BACHELOR OF PHYSICS
REGULATIONS

ELIGIBILITY

A pass in Higher Secondary Examination in Academic stream or Vocational stream under Higher Secondary Board of Examination, Tamil Nadu with Physics as one of the subjects and as per the norms set by the Government of Tamil Nadu or an Examination accepted as equivalent thereto by the Academic Council, subject to such conditions as may be prescribed thereto are permitted to appear and qualify for the **Bachelor of Physics Degree Examination** of this College after a course of study of three Academic years.

OBJECTIVES OF THE COURSE

The Curriculum is designed to attain the following learning goals which students shall accomplish by the time of their graduation:

1. Producing graduates who are well acquainted with the fundamentals of Physics and requisite skills, in order to use their knowledge in Physics in a wide range of practical applications.
2. Developing creative thinking and the power of imagination to enable graduates work in research in academia and industry for broader applications.
3. Relating the training of Physics graduates to the employment opportunities within the country.
4. To promote societal values through Physics related activities

SCHEME OF EXAMINATIONS

Subject Code	Subject	Hrs of Instruction	Exam Duration (Hrs)	Max Marks			Credit Points
				CA	CE	Total	
First Semester							
Part – I							
15UTL11U 15UHL11H 15UML11M 15UFL11F	Tamil-I Hindi-I Malayalam-I French – I	6	3	25	75	100	4
Part – II							
15UEG12E	English - I	6	3	25	75	100	4
Part – III							
15UPY13A	**CORE-- I:**Mechanics, Properties of Matter and Acoustics	6	3	25	75	100	4
15UMA1AE	**Allied- I:** Mathematics -I	7	3	20	55	75	3
15UPY13P	**CORE- Lab- I:** General Experiments	3	-	-	-	-	-
Part – IV							
15UFC1FA	Environmental Studies	2	3	-	50	50	2
		30				**425**	**17**
Second Semester							
Part – I							
15UTL21U 15UHL21H 15UML21M 15UFL21F	Tamil-II Hindi-II Malayalam-II French – II	6	3	25	75	100	4
Part – II							
15UEG22E	English - II	6	3	25	75	100	4
Part – III							
15UPY23A	**CORE-- II:** Heat and Thermodynamics	6	3	25	75	100	4
15UPY23P	**CORE- Lab- I:** General Experiments	3	3	40	60	100	4
15UMA2AE	**Allied - I:** Mathematics- II	7	3	20	55	75	3

06/04/2016

BoS Chairman/HoD
Department of Physics
Dr. N. G. P. Arts and Science College
Coimbatore – 641 048

Dr. P.R. MUTHUSWAMY
PRINCIPAL
Dr NGP Arts and Science College
Dr. NGP - Kalapatti Road
Coimbatore - 641 048
Tamilnadu, India

Part – IV							
15UFC2FA	Value Education: Human Rights	2	3	-	50	50	2
		30				**525**	**21**
Third Semester							
Part – I							
15UTL31U 15UHL31H 15UML31M 15UFL31F	Tamil-III Hindi-III Malayalam-III French – III	5	3	25	75	100	4
Part – II							
15UEG32E	English - III	5	3	25	75	100	4
Part – III							
15UPY33A	**CORE--III:** Optics	4	3	25	75	100	4
15UPY33P	**CORE- Lab- II:** General Experiments	2	-	-	-	-	-
15UCY3AA	**Allied - II:** Chemistry- I	4	3	20	55	75	3
	Allied Practical- I: Chemistry	3	-	-	-	-	-
Part – IV							
15UPY3SA	**Skill based Subject -I:** Principles of Programming Concepts and C Programming	3	3	20	55	75	3
	NMEC –I	2	3	-	50	50	2
15UFC3FA/ 15UFC3FB/ 15UFC3FC/ 15UFC3FD/ 15UFC3FE	Tamil / Advanced Tamil (OR)Yoga for Human Excellence / Women's Rights/Constitution of India	2	3	-	50	50	2
		30				**550**	**22**
Fourth Semester							
Part – I							
15UTL41U 15UHL41H 15UML41M 15UFL41F	Tamil-IV Hindi-IV Malayalam-IV French – IV	5	3	25	75	100	4
Part – II							
15UEG42E	English - IV	5	3	25	75	100	4
Part – III							
15UPY43A	**CORE-- IV:** Atomic Physics and Spectroscopy	4	3	25	75	100	4

