



# HAJEE KARUTHA ROWTHER HOWDIA COLLEGE

(An Autonomous Institution Affiliated to Madurai Kamaraj University, Madurai.)

Re-Accredited with A++ Grade by NAAC (3<sup>rd</sup> Cycle)

Uthamapalayam - 625 533.

## PG & RESEARCH DEPARTMENT OF PHYSICS

BACHELOR OF SCIENCE - PHYSICS

SYLLABUS

Choice Based Credit System – CBCS

With

Outcome Based Education (OBE)

(Academic Year 2026 - 2027 onwards)

# **HAJEE KARUTHA ROWTHER HOWDIA COLLEGE**

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**Uthamapalayam - 625 533.**

## **College Vision and Mission**

### **Vision**

Our vision is to provide the best type of higher education to all, especially to students hailing from minority Muslim community, rural agricultural families and other deprived, under privileged sections of the society, inculcating the sense of social responsibility in them. Our college is committed to produce talented, duty-bound citizens to take up the challenges of the changing times.

### **Mission**

Our mission is to impart and inculcate social values, spirit of service and religious tolerance as envisioned by our beloved Founder President Hajee Karutha Rowther.

The Vision beckons..... the Mission continues forever.

# **HAJEE KARUTHA ROWTHER HOWDIA COLLEGE**

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**Uthamapalayam - 625 533.**

## **Department Vision and Mission**

### **Vision**

- ❖ To provide an ambient environment for learning and research in physical science with a focus on academic excellence.

### **Mission**

- ❖ To apply conventional and non-conventional tools in physics in tune with emerging trends of science.
- ❖ To bridge the gap between curriculum based learning and carrier readiness, employability through competitive physics in the competitive world
- ❖ Ignite the students to pursue higher studies and research programs.
- ❖ To create a meticulous awareness among students about issues pertaining to welfare of society and environment

## Programme Educational Objectives (PEO)

Our graduates will be progressive, efficient, value based, academically excellent, creative, collaborative, empowered and globally competent literates with the skills required for societal change.

They will demonstrate

<b>PEO1</b>	Comprehensive knowledge and expertise, employability, the acumen of creative and critical thinking, the spirit of enquiry and professional attitude required for a successful career
<b>PEO2</b>	Accountability, linguistic competence and communication skills in the work environment and beyond
<b>PEO3</b>	Perseverance, effective collaboration, team spirit, leadership and problem solving skills
<b>PEO4</b>	Keen sense of civility, professional ethics, receptivity and moral righteousness
<b>PEO5</b>	Commitment to address social and environmental threats and to act as responsible service-minded, duty-bound global citizens

## Programme Outcomes (PO)

On completion (after three years) of Bachelor of Science, Physics programme, the students are able to

<b>PO1</b>	Identify key concepts, principles and fundamental laws that are central to the study of various areas of physics, define and describe them with clarity
<b>PO2</b>	Be able to communicate the physics contents effectively both in oral and written form.
<b>PO3</b>	Explain the mathematical foundation of the underlying physics principles, concepts and laws
<b>PO4</b>	Plan and execute an experiment through careful observations and precise measurements for the proper designing of the next level experimental physics
<b>PO5</b>	Recognize the need for and have an ability to present brief lecture, writing scientific reports, projects, dissertation and engage in debates and discussions

### Programme Specific Outcomes (PSO)

A graduate of B.Sc. Physics after three years will

<b>PSO1</b>	Students will have successful professional careers in academics as well as in the public/ private sectors in the field of physics, mathematics and environmental sciences
<b>PSO2</b>	The students will be capable enough to acquire basic and specialist science skills, their use and incorporation to boost their confident and faith, for effective personal and professional development
<b>PSO3</b>	Student will be able to gain holistic knowledge about the environment, that is essential for being responsible citizen to protect nature
<b>PSO4</b>	Students will be equipped with lifelong learning process for self-sustainability, employability and leadership roles in our dynamic society
<b>PSO5</b>	Students will be provided with value based ethical leadership in professional and social life

### Programme Scheme

#### Eligibility

A pass in +2 examination conducted by the Board of Higher Secondary Education, Government of Tamil Nadu with Physics, Mathematics and Chemistry.

#### For Programme Completion

A Candidate shall complete:

- Part I - Language Courses – Tamil/Arabic/Malayalam in semesters I, II, III and IV respectively
- Part II - Language Courses - English in semesters I, II, III, IV respectively
- Part III - Core Courses in semesters I, II, III, IV, V and VI respectively
- Part III - Generic Elective Courses in semesters I, II, III and IV respectively
- Part III - Discipline Elective Courses in semesters IV, V and VI respectively
- Part IV - Foundation Course (Skill Enhancement Course) in Semester I
- Part IV - Entrepreneurial Skills (Skill Enhancement Course) Course in Semester III
- Part IV - Professional Competency Skill (Skill Enhancement Course) Course in Semester V
- Part IV – Non Major Elective (Skill Enhancement Course) Courses in Semesters V and VI respectively
- Part IV - Environmental Studies Course in semester I
- Part IV - Value Education Course in semester III
- Part IV - Summer Internship/Industrial Training Course in semester V
- Part V - Extension activity in semester IV

#### Scheme of Examinations under Choice Based Credit System

Term End Examinations (TEE)	- 75 Marks
Continuous Internal Assessment Examinations (CIAE)	- 25 Marks
Total	- 100 Marks

#### Pattern of Continuous Internal Assessment Examinations (CIAE)

Average of Two Internal Tests (each 20 marks)	- 20 Marks
Assignment	- 05 Marks
Total	- 25 Marks

#### Pattern of Term End Examinations

(Max. Marks: 75 / Time: 3 Hours)

#### External Examinations Question Paper Pattern for Part I & III and Part IV (Non- Major Elective & Skill based Subject)

**Section - A (5 X 1 = 5 Marks)**

Answer ALL questions.

- Questions 1 - 5
- One question from each unit
- Multiple choice questions and each question carries Four choices

**Section - B (5 X 2 = 10 Marks)**

Answer ALL questions.

- Questions 6 - 10
- One question from each unit
- Short Answer (Definition)

**Section - C (5 X 6 = 30 Marks)**

Answer any ALL questions (Choose either a or b).

- Questions 11 - 15
- One question from each unit
- Paragraph

**Section - D (3 X 10 = 30 Marks)**

Answer any THREE out of five questions.

- Questions 16 - 20
- One question from each unit
- Essay type

**External Examinations Question Paper Pattern for Part IV-  
Foundation Course**

- MCQ Pattern (1 X 75 = 75 Marks)

**External Examinations Question Paper Pattern for Part IV-  
Environmental Studies and Value Education**

**Section - A: (5 X 6 = 30 Marks)**

Answer ALL questions choosing either A or B.

- Questions 1 - 5
- Two questions from each unit (either .... or .... type)
- Paragraph

**Section - B (3 X 15 = 45 Marks)**

Answer any THREE out of five questions.

