3
CO-5	2	2	3	2	3	3	2	2	2	2	2.3
										Mean Overall Score	2.3 (High)

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	75	100	

Question Paper Pattern

Maximum Marks: 75 Marks **Exam Duration: 3 Hrs**

Part-A 5x6=30 Marks Answer ALL Questions (Either or Type-Two questions from each unit)
Part-B 3x15=45 Marks Answer Any Three Questions (Three out of Five-one question from each unit)

HOD

HEAD
PG and Research Department of Physics,
Rajah Serfoji Govt. College (Autonomous),
Thanjavur-613 005.

COE

CONTROLLER OF EXAMINATIONS.
RAJAH SERFOJI GOVT. COLLEGE (AUTONOMOUS)
THANJAVUR-613 005.

(For the candidates admitted from 2023 – 2024 onwards)

Course	SEC4	Semester - III	Course Code: T3PHSE4
Course Title	ENTREPRENEURIAL SKILL		
Credits	1	Instruction Hours – 1	Medium : English
Learning Objectives	To instruct the characteristics essential for entrepreneurial and the role of entrepreneurial in economic development. To encourage rural entrepreneurs. To know the special schemes offered by the government.		

UNITS	Course Details
Unit - I	**CONCEPT OF ENTREPRENEURSHIP:** Meaning – Definition – characteristics –role of entrepreneurs in economic development – classification of entrepreneurs – factors affecting entrepreneurial growth – entrepreneurship development programmes.
Unit - II	**PROJECT:** Project appraisal – Project formulation – Project identification – sources of ideas – preliminary evaluation and testing of ideas.
Unit - III	**LICENSING:** Licensing procedures to start an industrial unit – procedures to start small and women entrepreneurs – import and export substitutions oriented items – new procedures.
Unit - IV	**GOVERNMENT SUBSIDISED LOAN SCHEMES:** District industrial centre (DIC) - Definition of MSME- Classification – Types of Schemes, Objectives , Key Benefits and How to apply - Unemployed Youth Employment Generation Programme UYEGP – Prime Minister Employment Generation Programme PMEGP.
Unit - V	**GOVERNMENT MSME INCENTIVE SCHEMES** Objectives and Key Benefits - Capital subsidy - Additional Capital subsidy: Thrust Sector Enterprises, List of thrust sectors, Micro Manufacturing Enterprises - Operational Improvement: Low Tension Power Tariff(LTPT) subsidy, Payroll subsidy, generator subsidy.
Unit - VI	**PROFESSIONAL COMPONENTS:** Expert Lectures, Online Seminars - Webinars on Industrial Interactions/Visits, and Communication Skill Enhancement, Social Accountability and Patriotism
Text Books	1. Entrepreneurial development – C. Gupta, N. P. Srinivasan, Sultan Chand and sons 2.Dynamics of entrepreneurial development and Management – Vasant Desai, Himalaya Publishing House. 3.Scheme Booklet for MSMEs in Government of Tamil Nadu – with effect from 16th February 2021.
Ref. books	1. Entrepreneurship development principles, policies and programme – P. Saravanavel.

COURSE OUTCOMES:

At the end of the course, the student will be able to:

CO1	Understand the concept of entrepreneurship.	K1
CO2	Get awareness about the source of project appraisal	K2
CO3	Understand the legal requirements for licensing procedures.	K3
CO4	Know the incentives and subsidies of state and central governments	K4
CO5	Get the idea of entrepreneurial opportunities of physical science	K5
K1 - Remember; K2 – Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate;		

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	3	3	3	2	3	2	3	2
CO2	2	3	2	2	3	3	2	3	2	2
CO3	2	2	2	2	2	3	3	3	3	2
CO4	3	2	3	3	2	3	3	3	3	2
CO5	2	2	2	2	3	3	2	2	2	2

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	3	2	3	3	3	2	3	2	3	2
CO2	2	3	2	2	3	3	2	3	2	2
CO3	2	2	2	2	2	3	3	3	3	2
CO4	3	2	3	3	2	3	3	3	3	2
CO5	2	2	2	2	3	3	2	2	2	2

Question Paper Pattern

Maximum Marks: 75 Marks **Exam Duration: 3 Hrs**

Part-A 5x6=30 Marks Answer ALL Questions (Either or Type-Two questions from each unit)

Part-B 3x15=45 Marks Answer Any Three Questions (Three out of Five-one question from each unit)

HOD

HEAD
PG and Research Department of Physics,
Rajah Serfoji Govt. College (Autonomous),
Thanjavur-613 005.