15UPY43P	**CORE- Lab- II:** General Experiments	2	3	40	60	100	4
15UCY4AA	**Allied - II:** Chemistry -II	4	3	20	55	75	3
15UCY4AP	Allied Practical- I : Chemistry	3	3	20	30	50	2
Part – IV							
15UPY4SA	**Skill based Subject II:** Object Oriented Programming with C++	3	3	20	55	75	3
	NMEC –II	2	3	-	50	50	2
15UFC4FA 15UFC4FB 15UFC4FC	Tamil/ Advanced Tamil (or) General Awareness	2	3	-	50	50	2
		30				**700**	**28**
Fifth Semester							
Part – III							
15UPY53A	**CORE- –V:** Classical Mechanics and Mathematical Physics	4	3	25	75	100	4
15UPY53B	**CORE-- VI:** Electricity and Magnetism	4	3	20	55	75	3
15UPY53C	**CORE- –VII:** Applied Electronics	4	3	20	55	75	3
15UPY53D	**CORE- –VIII:** Nuclear Physics	4	3	25	75	100	4
	CORE- Lab- III: General Experiments	3	-	-	-	-	-
	CORE- Lab- IV: Digital Electronics and Microprocessor	2	-	-	-	-	-
	CORE- Lab –V: Computer Programming	2	-	-	-	-	-
	Elective- I	4	3	25	75	100	4
Part – IV							
15UPY5SA	**Skill based Subject III:** Digital Electronics	3	3	20	55	75	3
		30				**525**	**21**
Sixth Semester							
Part – III							
15UPY63A	**CORE- –IX:** Quantum Mechanics and Relativity	5	3	25	75	100	4

15UPY63B	**CORE-- X:** Solid State Physics	5	3	25	75	100	4
15UPY63P	**CORE- Lab- III:** General Experiments	3	3	40	60	100	4
15UPY63Q	**CORE- Lab- IV:** Digital Electronics and Microprocessor	3	3	30	45	75	3
15UPY63R	**CORE- Lab –V:**Computer Programming	3	3	30	45	75	3
	Elective- II	4	3	25	75	100	4
	Elective- III	4	3	25	75	100	4
Part – IV							
15UPY6SA	**Skill based subject - IV:** Microprocessors	3	3	20	55	75	3
Part – V							
15UEX65A	Extension Activity	**-**	**-**	**-**	**50**	**50**	**2**
		30				**775**	**31**
GRAND TOTAL						**3500**	**140**

ELECTIVE – I

(Student shall select any one of the following subjects as Elective in Fifth semester)

S.No	Subject Code	Name of the Subject
1.	15UPY5EA	Material Science
2.	15UPY5EB	Energy Physics
3.	15UPY5EC	Agricultural Physics

ELECTIVE – II

(Student shall select any one of the following subjects as Elective in Sixth semester)

S.No	Subject Code	Name of the Subject
1.	15UPY6EA	Fundamentals of Nano Science
2.	15UPY6EB	Optical Fibres and Fibre Optic Communication Systems
3.	15UPY6EC	Bio-Physics

ELECTIVE - III

(Student shall select any one of the following subjects as Elective in Sixth semester)

S. No	Subject Code	Name of the Subject
1.	15UPY6ED	Space Physics
2.	15UPY6EE	Geophysics
3.	15UPY6EF	Medical Physics

NON MAJOR ELECTIVE COURSES (NMEC)

The Department offers the following two papers as Non Major Elective Course for other than the Physics students.

Student shall select the following subject as Non Major Elective Course during their third and fourth semester.