- Questions 6 - 10
- One question from each unit
- Essay type

**Part V (Extension Activities) - 13 Activities**

- Internal Evaluation

**Passing Marks**

Minimum 27 for External Exam

Eligibility for the degree - passing minimum is **40%**

**Practical Examination**

Internal - 40 marks

External - 60 marks (minimum 24 marks)

Total - 100 marks

Passing minimum is **40%**

**Weightage**

Weightage for Bloom's Taxonomy	Percentage	Marks	
		CIAE	TEE
Knowledge (Remembering) - K1	15	4	11
Understanding - K2	20	5	15
Applying - K3	25	6	19
Analyzing - K4	40	10	30
<b>Gross Total</b>	<b>100</b>	<b>25</b>	<b>75</b>

### Assessment

#### Distribution of questions and marks for Continuous Internal Assessment Examinations

Bloom's Taxonomy	Section A	Section B	Section C	Section D	Total
Knowledge(K1)	2(2)	2(2)	-	-	25 marks
Understanding(K2)	Assignment (5)				
Apply(K3)	-	-	2(6)	-	
Analyzing (K4)	-	2(2)	-	1(8)	

#### Distribution of questions and marks for Term End Examinations.

Bloom's Taxonomy	Section A	Section B	Section C	Section D	Total
Knowledge(K1)	1(1)	2(4)	1(6)	-	Total 75 Marks
Understanding(K2)	1(1)	1(2)	2(12)	-	
Apply(K3)	3(3)	2(4)	2(12)	-	
Analyzing (K4)	-	-	-	3(30)	

Note: Figures in parenthesis are Marks

### Credits Distribution

S. No	Part	Category	No of Courses	No of Credits
1	Part - I	Language	4	12
2	Part - II	English	4	12
3	Part - III	Core (Theory / Practical / Project)	17	69
		Discipline Elective (Theory / Practical)	4	14
		Generic Elective (Theory / Practical *)	6	16
4	Part - IV (AEC)	Foundation Course	1	2
		EVS	1	2
		Value Education	1	2
		NME - I & II	2	4
5	Part - IV (SEC)	Entrepreneurial Skills	1	2
		Professional Competency	1	2
		Internship	1	2
6	Part - V	Extension Activity	1	1
<b>Total</b>			<b>44</b>	<b>140</b>

\* Generic Elective Practical Examinations should be Conducted only in Even Semester

**B.Sc., PHYSICS**

**Details of Course Category, Code, Credits & Title**

Course Category	Course Code	Course Title	Hrs	CIAE	TEE	Max. Marks	Credits
<b>Semester - I</b>							
<b>Part - I</b>							
Language - I	26UTALL11	பொதுத்தமிழ் - I	6	25	75	100	3
	26UARLL11	Introduction to Arabic Language - I					
	26UMMLL11	History of Malayalam Literature					
<b>Part - II</b>							
English - I	26UENLL11	General English - I	6	25	75	100	3
<b>Part - III</b>							
Core - I	26UPHCC11	Mechanics, Properties of Matter and Acoustics	5	25	75	100	5
Core - II (Lab)	26UPHCC1P	Physics Practical - I	3	40	60	100	3
Generic Elective - I	26UMAGE11	Allied Mathematics - I	6	25	75	100	3
<b>Part - IV</b>							
Foundation Course (SEC)(MCQ)	26UPHFN11	Introductory Physics	2	25	75	100	2
EVS	26UGEVS11	Environmental Studies	2	25	75	100	2
<b>TOTAL</b>			<b>30</b>				<b>21</b>

Course Category	Course Code	Course Title	Hrs	CIAE	TEE	Max. Marks	Credits
<b>Semester - II</b>							
<b>Part - I</b>							
Language - II	26UTALL21	பொதுத்தமிழ் - II	6	25	75	100	3
	26UARLL21	Introduction to Arabic Language - II					
	26UMMLL21	Prose, Composition & Translation					
<b>Part - II</b>							
English - II	26UENLL21	General English - II	6	25	75	100	3
<b>Part - III</b>							
Core - III	26UPHCC21	Thermo Dynamics and Statistical Physics	5	25	75	100	5
Core - IV (Lab)	26UPHCC2P	Physics Practical - II	3	40	60	100	3
Core - V	26UPHCC22	Electricity and Magnetism	4	25	75	100	4
Generic Elective - II	26UMAGE21	Allied Mathematics - II	4	25	75	100	3
Generic Elective - II (Lab)	26UMAGE2P	MS Office Lab	2	40	60	100	2
<b>TOTAL</b>			<b>30</b>				<b>23</b>

Course Code	Course Title	Category	Hours	Credits	Marks		
					CIAE	TEE	Total
26UPHCC11	MECHANICS, PROPERTIES OF MATTER AND ACOUSTICS	Core - I	5	5	25	75	100

Course Objectives		
This course allows the students: To have a basic understanding of the laws and principles of mechanics, matter as anything that has mass and occupies space. Acoustics refers to a specific signal used in fields like underwater communication to detect the start of a transmission.		
UNIT	Contents	No. of Hours
I	<b>LAWS OF MOTION AND GRAVITATION:</b> Newton's Laws – basic forces and equations of motion – Kepler's laws– Newton's law of gravitation – determination of G by Boy's method – earth density - velocity of escape from the Earth and solar system- orbital velocity – weightlessness – Earth satellites – parking orbit – mass of the Sun – satellite- potential and kinetic energy – Einstein's theory of gravitation.	15
II	<b>CONSERVATION LAWS:</b> Conservation of linear and angular momentum – centre of mass – Internal forces- elastic and inelastic collision – general elastic collision of particles of different masses – significance of conservation laws – law of conservation of energy – concepts of work – power – energy – conservative and non-conservative forces – potential energy and conservation of energy in gravitational and electric field.	15
III	<b>ELASTICITY:</b> Stress – strain- Hooke's law – different moduli of elasticity elastic constants – work done in a linear strain, shearing strain and volume strain of the deforming body. Poisson's ratio – relation between elastic constants and Poisson's ratio–torsion of a cylinder - torque per unit twist of a cylinder –rigidity modulus by static torsion – Searle's apparatus – torsional oscillations of a body – Rigidity modulus and M.I by torsional pendulum.	15
IV	<b>BENDING OF BEAMS:</b> Bending couple– expression for bending moment – expression for depression at the loaded end of the cantilever – oscillations of a cantilever – uniform and non-uniform bending of beam - experiment to find Young's modulus –I section girders. <b>VISCOSITY:</b> Definition – streamline and turbulent flow – coefficient of viscosity – Poiseuille's formula –Bernoulli's theorem – applications- Torricelli's theorem– venturimeter.	15
V	<b>WAVES AND OSCILLATIONS:</b> Simple Harmonic Motion (SHM) and its properties – composition of two SHM in a straight line and at right angles- Laws of vibration in stretched strings- determination of frequency using Melde's string experiment. <b>ACOUSTICS AND ULTRASONICS:</b> Intensity of sound – decibel – loudness of sound – reverberation – Sabine's reverberation formula –	15

	factors affecting the coustics of buildings – ultrasonic waves: Properties– production of ultrasonic waves – piezoelectric crystal method – magnetostriction effect – applications of ultrasonic waves	
<b>Total</b>		<b>75</b>
<b>Course Outcomes</b>		<b>Knowledge Level</b>
<b>CO</b>	<b>On completion of this course, students will</b>	
1	Understand the Newton’s law of motion, Kepler’s laws and basic principles behind planetary motion.	K1, K2, K3
2	Acquire the knowledge on the conservation laws, differentiate conservative and non-conservative forces.	K1, K2, K3
3	Relate elastic behaviour in terms of three moduli of elasticity and working of torsion pendulum .	K1, K2, K3
4	Be able to appreciate concept of bending of beams and analyse the expression, Viscosity of fluid and support the interesting phenomena associated with liquid.	K1, K2, K3,K4
5	Analyse simple harmonic motions , concept of resonance and to evaluate the frequency of vibration , concept of acoustics, knowledge of ultrasonic in real life, production of ultrasonic waves	K1, K2, K3,K4
<b>K1-Knowledge, K2-Understand, K3-Apply, K4- Analyze</b>		
<b>Textbooks</b>		
1.	D.S.Mathur, <i>Elements of Properties of Matter</i> , S.Chand and Co, 2010.	
2.	BrijLaland N. Subrahmanyam, <i>Properties of Matter</i> , S.Chand and Co, 2003.	
3.	D.R.Khanna and R.S.Bedi, <i>Textbook of Sound</i> , Atma Ram and sons, 1969.	
4.	BrijLal and N.Subrahmanyam, <i>A Text Book of Sound</i> , Second revised edition, Vikas Publishing House, 1995.	
5.	R.Murugesan, <i>Properties of Matter</i> , S.Chand and Co, 2012.	
<b>Reference Books</b>		
1.	C.J. Smith, <i>General Properties of Matter</i> , Orient Longman Publishers, 1960.	
2.	H.R. Gulati, <i>Fundamental of General Properties of Matter</i> , Fifth edition, R. Chand and Co, 1977.	
3.	A.P French, <i>Vibration and Waves, MIT Introductory Physics</i> , Arnold-Heinmann, India, 1973.	
<b>e-Resources</b>		
1.	<a href="https://www.biolinscientific.com/blog/what-are-surfactants-and-how-do-they-work">https://www.biolinscientific.com/blog/what-are-surfactants-and-how-do-they-work</a>	
2.	<a href="http://hyperphysics.phy-astr.gsu.edu/hbase/permot2.html">http://hyperphysics.phy-astr.gsu.edu/hbase/permot2.html</a>	
3.	<a href="https://www.youtube.com/watch?v=gT8Nth9NWPM">https://www.youtube.com/watch?v=gT8Nth9NWPM</a>	