COE

CONTROLLER OF EXAMINATIONS,
RAJAH SERFOJI GOVT. COLLEGE (AUTONOMOUS)
THANJAVUR-613 005.

(For the candidates admitted from 2023 – 2024 onwards)

Course	**SEC5**	**Semester - III**	**Course Code: T3PHSE5**
Course Title	**CELL PHONE BASICS AND SERVICING**		
Credits	**2**	**Instruction Hours -2**	**Medium : English and Tamil**
Course Objectives	To understand the fundamentals of cell phone . To learn the chip level study and trouble shooting . To acquire the practical knowledge .		

UNITS	COURSE DETAILS
Unit - I	**FUNDAMETALS OF CELL PHONE** Introduction to GSM/CDMA - Concepts of GSM/CDMA cellular Technologies-Working of GSM -Information of cell sited & Base station cell processing of a GSM –GPRS – Mobile Software (PC suite)
Unit - II	**CHIP LEVEL STUDY** I Chip level Information of Mobile phones (Tools & Components)- BGA-SMD-Air Gun-soldering station- Rework station-Soldering lead-Soldering paste-De-Soldering wire-Identification of IC's-Assembling & Disassembling of mobile phones.
Unit - III	**MOBILE PHONE USAGE:** MERITS: Communication – Education - Photo and Video Sharing – Entertainment – Reminders - Alerts and Notes - Travel Purposes – Digital payments. DEMERITS: Health risks of mobile phones and base stations due to radiation – Electromagnetic interference - Traffic accidents – violation of cell phone usage
Unit - IV	**TROUBLE SHOOTING** Causes for various problems & Troubleshooting of problems in a Mobile Phone-Network problems- Sim card problems-Charging problems-Battery problems-Software Unlocking-software flashing-IMEI-Information Downloads of logos & Ring tones- Problems related to mobile phone hand sets-replacement of various components ICS.
Unit - V	**SOFTWARE AND HARDWARE REPLACEMENT:** Software unlocking- Software flashing- Downloads of Ring tones – Hand set problems – Replacement of modules (display, mic, speaker, antenna, amplifier, etc).
Unit - VI	**PROFESSIONAL COMPONENTS:** expert lectures –seminars — webinars – industry inputs – social accountability – patriotism
Text Books	1. William L .Armstrong, Learn Cell phone Repair, kindle edition,2013 2. Pandit Sanjib, Advance Mobile Repairing: Multicolour Circuits, service Diagram & Repairing, BPB publications.2010.
Web resources	1. https://www.who.int/news-room/questions-and-answers/item/what-are-the-health-risks-associated-with-mobile-phones-and-their-base-stations

COURSEOUTCOMES:

At the end of the course, the student will be able to:

CO1	To understand the fundamentals of cell phone
CO2	To learn the chip level study and trouble shooting
CO3	Understand the knowledge of merits and demerits of mobile phones.
CO4	To acquire the knowledge in the trouble shooting of the cell phone
CO5	To acquire the practical knowledge in the repair and maintenance of the cell phone

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Course Outcomes (COs)↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	2	3	2	2	2	2	2	2	3	2.3
CO-2	2	2	1	2	3	3	2	3	2	2	2.2
CO-3	3	3	3	2	3	2	2	2	2	2	2.4
CO-4	3	2	2	2	3	2	2	3	2	2	2.3
CO-5	2	3	2	2	2	3	2	2	3	2	2.3
										Mean Overall Score	**2.3 (High)**

Question Paper Pattern

Maximum Marks: 75 Marks **Exam Duration: 3 Hrs**

Part-A 5x6=30 Marks Answer ALL Questions (Either or Type-Two questions from each unit)
Part-B 3x15=45 Marks Answer Any Three Questions (Three out of Five-one question from each unit)

HOD

HEAD
PG and Research Department of Physics,
Rajah Serfoji Govt. College (Autonomous),,
Thanjavur-613 005.