S. No	Subject Code	Name of the Subject
1	15UED34V	Principles of Physics -I
2	15UED44V	Principles of Physics -II

FOR COURSE COMPLETION

Students have to complete the following subject:

- Language papers (Tamil/Malayalam/French/Hindi, English) in I, II, III and IV semesters.
- Environmental Studies in I semester.
- Value Education in II and III semester respectively.
- General Awareness in IV semester.
- Allied papers in I ,II,III and IV semesters.
- Two Non Major Elective Course in the III and IV semesters.
- Extension activity in the VI semester.
- Elective papers in the V and VI semesters.
- Internship Training in the VI semester

Total Credit Distribution

Subjects	Credits	Total		Credits	Cumulative Total
Part I: Tamil	4	4x 100 =	400	16	32
Part II: English	4	4x 100 =	400	16	
Part III:					
CORE-	4	8x 100 =	800	32	82
	3	2x 75 =	150	06	
CORE-Practical	4	3x 100 =	300	12	
	3	2x 75 =	150	06	
Allied	3	4x75 =	300	12	
Allied Practical	2	1x50 =	50	02	
Elective	4	3 x 100	300	12	
Part IV:					
Skill based	3	4 x 75 =	300	12	24
NMEC	2	2 x 50 =	100	04	
Value Education	2	2 x 50=	100	04	
Environmental studied	2	1 x 50 =	50	02	
General Awareness	2	1 x 50 =	50	02	
Part V:					
Extension	2	1x50 =	50	02	02
Total			**3500**	**140**	**140**

15UTL11U	பகுதி – I: தமிழ் தாள் -I	முதல் பருவம்

Total Credit: 4
Hours per week: 6

(கவிதை, சிறுகதை, இதழியல், இலக்கணம், இலக்கிய வரலாறு)

அலகு -1 கவிதைகள்

1. பாரதியார் – செந்தமிழ்நாடு
2. பாரதிதாசன் – புத்தகச் சாலை, நீங்களே சொல்லுங்கள்
3. கவிமணி – ஒற்றுமையே உயிர்நிலை
4. சிற்பி – பெல்ஜியம் கண்ணாடி
5. மு.மேத்தா – மரங்கள்
6. ஆ.வெண்ணிலா – நீரில் அலையும் முகம்

அலகு - 2 சிறுகதைகள்

1. புதுமைப்பித்தன் – கடவுளும் கந்தசாமிப் பிள்ளையும்
2. ஜெயகாந்தன் – யுக சந்தி
3. தி.ஜானகிராமன் – சிலிர்ப்பு
4. நாஞ்சில் நாடன் – சூடிய பூ சூடற்க
5. பட்சி – பெத்த வயிறு

அலகு - 3 நீதி இலக்கியம்

1. திருக்குறள் - அறன் வலியுறுத்தல்
2. ஏலாதி – (பா.எண் : 15,16,26,39,47)
3. கார்நாற்பது – (முதல் 10 பாடல்கள்)

அலகு - 4 இதழியல் கலை

1. இதழியல் விளக்கம் (இதழியல் விளக்கமும் இலக்கணமும், இதழ்களின் பணிகளும் பொறுப்புகளும், இதழ்களின் வகைகள்)
2. தமிழ் இதழ்கள் (நாளிதழ்கள், வார இதழ்கள், மாத இதழ்கள்)
3. தமிழ் ஊடகங்கள் (வானொலி, தொலைக்காட்சி, இணையம்)

அலகு – 5 இலக்கிய வரலாறும் இலக்கணமும்

1. தமிழ்க் கவிதையின் தோற்றமும் வளர்ச்சியும் (மரபுக்கவிதை, புதுக்கவிதை)
2. தமிழ்ச் சிறுகதையின் தோற்றமும் வளர்ச்சியும்
3. பதினெண் கீழ்க்கணக்கு நூல்கள்
4. **இலக்கணம் :** அ)ஒற்றுமிகும் இடங்கள், ஆ) ஒற்று மிகா இடங்கள்.