**Mapping with Programme Outcomes:**

CO /PO	P01	P02	P03	P04	P05
C01	3	3	3	2	3
C02	3	3	3	2	3
C03	3	3	3	3	3
C04	2	3	3	3	2
C05	3	3	2	3	3

**Strong-3      Medium-2      Low-1**

**Level of Correlation between PSO's and CO's**

CO /PSO	PS01	PS02	PS03	PS04	PS05
C01	3	3	2	3	3
C02	2	3	3	3	2
C03	3	2	3	2	3
C04	3	3	3	3	3
C05	2	3	3	3	3

**Strong-3      Medium-2      Low-1**

**COURSE CONTENTS AND LECTURE SCHEDULE**

Module No.	Topic	No. of Lectures
<b>UNIT - I</b>		
1.1	Newton's Laws – basic forces and equations of motion - Kepler's laws	3
1.2	Newton's law of gravitation – Determination of G by Boy's method	4
1.3	Earth density - velocity of escape from the Earth and solar system - Orbital velocity - weightlessness	4
1.4	Earth satellites – parking orbit – mass of the Sun – satellite- potential and kinetic energy –Einstein's theory of gravitation	4
<b>UNIT - II</b>		
2.1	Conservation of linear and angular momentum – center of mass - Internal forces	4
2.2	Elastic and inelastic collision – general elastic collision of particles of different masses	4
2.3	Significance of conservation laws – law of conservation of energy concepts of work- power – energy – conservative and non-conservative forces	4
2.4	Potential energy and conservation of energy in gravitational and electric field	3
<b>UNIT - III</b>		
3.1	Stress – strain - Hooke's law –Different moduli of elasticity elastic constants	3
3.2	Work done in a linear strain, shearing strain and volume strain of the deforming body. Poisson's ratio	4

3.3	Relation between elastic constants and Poisson's ratio-Torsion of a cylinder-torque per unit twist of a cylinder	4
3.4	Rigidity modulus by static tension -Searle's apparatus torsional oscillations of a body- Rigidity modulus and M.I by torsional pendulum	4
<b>UNIT - IV</b>		
4.1	Bending couple- expression for bending moment - expression for depression at the loaded end of the cantilever-I section girders	4
4.2	Uniform and non-uniform bending of beam - experiment to find Young's modulus	4
4.3	Definition - streamline and turbulent flow - coefficient of viscosity	3
4.4	Poiseuille's formula -Bernoulli's theorem-applications-Torricelli's theorem-venturimeter	4
<b>UNIT - V</b>		
5.1	Simple Harmonic Motion (SHM) and its properties- composition of two SHM in a straight line and at right angles	4
5.2	Laws of vibration in stretched strings - determination of frequency using Melde's string experiment	3
5.3	Intensity of sound - decibel - loudness of sound -reverberation - Sabine's reverberation formula- factors affecting the acoustics of buildings	4
5.4	Ultrasonic waves: Properties-production of ultrasonic waves - Piezoelectric crystal method - magnetostriction effect - applications of ultrasonic waves	4
<b>Total</b>		<b>75</b>

**Course Designer**

**Name: Dr. M. Fathima Parveen**

Associate Professor of Physics

Course Code	Course Title	Category	Hours	Credits	Marks		
					CIAE	TEE	Total
26UPHCC1P	PHYSICS PRACTICAL - I	Core - II	3	3	40	60	100

Course Objectives		
To enable the students to develop the practical skills and to verify the various basic concepts of physics in mechanics and properties of matter experiments		
Unit	Contents	No. of Hours
<b>Minimum of Eight Experiments from the list</b>		
I.	1. Determination of rigidity modulus of the given wire and moment of inertia of the disc with masses using Torsional pendulum. 2. Determination of Young's modulus of the give beam by uniform bending –Pin and Microscope.	9
II	3. Determination of Young's modulus of the given beam by non-uniform bending – scale and telescope. 4. Determination of Young's modulus of the given beam by cantilever – load depression graph	9
III	5. Determination of Young's modulus of the given beam by cantilever – oscillation method 6. Determination of co-efficient of viscosity by Stokes' method – terminal velocity.	9
IV	7. Determination of viscosity by Poiseuille's flow method. 8. Determination of acceleration due to gravity (g) using compound pendulum.	9
V	9. Determination of Young's Modulus of the given beam by non – uniform bending - pin and microscope. 10. Determination of surface tension by drop weight method for different liquids.	9
<b>Total</b>		<b>45</b>
Course Outcomes		Knowledge Level
CO	On completion of this course, students will	
1	Estimate the rigidity modulus of a given wire	K1,K2,K3
2	Estimate the value of Young's modulus of a given wooden scale with different bending methods	K1,K2,K3
3	Understand the experimental method of how to find the viscosity of a liquid	K1,K2,K3
4	Estimate the acceleration due to gravity of Earth	K1,K2,K3,K4
5	Understand the experimental method to find the surface tension of a liquid	K1,K2,K3,K4
<b>K1-Knowledge, K2-Understand, K3-Apply, K4- Analyze</b>		
<b>Textbooks</b>		

1.	C.C. Ouseph, U.J. Rao and V. Vijayendren, <i>Practical Physics and Electronics</i> S. Viswanathan Publishers, 2013.
2.	C.L. Arora, B.Sc., <i>Practical Physics</i> , S. Chand and Co., 2010.
<b>Reference Books</b>	
1.	Brijlal and N. Subrahmanyam, Properties of Matter, S. Chand and Co., 2003.

**Mapping with Programme Outcomes:**

CO /PO	P01	P02	P03	P04	P05
C01	2	3	3	2	3
C02	2	3	2	3	3
C03	2	3	2	3	2
C04	2	3	3	2	3
C05	3	3	2	3	3

**Strong-3                  Medium-2                  Low-1**

**Level of Correlation between PSO's and CO's**

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
C01	1	3	2	2	3
C02	1	3	3	3	3
C03	2	2	3	2	2
C04	2	3	2	3	3
C05	2	3	3	3	2

**Strong-3                  Medium-2                  Low-1**

**COURSE CONTENTS AND LAB SCHEDULE**

Module No.	Topic	No. of Hours
<b>UNIT - I</b>		
1.1	Determination of rigidity modulus of the given wire and moment of inertia of the disc with masses using Torsional pendulum.	5
1.2	Determination of Young's modulus of the give beam by uniform bending –Pin and Microscope.	4
<b>UNIT - II</b>		
2.1	Determination of Young's modulus of the given beam by non-uniform bending – scale and telescope.	4
2.2	Determination of Young's modulus of the given beam by cantilever – load depression graph	5
<b>UNIT - III</b>		
3.1	Determination of Young's modulus of the given beam by cantilever – oscillation method	5
3.2	Determination of co-efficient of viscosity by Stokes' method – terminal velocity.	4
<b>UNIT - IV</b>		

4.1	Determination of viscosity by Poiseuille's flow method	5
4.2	Determination of acceleration due to gravity (g) using compound pendulum.	4
<b>UNIT - V</b>		
5.1	Determination of Young's Modulus of the given beam by non - uniform bending - pin and microscope.	5
5.2	Determination of surface tension by drop weight method for different liquids	4
<b>Total</b>		<b>45</b>