COE

CONTROLLER OF EXAMINATIONS
RAJAH SERFOJI GOVT. COLLEGE (AUTONOMOUS)
THANJAVUR-613 005.

(For the candidates admitted from 2023 – 2024 onwards)

Course	SEC6	Semester - IV	Course Code: T4PHSE6
Course Title	HOUSE WIRING		
Credits	2	Instruction Hours - 2	Medium: English and Tamil
Course Objectives	To understand the fundamental concepts of house wiring		

UNITS	COURSE DETAILS
Unit - I	**WIRES:** Wires – Stranded wires – Types of wires – Lead sheathed wire – TRS (or) CTS wires- Weather proof wires – Flexible wires – Wire splicing and termination – Western union splice (or) twist splice.
Unit - II	**SWITCHES:** Symbols of electrical and connecting accessories – Switches – Surface switch (or) Tumbler switch – Pull switch (or) Ceiling switch – Grid switch – Architrave switch – Main switch – Splitter units – Distribution fuse boards – Circuit breaker
Unit - III	**FUSE AND LAMP HOLDERS:** Fuse – Principle of operation – Melting points of various metals – Silver as a fusing element – Copper as a fuse wire. Lamp holder – Switched bayonet cap lamp holders – Swivel lamp holders – Ceiling rose – Plugs.
Unit - IV	**WIRING AND EARTHING:** General rules related to wiring - Wiring tools – materials – procedure –safety and precaution- layout diagram – one lamp from one switch– Single phase and three phase wiring – Earthing – Neutral wire – Requirement for grounding – Methods of Earthing – Earthing through water main pipe – plate Earthing.
Unit - V	**TESTING :** Testing procedures – Insulation and leakage test – continuity test – open circuit test – short circuit test – polarity test – Earthing system test.
Unit - VI	**PROFESSIONAL COMPONENTS:** expert lectures –seminars — webinars – industry inputs – social accountability – patriotism
Text Books	1. Electrical wiring, Estimating and Costing – S.L.Uppal, Khanna Publications, Delhi, 2006.
Ref. Book	1. House wiring – Ramanathan Publications, 2014. 2. Electrical wiring residential – Ray.C.Mullin.Phil Simmons, Delmar, Cengage learning, 2012.

COURSEOUTCOMES:
At the end of the course, the student will be able to:

CO1	Acquire basic skills on House wiring.
CO2	Gain knowledge about the different types of switches.
CO3	Understand the knowledge about the principle and operation of fuse.
CO4	Gain the knowledge of house wiring and earthing
CO5	Understand the testing procedures.

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Course Outcomes (COs)↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	2	2	2	3	1	3	2	2.2
CO-2	2	3	2	3	2	2	2	3	2	3	2.4
CO-3	2	3	2	2	2	2	2	3	3	1	2.2
CO-4	2	3	1	3	3	2	3	1	3	3	2.4
CO-5	2	3	1	2	1	2	3	3	3	2	2.2
									Mean Overall Score		2.28 (High)

Question Paper Pattern

Maximum Marks: 75 Marks **Exam Duration: 3 Hrs**

Part-A 5x6=30 Marks Answer All Questions (Either or Type- Two Questions from each unit)
Part-B 3x15=45 Marks (Three out of Five-one question from each unit)

HOD

HEAD
PG and Research Department of Physics,
Rajah Serfoji Govt. College (Autonomous),
Thanjavur-613 005.