பார்வை நூல்கள்

1 . தமிழ்த்துறை வெளியீடு
2. இலக்கிய வரலாறு – பேராசிரியர் முனைவர் பாக்யமேரி
3. இதழியல் கலை - மா.பா.குருசாமி

15UHL11H	PART-I : HINDI-I	SEMESTER- I

Total Credit:4
Hours per week: 6

Prose, Non-detailed Text, Grammar & Translation Books Prescribed:

1. PROSE : **Nuthan Gadya Sangrah**

EDITOR: Jayaprakash (Prescribed Lessons – only 4)

Lesson 1 - Razia
Lesson 2 – Makreal
Lesson3- Bahtha Pani Nirmala
Lesson 4 – Rashtrapitha Mahathma Gandhi

PUBLISHER: Sumitra Prakashan Sumitravas,
16/4 Hastings Road,
Allahabad – 211 001.

2. NON DETAILED TEXT: Kahani Kunj.

EDITOR: Dr.V.P.Amithab. (Stories 1 -4 only)
Publisher : Govind Prakashan Sadhar Bagaar,
Mathura,
Uttar Pradesh – 281 001.

3. GRAMMAR : Shabdha Vichar (Sangya, Sarvanam, Karak, Visheshan) Only(Noun, Pronoun, Adjective, Case Endings)
Theoretical & Applied. Book for

REFERENCE : Vyakaran Pradeep by Ramdev.
Publisher : Hindi Bhavan,
36,Tagore Town
Allahabad – 211 002. 4.

4.TRANSLATION: English- Hindi only. Anuvadh Abhyas – III
(1-10 lessons Only)

PUBLISHER: Dakshin Bharath Hindi Prachar Sabha
Chennai -17.

4. **COMPREHENSION :** 1 Passage from ANUVADH ABHYAS – III
(16- 30)
Dakshin bharath hindi prachar sabha
Chennai- 17.

15UML11M	PART-I: MALAYALAM-I	SEMESTER-I

Total Credit: 4
Hours per week: 6

Paper I Prose, Composition & Translation

This paper will have the following five units:

Unit I &II - Novel

Unit III & IV - Short story

Unit V **-** Composition & Translation

TEXT BOOKS:

Unit I &II - *M.T. Vasudevan Nair*. **Naalukettu –** (**D.C. Books**, Kottayam, Kerala)

UnitIII&IV-*Lalithampika.***Manikkianum Mattu Prathana Kathakalum–** *Antharjanam* (**D.C.Books**, Kottayam, Kerala)

Unit V - Expansion of ideas, General Essay and Translation of a simple passage from English about **100** words) to Malayalam

REFERENCE BOOKS:

1. *Kavitha Sahithya Charitram, M.Leelavathi* (Kerala Sahithya Academy, Trichur)
2. *K.M.Tharakan,* **Malayala Novel sahithya Charitram –** (**N.B.S. Kottayam**)
3. *G.Sankarapillai*, **Malayala Nataka Sahithya Charitram-** (**D.C.Books**, Kottayam)
4. *M.Achuyuthan*, **Cherukatha Innale Innu – (D.C. Books**, Kottayam)
5. *K.M. George,* **Sahithya Charitram Prasthanangalilude.** (Chief Editor) (D.C. Books, Kottayam)