**Course Designer**

**Name: Dr. A. Mujiber Rahman**

Associate Professor of Physics

Course Code	Course Title	Category	Hours	Credits	Marks		
					CIAE	TEE	Total
26UMAGE11	ALLIED MATHEMATICS - I	Generic Elective - I	6	3	25	75	100

Course Objectives		
This course deals with fundamental concepts of the basic skills of differentiation, successive differentiation, and their applications. It enables us to examine the theoretical knowledge of double and triple integrals .		
UNIT	Contents	No. of Hours
I	<b>Introduction</b> - The $n^{th}$ derivative - Standard results - Fractional expressions - Trigonometrical transformation - Formation of equations involving derivatives-Leibnitz formula for the $n^{th}$ derivative of a product.	18
II	<b>Partial derivatives</b> -Successive partial derivatives-Function of a function rule-Total differential coefficient-A special case -Implicit Functions- Homogeneous functions- Partial derivatives of a function of two variables.	18
III	<b>Reduction formulae</b> -Types, integration of product of powers of algebraic and trigonometric functions, integration of product of powers of algebraic and logarithmic functions- Bernoulli's formula.	18
IV	<b>Multiple Integrals</b> - definition of double integrals -evaluation of double integrals-double integrals in polar coordinates-Change of order of integration.	18
V	<b>Triple integrals</b> -applications of multiple integrals-volumes of solids of revolution-areas of curved surfaces.	18
<b>Total</b>		<b>90</b>
Course Outcomes		Knowledge Level
CO	On completion of this course, students will	
1	Find the $n^{th}$ derivative, form equations involving derivatives and apply Leibnitz formula.	K1,K2,K3,K4
2	Use partial derivative and total derivative coefficient.	K1,K2,K3,K4
3	Able to solve the problems of reduction formula.	K1,K2,K3,K4
4	Determine double integral and double integrals in polar coordinates.	K1,K2,K3,K4
5	Demonstrate the Triple integrals-applications of multiple integrals.	K1,K2,K3,K4
<b>K1-Knowledge</b>		<b>K2-Understand</b>
		<b>K3-Apply</b>
		<b>K4-Analyze</b>
Text Books		
1.	Manikavachagam Pillay.T.K. and Natarajan.T, " <b>Calculus - Volume I</b> ", Viswanathan (Printers & Publishers) Pvt Ltd,Chennai,1997(Unit-I&II).	
2.	Manikavachagam Pillay.T.K. and Natarajan.T, " <b>Calculus - Volume II</b> ", Viswanathan (Printers & Publishers) Pvt Ltd,Chennai,1997(Unit-III,IV and V).	

Reference Books	
1.	Arumugam And Issac, <b>Calculus</b> , New Gamma Publishing House, Palayamkottai, June 2014.
2.	H. Anton, I. Birens and S. Davis, <b>Calculus</b> , John Wiley and Sons, Inc., 2002..
3.	G.B. Thomas and R.L. Finney, <b>Calculus</b> , Pearson Education, 2010.
e-Resources	
1.	<a href="https://nptel.ac.in">https://nptel.ac.in</a>

**Mapping with Programme Outcomes:**

CO /PO	P01	P02	P03	P04	P05
C01	3	2	3	3	3
C02	3	2	3	3	3
C03	3	2	3	3	3
C04	3	2	3	2	3
C05	3	2	3	3	3

**Strong-3 Medium-2 Low-1**

**Level of Correlation between PSO's and CO's**

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
C01	3	2	1	3	3
C02	3	2	1	3	3
C03	3	2	1	3	3
C04	3	2	1	2	3
C05	3	2	1	3	3

**Strong-3 Medium-2 Low-1**

**COURSE CONTENTS AND LECTURE SCHEDULE**

Module No.	Topic	No. of Lectures
<b>UNIT - I</b>		
1.1	The $n^{th}$ derivative.	3
1.2	Standard results.	3
1.3	Fractional expressions.	3
1.4	Trigonometrical transformation.	3
1.5	Formation of equations involving derivatives.	3
1.6	Leibnitz formula for the $n^{th}$ derivative of a product.	3
<b>UNIT - II</b>		
2.1	Partial derivatives–Successive partial derivatives.	4
2.2	Function of a function rule–Total differential coefficient.	4
2.3	A special case –Implicit Functions.	5
2.4	Homogeneous functions– Partial derivatives of a function of two variables.	5

<b>UNIT - III</b>		
3.1	Reduction formulae -Types.	4
3.2	Integration of product of powers of algebraic and logarithmic functions.	5
3.3	Bernoulli's formula.	4
3.4	Problems.	5
<b>UNIT - IV</b>		
4.1	Multiple Integrals - definition of double integrals .	4
4.2	evaluation of double integrals.	5
4.3	double integrals in polar coordinates.	4
4.4	Change of order of integration.	5
<b>UNIT - V</b>		
5.1	Triple integrals.	4
5.2	Applications of multiple integrals.	4
5.3	volumes of solids of revolution.	5
5.4	Areas of curved surfaces.	5
<b>Total</b>		<b>90</b>

**Course Designer**

**Name: Dr. S. SEYADALI FATHIMA**

Assistant Professor of Mathematics

Course Code	Course Title	Category	Hours	Credits	Marks		
					CIAE	TEE	Total
26UPHFN11	INTRODUCTORY PHYSICS	Foundation Course (SEC)(MCQ)	2	2	25	75	100

**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.

UNIT	Contents	No. of Hours
I	<b>Vectors</b> , scalars – Examples for scalars and vectors from physical quantities – Addition, Subtraction of vectors – Resolution and resultant of vectors – Units and dimensions – Standard physics constants.	6
II	<b>Different types of forces</b> – Gravitational, electrostatic, magnetic, electromagnetic, nuclear – Mechanical forces like, centripetal, centrifugal, friction, tension, cohesive, adhesive forces.	6
III	<b>Different forms of energy</b> – Conservation laws of momentum, energy – Types of collisions – Angular momentum – Alternate energy sources – Real life examples.	6
IV	<b>Types of motion</b> – 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.	6
V	<b>Surface tension</b> – 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.	6
<b>Total</b>		<b>30</b>

**Course Outcomes**

CO	On completion of this course, students will	Knowledge Level
1	Apply concept of vectors to understand concepts of Physics and solve problems	K1,K2,K3
2	Appreciate different forces present in Nature while learning about phenomena related to these different forces.	K1,K2,K3
3	Quantify energy in different process and relate momentum, velocity and energy	K1,K2,K3
4	Differentiate different types of motions they would encounter in various courses and understand their basis	K1,K2,K3,K4
5	Relate various properties of matter with their behavior and connect them with different physical parameters involved.	K1,K2,K3,K4

**Textbooks**

1.	D.S. Mathur, 2010, <i>Elements of Properties of Matter</i> , S. Chand and Co
2.	Brijlal and N. Subrahmanyam, 2003, <i>Properties of Matter</i> , S.Chand and Co.
<b>Reference Books</b>	
1.	H.R. Gulati, 1977, <i>Fundamental of General Properties of Matter</i> , Fifth edition, S.Chand and Co.
<b>e-Resources</b>	
1.	<a href="http://hyperphysics.phy-astr.gsu.edu/hbase/permot2.html">http://hyperphysics.phy-astr.gsu.edu/hbase/permot2.html</a>
2.	<a href="https://eesc.columbia.edu/courses/ees/climate/lectures/radiation_hays/">https://eesc.columbia.edu/courses/ees/climate/lectures/radiation_hays/</a>
3.	<a href="https://science.nasa.gov/ems/">https://science.nasa.gov/ems/</a>