COE

CONTROLLER OF EXAMINATIONS
RAJAH SERFOJI GOVT. COLLEGE (AUTONOMOUS)
THANJAVUR-613 005.

(For the candidates admitted from 2023 – 2024 onwards)

Course	SEC7	Semester - IV	Course Code: T4PHSE7
Course Title	PERSONALITY DEVELOPMENTT		
Credits	2	Instruction Hours - 2	Medium : English and Tamil
Course Objectives	To instruct the characteristics essential for personality development. To know the attitude, self esteem and motivation.		

UNITS	COURSE DETAILS
Unit - I	**INTRODUCTION TO PERSONALITY DEVELOPMENT:** The concept of personality - Dimensions of personality – Theories of Freud & Erickson-Significance of personality development. The concept of success and failure: What is success? - Hurdles in achieving success - Overcoming hurdles - Factors responsible for success – What is failure - Causes of failure. SWOT analysis.
Unit - II	**ATTITUDE:** Attitude - Concept - Significance - Factors affecting attitudes - Positive attitude – Advantages –Negative attitude- Disadvantages - Ways to develop positive attitude - Differences between personalities having positive and negative attitude.
Unit - III	**MOTIVATION:** Concept of motivation - Significance – Internal and external motives - Importance of self- motivation- Factors leading to de-motivation.
Unit - IV	**SELF-ESTEEM:** Term self-esteem - Symptoms - Advantages - Do's and Don'ts to develop positive self-esteem – Low self esteem- Symptoms - Personality having low self esteem - Positive and negative self esteem. Interpersonal Relationships – Defining the difference between aggressive, submissive and assertive behaviours - Lateral thinking
Unit - V	**OTHER ASPECTS OF PERSONALITY DEVELOPMENT:** Body language - Problem-solving - Conflict and Stress Management - Decision-making skills - Leadership and qualities of a successful leader – Character building -Team-work – Time management - Work ethics –Good manners and etiquette.
Unit - VI	**PROFESSIONAL COMPONENTS:** expert lectures –seminars – webinars – industry inputs – social accountability – patriotism
Text Books	1. Hurlock, E.B (2006). Personality Development, 28th Reprint. New Delhi: Tata McGraw Hill. 2. Stephen P. Robbins and Timothy A. Judge(2014), Organizational Behavior 16th Edition: Prentice Hall.
Ref. Book	1. Andrews, Sudhir. How to Succeed at Interviews. 21st (rep.) New Delhi.Tata McGraw-Hill 1988. 2. Heller, Robert.Effective leadership. Essential Manager series. Dk Publishing, 2002

	3. Hindle, Tim. Reducing Stress. Essential Manager series. Dk Publishing, 2003 4. Lucas, Stephen. Art of Public Speaking. New Delhi. Tata - Mc-Graw Hill. 2001 5. Mile, D.J Power of positive thinking. Delhi. Rohan Book Company, (2004). 6. Pravesh Kumar. All about Self- Motivation. New Delhi. Goodwill Publishing House. 2005. 7. Smith, B . Body Language. Delhi: Rohan Book Company. 2004

COURSEOUTCOMES:

At the end of the course, the student will be able to:

CO1	Understand the knowledge of success and failure in the life.
CO2	Acquire positive attitude.
CO3	Acquire the knowledge of Conflict and Stress Management.
CO4	Know about Do's and Don'ts to develop positive self-esteem.
CO5	Understand other aspects of personality development.

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific

Course Outcomes (COs)↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	3	3	2	2	3	3	2	2	2	2.5
CO-2	3	3	2	2	2	3	3	3	2	2	2.5
CO-3	3	3	2	2	2	3	3	3	2	2	2.5
CO-4	3	3	2	2	2	3	3	2	2	2	2.5
CO-5	3	3	2	2	3	3	3	2	2	3	2.6
									Mean Overall Score		2.52 (High)

Outcomes

Question Paper Pattern

Maximum Marks: 75 Marks **Exam Duration: 3 Hrs**

Part-A 5x6=30 Marks Answer ALL Questions (Either or Type-Two questions from each unit)
Part-B 3x15=45 Marks Answer Any Three Questions (Three out of Five-one question from each unit)

HOD

HEAD
PG and Research Department of Physics,
Rajah Serfoji Govt. College (Autonomous),
Thanjavur-613 005.