### Mapping with Programme Outcomes:

CO /PO	PO1	PO2	PO3	PO4	PO5
C01	3	3	3	3	3
C02	2	3	3	3	2
C03	3	3	3	2	3
C04	3	3	3	3	3
C05	3	2	3	3	3

**Strong-3      Medium-2      Low-1**

### Level of Correlation between PSO's and CO's

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
C01	3	3	2	3	2
C02	3	3	2	2	2
C03	3	3	2	3	2
C04	3	3	2	2	2
C05	3	3	2	2	3

**Strong-3      Medium-2      Low-1**

### COURSE CONTENTS AND LECTURE SCHEDULE

Module No.	Topic	No. of Lectures
<b>UNIT - I</b>		
1.1	Vectors, scalars – Examples for scalars and vectors from physical quantities	2
1.2	Addition, Subtraction of vectors – Resolution and resultant of vectors	2
1.3	Units and dimensions – Standard physics constants	2
<b>UNIT - II</b>		
2.1	Different types of forces	2
2.2	Gravitational, electrostatic, magnetic, electromagnetic, nuclear	2
2.3	Mechanical forces like, centripetal, centrifugal, friction, tension, cohesive, adhesive forces	2

<b>UNIT - III</b>		
3.1	Different forms of energy – Conservation laws of momentum, energy	2
3.2	Types of collisions – Angular momentum	2
3.3	Alternate energy sources – Real life examples	2
<b>UNIT - IV</b>		
4.1	Types of motion – Linear, projectile, circular, angular, simple harmonic motions	2
4.2	Satellite motion – Banking of a curved roads	1
4.3	Stream line and turbulent motions – Wave motion	1
4.4	Comparison of light and sound waves	1
4.5	Free, forced, damped oscillations	1
<b>UNIT - V</b>		
5.1	Surface tension – Shape of liquid drop	1
5.2	Angle of contact – Viscosity –lubricants	1
5.3	Capillary flow – Diffusion – Real life examples	2
5.4	Properties and types of materials in daily use	1
5.5	Conductors, insulators – Thermal and electric	1
<b>Total</b>		<b>30</b>

**Course Designer**

**Name: Dr. T. K. Thirumalaisamy**

Associate Professor of Physics

Course Code	Course Title	Category	Hours	Credits	Marks		
					CIAE	TEE	Total
26UPHCC21	THERMO DYNAMICS AND STATISTICAL PHYSICS	Core – III	5	5	25	75	100

Course Objectives		
This course deals with transport phenomena in gases, laws of thermodynamics, entropy and thermodynamical relations form the basis of thermodynamical behavior of matter and a bridge between the microscopic and macroscopic properties of matter.		
UNIT	Contents	No. of Hours
I	<b>CALORIMETRY:</b> Specific heat capacity – specific heat capacity of gases $C_p$ and $C_v$ – Meyer’s relation – Joly’s method for determination of $C_v$ – Regnault’s method for determination of $C_p$ <b>KINETIC THEORY OF GASES:</b> Postulates of kinetic theory of gases– expression for the pressure of gas – kinetic energy per unit volume of a gas– degrees of freedom and Maxwell’s law of equipartition of energy – atomicity of gases – mean free path – transport phenomena –diffusion, viscosity and thermal conductivity of gases.	15
II	<b>HEAT TRANSFER:</b> Modes of heat transfer– conduction, convection and radiation – coefficient of thermal conductivity – rectilinear flow of heat along a bar – spherical flow of heat and cylindrical flow of heat – Forbe’s method – Lee’s disc method – black body radiation – distribution of energy in black body radiation – Wien’s law and Rayleigh Jean’s law – Planck’s law of radiation – Stefan’s law and its derivation – Newton’s law of cooling from Stefan’s law.	15
III	<b>THERMODYNAMICS-I:</b> Zeroth law and first law of thermodynamics – applications – specific heat capacity of gases – isothermal, adiabatic, isochoric and isobaric processes – gas equation during adiabatic process – work done in an isothermal and adiabatic process – heat engine – efficiency of heat engine – Carnot’s engine working and efficiency – petrol and diesel engines-comparison of engines.	15
IV	<b>THERMODYNAMICS-II:</b> Second law of thermodynamics – concept of entropy – entropy changes of a closed system – entropy change in reversible and irreversible processes – T-S diagram – entropy of a perfect gas – zero point energy–Maxwell’s thermo dynamical relations – Clapeyron’s latent heat equation from Maxwell’s relations –enthalpy-thermodynamic properties - $C_p$ , $C_v$ and $\mu$ - Joule-Kelvin coefficient for an ideal gas.	15
V	<b>STATISTICAL MECHANICS:</b> Definition of phase-space – ensembles – types of ensembles – micro and macro states – probability theorems in thermodynamics – Maxwell-Boltzmann statistics – expression for distribution function in terms of temperature – Bose-Einstein statistics – expression for distribution function – photon gas – Fermi-Dirac	15

	statistics – expression for distribution function – electron gas – comparison of three statistics.	
	<b>Total</b>	<b>75</b>
<b>Course Outcomes</b>		<b>Knowledge Level</b>
<b>CO</b>	<b>On completion of this course, students will</b>	
1	Understand the basic knowledge on specific heat capacities, kinetic theory of gases and its transport phenomena.	K1, K2,K3
2	Focus on three modes heat distributions and how emitters radiate energy using Planck's, Wien's laws to calculate emissive power	K1, K2,K3
3	Focus on the first law of Thermodynamics relates the internal energy change, work done and heat transferred to the system.	K1, K2,K3
4	Understand the concept of second law of thermodynamics, Entropy and its physical significance, Maxwell's thermodynamical relations.	K1, K2,K3,K4
5	Able to understand how microscopic particle behavior with macroscopic thermodynamic properties entropy, temperature, pressure, Bose-Einstein, Fermi-Dirac to explain phase transitions of an ideal gases.	K1, K2,K3,K4
<b>K1-Knowledge, K2-Understand, K3-Apply, K4- Analyze</b>		
<b>Textbooks</b>		
1.	R. Murugesan and Kiruthiga Sivaprasath, <i>Thermal Physics</i> , S. Chand and Co, 2004	
2.	Brijlal and N. Subramaniam, <i>Heat and Thermodynamics</i> , S. Chand and Co, 2000.	
3	Gupta Kumar and Sharma, <i>Statistical Mechanics</i> , S. Chand and Co, 2013.	
<b>Reference Books</b>		
1.	J.B. Rajam and C.L. Arora, <i>Heat and Thermodynamics</i> , S. Chand and Co. Ltd, 1976,	
2.	D.S. Mathur, <i>Heat and Thermodynamics</i> , Sultan Chand and Sons, 2009.	
3	Satya Prakash, <i>Statistical Mechanics</i> , Kedar Nath Ram Nath, 2020.	
4	Resnick, Halliday and Walker, <i>Fundamentals of Physics</i> , 6th Edition. 2010,	
<b>e-Resources</b>		
1.	<a href="https://youtu.be/M_5KYncYNyc">https://youtu.be/M_5KYncYNyc</a>	
2.	<a href="https://www.youtube.com/watch?v=4M72kQulGKkandvI=en">https://www.youtube.com/watch?v=4M72kQulGKkandvI=en</a>	
3	<a href="http://www.freebookcentre.net/Physics/Physics-Books-Online.html">http://www.freebookcentre.net/Physics/Physics-Books-Online.html</a>	

**Mapping with Programme Outcomes:**

CO /PO	P01	P02	P03	P04	P05
<b>C01</b>	1	3	3	3	2
<b>C02</b>	3	2	3	2	3
<b>C03</b>	3	3	2	3	3
<b>C04</b>	3	3	3	3	3
<b>C05</b>	2	2	3	3	3

**Strong-3**

**Medium-2**

**Low-1**

### Level of Correlation between PSO's and CO's

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
C01	2	3	3	3	3
C02	3	3	3	3	3
C03	3	3	2	3	3
C04	2	3	3	2	3
C05	3	2	3	3	2

**Strong-3                  Medium-2                  Low-1**

### COURSE CONTENTS AND LECTURE SCHEDULE

Module No.	Topic	No. of Lectures
<b>UNIT - I</b>		
1.1	Specific heat capacity – specific heat capacity of gases $C_p$ and $C_v$ - Meyer's relation	4
1.2	Joly's method for determination of $C_v$ – Regnault's method for determination of $C_p$	3
1.3	Postulates of Kinetic theory of gases-expression for the pressure of gas-kinetic energy per unit volume of a gas- Interpretation of temperature-degrees of freedom	4
1.4	Maxwell's law of equipartition of energy-atomicity of gases-mean free path-transport phenomena-diffusion, viscosity and thermal conductivity of gases	4
<b>UNIT - II</b>		
2.1	Modes of heat transfer- conduction, convection and radiation-coefficient of thermal conductivity	3
2.2	Rectilinear flow of heat along a bar-spherical flow of heat and cylindrical flow of heat - Forbe's method –Lee's disc method	4
2.3	Black body radiation– distribution of energy in black body radiation – Wien's law and Rayleigh Jean's law –Planck's law of radiation	4
2.4	Stefan's law and its derivation–Newton's law of cooling from Stefan's law.	4
<b>UNIT - III</b>		
3.1	Zeroth law and first law of thermodynamics – applications-Specific heat of a gas.	4
3.2	Isothermal, adiabatic, isochoric and isobaric processes – gas equation during adiabatic process	3
3.3	Work done in an isothermal and adiabatic process – heat engine –efficiency of heat engine – Carnot's engine working and efficiency	4
3.4	petrol and diesel engines – comparison of engines.	4

<b>UNIT - IV</b>		
4.1	Second law of thermodynamics – concept of entropy – entropy of a closed system – entropy of a perfect gas	4
4.2	Entropy changes in reversible and irreversible processes – T-S diagram	3
4.3	Zero point energy – Maxwell’s thermodynamical relations – Clapeyron’s latent heat equation from Maxwell’s relations – Enthalpy	4
4.4	Thermodynamic properties $C_p$ , $C_v$ and $\mu$ -Joule-Kelvin coefficient for an ideal gas.	4
<b>UNIT - V</b>		
5.1	Definition of phase-space – ensembles – types of ensembles – micro and macro states	4
5.2	Probability theorems in thermodynamics – Maxwell-Boltzmann statistics – expression for distribution function	5
5.3	Bose-Einstein statistics – expression for distribution function – photon gas	3
5.4	Fermi-Dirac statistics – expression for distribution function – electron gas – comparison of three statistics.	3
<b>Total</b>		<b>75</b>

**Course Designer**

**Name: Dr. M. Fathima Parveen**

Associate Professor of Physics

Course Code	Course Title	Category	Hours	Credits	Marks		
					CIAE	TEE	Total
26UPHCC2P	PHYSICS PRACTICAL – II	Core – IV	3	3	40	60	100

Course Objectives		
To enable the students to develop the practical skills and to verify the various basic concepts of physics in thermal physics, electricity and acoustics experiments.		
Unit	Contents	No. of Hours
<b>Minimum of Eight Experiments from the list</b>		
I.	1. Determination of thermal conductivity of a good conductor by Searle's method. 2. Determination of thermal conductivity of a bad conductor by Lee's disc method.	9
II	3. Determination of the Velocity of sound through a wire using Sonometer. 4. Determination of frequency of an electrically maintained tuning fork.	9
III	5. To verify the laws of transverse vibration using Sonometer. 6. To verify the laws of vibration using Melde's string apparatus.	9
IV	7. Frequency of AC by using Sonometer. 8. Potentiometer – calibration of low range voltmeter.	9
V	9. Carey Foster Bridge – Determination of Resistance and Resistivity 10. Determination of specific heat capacity of solid – method of mixtures	9
<b>Total</b>		<b>45</b>
Course Outcomes		Knowledge Level
CO	On completion of this course, students will	
1	Determine the thermal conductivities of good and bad conductor.	K1 K2 K3
2	Determine the frequency and velocity of sound waves.	K1 K2 K3
3	Find the laws of vibration using sonometer and Melde's string instruments.	K1 K2 K3
4	Analyse the Frequency of A.C mains using sonometer	K1 K2 K3,K4
5	Determine the specific heat capacity of solids.	K1 K2 K3,K4
<b>K1-Knowledge, K2-Understand, K3-Apply, K4- Analyze</b>		
Textbooks		
1.	C.L. Arora, B.Sc., <i>Practical Physics</i> , S. Chand and Co., 2010.	
2.	Brijlal and N. Subrahmanyam, <i>Properties of Matter</i> , S. Chand and Co., 2003	
Reference Books		
1.	Brijlal and N. Subrahmanyam, <i>Properties of Matter</i> , S. Chand and Co., 2003	

**Mapping with Programme Outcomes:**

CO /PO	P01	P02	P03	P04	P05
C01	2	3	3	2	3
C02	2	3	2	3	3
C03	2	3	2	3	2
C04	2	3	3	2	3
C05	3	3	2	3	3

**Strong-3                  Medium-2                  Low-1**

**Level of Correlation between PSO's and CO's**

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
C01	1	3	2	2	3
C02	1	3	3	3	3
C03	2	2	3	2	2
C04	2	3	2	3	3
C05	2	3	3	3	2

**Strong-3                  Medium-2                  Low-1**

**COURSE CONTENTS AND LAB SCHEDULE**

Module No.	Topic	No. of Hours
<b>UNIT - I</b>		
1.1	Determination of thermal conductivity of a good conductor by Searle's method.	5
1.2	Determination of thermal conductivity of a bad conductor by Lee's disc method.	4
<b>UNIT - II</b>		
2.1	Determination of the Velocity of sound through a wire using Sonometer.	4
2.2	Determination of frequency of an electrically maintained tuning fork.	5
<b>UNIT - III</b>		
3.1	To verify the laws of transverse vibration using Sonometer.	5
3.2	To verify the laws of vibration using Melde's string apparatus.	4
<b>UNIT - IV</b>		
4.1	Frequency of AC by using Sonometer.	5
4.2	Potentiometer – calibration of low range voltmeter.	4
<b>UNIT - V</b>		
5.1	Carey Foster Bridge – Determination of Resistance and Resistivity	5
5.2	Determination of specific heat capacity of solid – method of mixtures	4
<b>Total</b>		<b>45</b>

**Course Designer**

**Name: Dr. A. Mujiber Rahman**

Associate Professor of Physics

Course Code	Course Title	Category	Hours	Credits	Marks		
					CIAE	TEE	Total
26UPHCC22	ELECTRICITY AND MAGNETISM	Core - V	4	4	25	75	100

Course Objectives		
To gain in depth knowledge about the nature of static and dynamic charges and their electric and magnetic effects.		
UNIT	Contents	No. of Hours
I	<b>Static electricity</b> Electric charges - Coulomb's law - electric field - flux of electric field - Gauss law and its proof - applications of Gauss law - electric field due to charged sphere (a) at a point outside (b) at a point inside (c) at a point on the surface of the sphere. electric field due to infinite plane sheet of charges - electric field at a point between two parallel plates charged conductors - electric potential - relation between electric field and potential - potential due to charged spherical conductor at a point (a) outside (b) on the surface and (c) inside.	12
II	<b>Capacitance and charge storage</b> Capacitance - principle of capacitor - expression for capacitance - spherical capacitor (both outer sphere earthed and inner sphere earthed) - cylindrical capacitor - parallel plate capacitor with and without partially filled dielectric - capacitors in series and parallel combinations - energy of a capacitor - loss of energy, when two charged conductors share the charges.	12
III	<b>Current electricity</b> Kirchhoff's laws - application of Kirchhoff's laws to Wheatstone's networks - Carey Foster's bridge - determination of the resistance of the given wire with the necessary theory - temperature coefficient of resistance - determination of temperature coefficient using Carey Fosters bridge - principle of potentiometer - determination of internal resistance of the cell using potentiometer - calibration of low range ammeter and voltmeter.	12
IV	<b>Magnetic effects of current</b> Biot's-Savart's law and applications - long straight wire of infinite length - Ampere's circuital theorem - magnetic field at the centre of a circular coil carrying current - magnetic field along the axis of a coil carrying current - solenoid - ballistic galvanometer theory - damping correction - comparison between deadbeat and aperiodic galvanometer - comparison of capacitance and e.m.f using B.G.	12
V	<b>Electro magnetism</b> Faraday's law of electromagnetic induction - Lenz's law - self-inductance - determination of self-inductance by Owen's bridge and	12