COE

CONTROLLER OF EXAMINATIONS
RAJAH SERFOJI GOVT. COLLEGE (AUTONOMOUS)
THANJAVUR-613 005.

(For the candidates admitted from 2023 – 2024 onwards)

Course	**PCS**	**Semester - VI**	**Course Code: T6PHPC**
Course Title	**PROFESSIONAL COMPETENCY SKILL**		
Credits	**2**	**Instruction Hours - 2**	**Medium : English and Tamil**
Course Objectives	To develop the personality development and to improve the skills needed for the employment opportunities		

UNITS	Course Details
Unit - I	**KNOW YOURSELF:** Knowing yourself – Positive thinking – Physical fitness – Emotional Intelligence – Skills to develop emotional intelligence.
Unit - II	**RESUME WRITING:** Resume writing - purpose of a resume – How long should my resume job? – Types of Resume – Chronological Resume, Functional Resume, Combination Resume, Infographic Resume, Resume with profile, Targeted Resume, mini Resume, Non-traditional resume – Things to do – Formats of Resume – Job Application or covering letter.
Unit - III	**GROUP DISCUSSION:** Introduction – Types of Group discussions – Difference between group discussion and panel discussion debate – personality traits – Advantages of Group discussion – Dos and Don'ts.
Unit - IV	**INTERVIEW SKILLS:** Introduction – Types of interviews – Preparatory steps for job interview– Interview skills – punctuality – Think before you speak – clarity – being confident – Listening – Expressing optimism – Body language – Showing interest – Communication skills – Expressing gratitude.
Unit - V	**PROFESSIONAL SKILLS:** Creativity at work place – Ethical values – Capacity building, Developing interpersonal relationship -Leadership and team building – Decision making – Stress and Time management
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 Books	1) ICTACT – Soft skills and Industry awareness – Tamil Nadu state council for Higher Education, Department of Higher Education – ICT Academy of Tamil Nadu, Chennai. 2) Soft Skills: An integrated approach to maximize personality, Gajendra S.Chauhan, Sangeetha Sharma, Wiley India.

COURSE OUTCOMES:

At the end of the course, the student will be able to:

CO1	Acquire the knowledge about the personality development.	K2
CO2	Gain the knowledge about various types of resumes and resume writing.	K2
CO3	Able to face the first step of interview on gaining the group discussion skills	K3
CO4	Acquire interview skills and understand about body language.	K4
CO5	Gain the professional skills for employability and leadership.	K3
K1 - Remember; K2 – Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate;		

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	2	2	2	2	2	3	3	3	3	2
CO2	2	3	2	2	3	3	2	3	2	2
CO3	3	2	3	3	3	2	3	2	3	2
CO4	3	2	3	3	2	3	3	3	3	2
CO5	2	2	2	2	3	3	2	2	2	2

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	3	2	3	3	2	3	3	3	3	2
CO2	3	2	3	3	3	2	3	2	3	2
CO3	2	2	2	2	2	3	3	3	3	2
CO4	2	3	2	2	3	3	2	3	2	2
CO5	2	2	2	2	3	3	2	2	2	2

Question Paper Pattern

Maximum Marks: 75 Marks **Exam Duration: 3 Hrs**

Part-A 5x6=30 Marks Answer ALL Questions (Either or Type-Two questions from each unit)

Part-B 3x15=45 Marks Answer Any Three Questions (Three out of Five-one question from each unit)

HOD

HEAD
PG and Research Department of Physics,
Rajah Serfoji Govt. College (Autonomous),
Thanjavur-613 005.

COE

CONTROLLER OF EXAMINATIONS
RAJAH SERFOJI GOVT. COLLEGE (AUTONOMOUS)
THANJAVUR-613 005