	Maxwell's bridge – growth and decay of current in LR circuit - growth and decay of current in CR circuit – alternating current – peak value, mean value and rms value of current – AC circuit LCR series and parallel resonance – acceptor and rejector circuits.	
<b>Total</b>		<b>60</b>
<b>Course Outcomes</b>		<b>Knowledge Level</b>
<b>CO</b>	<b>On completion of this course, students will</b>	
1	Understand the basic concepts of charges and its field and potential	K1, K2, K3
2	Describe the methods of storing of electrical charges	K1, K2, K3
3	Be able to study the motion of charges and its applications	K1, K2, K3
4	Be able to study the magnetic effects of moving charges	K1, K2, K3, K4
5	Apply various concepts and magnetic properties of materials	K1, K2, K3, K4
<b>K1-Knowledge, K2-Understand, K3-Apply, K4- Analyze</b>		
<b>Textbooks</b>		
1.	Sehgal, Chopra & Sehgal, <i>Electricity and Magnetism</i> , S. Chand & Co. publications, 1998	
<b>Reference Books</b>		
1.	R. Murugesan, <i>Electricity</i> , S. Chand & Co. publications, 2004	
2.	K. K. Tewari, <i>Electricity and Magnetism</i> , S. Chand & Co. publications, 2002	
3	D.N. Vasudeva, <i>Electricity and Magnetism with Electronics</i> , S. Chand & Co. publications, 2002	
<b>e-Resources</b>		
1.	<a href="https://www.edx.org/course/electricity">https://www.edx.org/course/electricity</a>	
2.	<a href="https://www.udemy.com/courses/electricity">https://www.udemy.com/courses/electricity</a>	
3	<a href="https://www.edx.org/course/magnetism">https://www.edx.org/course/magnetism</a>	

**Mapping with Programme Outcomes:**

CO /PO	P01	P02	P03	P04	P05
<b>C01</b>	3	3	2	2	3
<b>C02</b>	2	3	2	2	2
<b>C03</b>	3	3	2	3	2
<b>C04</b>	3	2	3	3	3
<b>C05</b>	3	3	2	3	2

**Strong-3 Medium-2 Low-1**

**Level of Correlation between PSO's and CO's**

CO /PSO	PS01	PS02	PS03	PS04	PS05
<b>C01</b>	3	3	2	2	3
<b>C02</b>	2	3	2	2	2
<b>C03</b>	3	3	2	3	2
<b>C04</b>	3	2	3	3	3
<b>C05</b>	3	3	2	3	2

**Strong-3 Medium-2 Low-1**

**COURSE CONTENTS AND LECTURE SCHEDULE**

Module No.	Topic	No. of Lectures
<b>UNIT - I</b>		
1.1	Electric charges - Coulomb's law - electric field - flux of electric field	2
1.2	Gauss law and its proof - applications of Gauss law - electric field due to charged sphere (a) at a point outside (b) at a point inside (c) at a point on the surface of the sphere	3
1.3	Electric field due to infinite plane sheet of charges - electric field at a point between two parallel plate charged conductors	3
1.4	Electric potential - relation between electric field and potential	2
1.5	Potential due to charged spherical conductor at a point (a) outside (b) on the surface and (c) inside	2
<b>UNIT - II</b>		
2.1	Capacitance - principle of capacitor - expression for capacitance	2
2.2	Spherical capacitor (both outer sphere earthed and inner sphere earthed)	2
2.3	Cylindrical capacitor - parallel plate capacitor with and without partially filled dielectric	3
2.4	Capacitors in series and parallel combinations- energy of a capacitor	3
2.5	Loss of energy, when two charged conductors share the charges.	2
<b>UNIT - III</b>		
3.1	Kirchhoff's laws - application of Kirchhoff's laws to Wheatstone's networks	2
3.2	Carey Foster's bridge - determination of the resistance of the given wire with the necessary theory	3
3.3	Temperature coefficient of resistance- determination of temperature coefficient using Carey Fosters bridge	2
3.4	Principle of potentiometer - determination of internal resistance of the cell using potentiometer	3
3.5	Calibration of low range ammeter and voltmeter.	2
<b>UNIT - IV</b>		
4.1	Biot-Savart's law and applications - long straight wire of infinite length	2
4.2	Ampere's circuital theorem	2
4.3	Magnetic field at the centre of a circular coil carrying current - magnetic field along the axis of a coil carrying current	3
4.4	Solenoid - ballistic galvanometer Theory - damping correction	2

4.5	Comparison between deadbeat and aperiodic galvanometer, comparison of capacitance and e.m.f using B.G.	3
<b>UNIT - V</b>		
5.1	Faraday's law of electromagnetic induction – Lenz's law – self-inductance	2
5.2	Determination of self-inductance by Owen's bridge and Maxwell's bridge	2
5.3	Growth and decay of current in LR circuit - growth and decay of current in CR circuit	3
5.4	Alternating current – peak value, mean value and rms value of current – AC circuit	2
5.5	LCR series and parallel resonance – acceptor and rejector circuits.	3
<b>Total</b>		<b>60</b>

**Course Designer**

**Name: Dr. M. Charles Robert**

Associate Professor of Physics

Course Code	Course Title	Category	Hours	Credits	Marks		
					CIAE	TEE	Total
26UMAGE21	ALLIED MATHEMATICS - II	Generic Elective - II	4	3	25	75	100

### Course Objectives

Trigonometry deals with the applications of De Moivre's theorem, hyperbolic functions. To acquire knowledge about finding approximate roots of the transcendental and algebraic equations. To improve students' ability to solve Problems in interpolation.

UNIT	Contents	No. of Hours
I	<b>Deductions from De Moivre's theorem:</b> Expansion of $\tan(\theta_1 + \theta_2 + \dots + \theta_n)$ - Expansion for $\sin n\theta$ , $\cos n\theta$ , and Expansion for $\tan n\theta$ in powers of $\tan \theta$ - Expansion of $\sin \alpha$ and $\cos \alpha$ in powers of $\alpha$ and $\tan \alpha$ - Expansions of $\sin^n \theta$ , $\cos^n \theta$ , $\tan^n \theta$ , $\sin^m \theta \cos^n \theta$ in terms of multiple angles.	12
II	<b>Hyperbolic Functions:</b> Properties of exponential function- Hyperbolic Functions-Relation between hyperbolic and circular function- Inverse Hyperbolic Functions.	12
III	<b>Solutions of Transcendental and Algebraic Equations:</b> Iteration Method - Aitken's method- Bisection method - Regula Falsi method - Newton Raphson method.	12
IV	<b>Solutions of Simultaneous Equations:</b> Gauss Elimination method- Gauss Jordan method - Gauss Seidel Iterative method - Gauss Jacobi method .	12
V	<b>Interpolation:</b> Newton's interpolation formulae - central difference interpolation formulae - Lagrange's interpolation formulae -Inverse interpolation.	12
<b>Total</b>		<b>60</b>

### Course Outcomes

CO	On completion of this course, students will	Knowledge Level
1	Recall expressions for trigonometric functions.	K1,K2,K3,K4
2	Relate circular trigonometric functions and hyperbolic Functions.	K1,K2,K3,K4
3	Find out the approximate roots of transcendental and algebraic equations.	K1,K2,K3,K4
4	Develop the skills of finding roots of simultaneous Equations.	K1,K2,K3,K4
5	Demonstrate knowledge about interpolation and Inverse interpolation.	K1,K2,K3,K4

**1-Knowledge**

**K2-Understand**

**K3-Apply**

**K4-Analyze**

### Text Books

1.	Khanna.M.L., " <b>Trigonometry</b> " Jai Prakash Nath & Co.,Educational Publishers, Meerut,1988. (Unit- I, II)
2.	S. Arumugam and A.Thangapandi ISSAC., " <b>Numerical Analysis with programming in C</b> ", New gamma Publication, Palayankottai (Unit-III, IV, V)

Reference Books	
1.	Arumugam. S., and Thangapandi Isaac, A., " <i>Algebra: Theory of Equations Theory of Numbers and Trigonometry</i> ", New Gamma Publishing House, Palayamkottai, 2011
2.	Rawat, K.S., " <i>Trigonometry</i> ", First Edition, Sarup Book Publishers Pvt. Ltd., New Delhi. 2008
3.	Numerical Methods, T.Veerarajan & T. Ramachandran ,second edition, Tata Mc Graw Hill,2006.
e-Resources	
1.	<a href="https://nptel.ac.in">https://nptel.ac.in</a>

### Mapping with Programme Outcomes:

CO /PO	P01	P02	P03	P04	P05
C01	3	2	3	2	2
C02	3	2	3	2	2
C03	3	2	3	2	2
C04	3	2	3	2	2
C05	3	2	3	2	2

Strong-3      Medium-2      Low-1

### Level of Correlation between PSO's and CO's

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
C01	3	2	2	2	3
C02	3	2	2	3	3
C03	3	2	2	3	2
C04	3	2	2	3	3
C05	3	2	2	3	3

Strong-3      Medium-2      Low-1

### COURSE CONTENTS AND LECTURE SCHEDULE

Module No.	Topic	No. of Lectures
<b>UNIT - I</b>		
1.1	Expansion of $\tan(\theta_1 + \theta_2 + \dots + \theta_n)$ and Expansion for $\sin n\theta$ , $\cos n\theta$ , and $\tan n\theta$	4
1.2	Expansion of $\sin \alpha$ and $\cos \alpha$ in powers of $\alpha$ and $\tan \alpha$	4
1.3	Expansions of $\sin^n \theta$ , $\cos^n \theta$ , $\tan^n \theta$ , $\sin^n \theta \cos^n \theta$ in terms of multiple angles	4
<b>UNIT - II</b>		
2.1	Hyperbolic functions and problems Properties of exponential function	2
2.2	Hyperbolic functions	2
2.3	Relation between hyperbolic and circular function	2
2.4	Inverse Hyperbolic functions	2
2.5	problems	4

<b>UNIT - III</b>		
3.1	Algebraic and Transcendental Equations	1
3.2	Iteration Method	2
3.3	Aitken's Method	1
3.4	Bisection method	2
3.5	Regula Falsi method	3
3.6	Newton Raphson method.	3
<b>UNIT - IV</b>		
4.1	Gauss elimination method	2
4.2	Gauss Jordan method	2
4.3	Gauss Jacobi iteration method	4
4.4	Gauss seidel iteration methods.	4
<b>UNIT - V</b>		
5.1	Newton's interpolation formulae	4
5.2	Central difference interpolation formulae	4
5.3	Lagrange's interpolation formulae	2
5.4	Inverse interpolation.	2
<b>Total</b>		<b>60</b>

**Course Designer**

**Name: Dr. S. Mohamed Basheer**

Assistant Professor of Mathematics

Course Code	Course Title	Category	Hours	Credits	Marks		
					CIAE	TEE	Total
26UMAGE2P	MS OFFICE LAB	Generic Elective - II Lab	2	2	40	60	100

### Course Objectives

This course is designed for those students who wish to learn numerous advance MS Word to gain knowledge of Excel. To acquire the knowledge of Power Point and Outlook features.

UNIT	Contents	No. of Hours
I	<ul style="list-style-type: none"> <li>Creating, editing, saving and printing text documents, Font and paragraph formatting, Simple character formatting</li> <li>Inserting tables, smart art, page breaks, using lists and images and working with images</li> </ul>	6
II	<ul style="list-style-type: none"> <li>Using spelling and grammar check, Understanding document properties,</li> <li>Spreadsheet basics, Creating, editing, saving and printing spreadsheets, Working with function and formulas,</li> </ul>	6
III	<ul style="list-style-type: none"> <li>Modifying worksheets with color and auto formats, graphically representing data: Charts, Graphs,</li> <li>Speeding data entry: Using Data forms, analyzing data: Data menu, Subtotal, Filtering Data, Formatting worksheets</li> </ul>	6
IV	<ul style="list-style-type: none"> <li>Opening, viewing, creating and printing slides, Applying auto layouts,</li> <li>Adding custom animation, Using slide transitions</li> </ul>	6
V	<ul style="list-style-type: none"> <li>Graphically representing data: Charts, Graphs, Creating professional slide for presentation,</li> <li>Understanding how to search/Google.</li> </ul>	6
<b>Total</b>		<b>30</b>

### Course Outcomes

### Knowledge Level

CO	On completion of this course, students will	
1	Create file and folders and select to save the document	K1,K2,K3,K4
2	Select spell for grammar check and save the document	K1,K2,K3,K4
3	Classify worksheet and analyzing data	K1,K2,K3,K4
4	Choose text using text effect and apply a graphic presentation	K1,K2,K3,K4
5	Identify basic navigation tools used in browsers	K1,K2,K3,K4

**K1-Knowledge**

**K2-Understand**

**K3-Apply**

**K4-Analyze**

### Text Books

- Nellaikannan. C, *MS OFFICE*, Nels Publication, third edition, 2004.

### Reference Books

1.	Bittu Kumar <b>Mastering MS Office</b>
2.	Ramesh Bangia., Learning <b>MS Office</b>
<b>e-Resources</b>	
1.	<a href="https://nptel.ac.in">https://nptel.ac.in</a>

**Mapping with Programme Outcomes:**

CO /PO	P01	P02	P03	P04	P05
C01	3	3	1	3	3
C02	3	3	1	3	3
C03	3	1	2	3	1
C04	3	3	2	3	3
C05	3	1	2	3	1

**Strong-3      Medium-2      Low-1**

**Level of Correlation between PSO's and CO's**

CO /PSO	PS01	PS02	PS03	PS04	PS05
C01	3	3	1	3	3
C02	3	3	1	3	3
C03	3	1	2	3	1
C04	3	3	2	3	3
C05	3	1	2	3	1

**Strong-3      Medium-2      Low-1**

**COURSE CONTENTS AND LAB SCHEDULE**

Module No.	Topic	No. of Hours
<b>UNIT - I</b>		
1.1	Creating, editing, saving and printing text documents, Font and paragraph formatting, Simple character formatting	3
1.2	Inserting tables, smart art, page breaks, using lists and images and working with images	3
<b>UNIT - II</b>		
2.1	Using spelling and grammar check, Understanding document properties,	3
2.2	Spreadsheet basics, Creating, editing, saving and printing spreadsheets, Working with function and formulas	3
<b>UNIT - III</b>		
3.1	Modifying worksheets with color and auto formats, graphically representing data: Charts, Graphs,	3
3.2	Speeding data entry: Using Data forms, analyzing data: Data menu, Subtotal, Filtering Data, Formatting worksheets	3
<b>UNIT - IV</b>		

4.1	Opening, viewing, creating and printing slides, Applying auto layouts,	3
4.2	Adding custom animation, Using slide transitions	3
<b>UNIT - V</b>		
5.1	Graphically representing data: Charts, Graphs, Creating professional slide for presentation,	3
5.2	Understanding how to search/Google.	3
<b>Total</b>		<b>30</b>

**Course Designer**

**Name: Dr. S. Mohamed Basheer**

Assistant Professor of Mathematics