15UFL11F	PART-I: FRENCH- I	SEMESTER- I

Total Credit: 4

Hours per week: 6

French Language for Under-graduate Degree Programmes

Compétence Culturelle	Compétence De communication	Compétence grammaticale
UNITÉ 1 – Ici, en France		
• Moi et les Autres • La France Express	• INTERACTION: s'identifier • RÉCEPTION ECRITE: Comprendre une annonce d'aeroport • RÉCEPTION ORALE: comprendre l'ecrit de la rue (Panneaux, plaques, rues...) • PRODUCTION ÉCRITE**:** écrire un SMS	• Le présent des verbes: Je suis, je reste,J'arrive • Le lieu: (je suis) à… (je suis) ici • L'infinitif
UNITÉ 2 – Ici, en classe		
• Moi et le francais • Le francais dane le monde	• INTERACTION: Se présenter • RÉCEPTION ORALE: Comprendre des consignes Orales • RÉCEPTION ÉCRITE: Comprendre une fiche D''inscription • PRODUCTION ÉCRITE: écrire un texte à 'impératif	• Tu/vous • Le present des Verbes en-er et de être:je, tu,vous • La forme Impérative (tu ,vous) Des verbes en-er
UNITÉ 3 - Samedi		
• Le fil du temps	• INTERACTION: S'informer • RÉCEPTION ORALE: Comprendre une annonce • RÉCEPTION ÉCRITE: Comprendre un article (titres et illustrations) • PRODUCTION ÉCRITE: écrire des slogans	• Les articles Défines:le,la,les • A,de+le,la,les: Au,aux,du,des,à l', de l' • Être(présent)I'heure • Ll faut+nom Ll faut+infinitive • Pharses

		verbe+complément, Complément+verbe
UNITÉ 4 - Dimanche		
• Les activités Culturelles des Français	• INTERACTION: Acheter,demander des Informations • RECEPTION ORALE: Comprendre les Titres du journal à la radio • RÉCEPTION ÉCRITE: Comprendre les Informations • PRODUCTION ÉCRITE: Inventer des noms de journaux	• Faire, present • Avior, present • Ll y a • Le présent des verbes en-er: Regarder • Combien? • Quand? • Complément de nom: Tremblement de terre, les noms de pays…. • Du,des,de la(reprise U2) • Les adjectifs possessifs: Mon,ta,son, Ma,ta,sa Mes,tes,ses
UNITÉ 5 – Dommage!		
• Un baby-boom en 2000 et 2001 • L'amour, toujours	• INTERACTION: exprimer la tristesse, la peur, conseiller,encourager • RÉCEPTION ORALE: Comprendre une émission De radio • RÉCEPTION ÉCRITE: Comprendre un sondage • PRODUCTION ÉCRITE: écrire des blogs	• Est-ce que • Le present des verbes pouvoir,Vouloir • Le conditionnel des Verbs pouvoir, Vouloir • Ne…pas

TEXT BOOK:

1. *Marcella Di Giura Jean-Claude Beacco,* **Alors I.** Goyal Publishers Pvt Ltd 86, University Block Jawahar Nagar (Kamla Nagar) New Delhi – 110007.

15UEG12E	PART- II: ENGLISH-I	SEMESTER- I

Total Credit: 4
Hours per week: 6

OBJECTIVES:

1. To develop the language competence of the students.
2. To be enriched with functional English.

UNIT – I

PROSE

1. My Financial Career – Stephen Leacock
2. At School – Gandhi
3. Ecology – Barry Commoner

UNIT – II

SHORT STORIES

1. The Gateman's Gift – R.K. Narayan
2. The Open Window – H.H. Munro
3. The Face of Judas Iscariot – Bonnie Chamberlain

UNIT – III

ONE ACT PLAY

1. The Discovery – Herman Ould

UNIT – IV

FUNCTIONAL GRAMMAR

1. Vocabulary Exercises
2. Synonyms, Compound Words, etc
3. Communication Skills – Tasks
4. Different types of sentences
5. The Structure of Sentences
6. Transformation of Sentences

UNIT – V

COMPOSITION TASKS

1. Greeting, Introducing, Requesting, Inviting
2. Congratulating, Thanking, Apologising, Advice
3. Suggestions, Opinions, Permissions.
4. Comprehension

TEXT BOOKS:

1. *Seshasayee. N*. 2001. **Honeycomb.** Anu Chitra Publications, Chennai.
2. *Syamala, V*. 2002. **Effective English Communication for You**. Emerald Publisher, Chennai.

REFERENCE BOOKS:

1. *Rajamanickam. A.* 2001**. Everyman's English Grammar.** Macmillan.
2. *Krishna Mohan and Meera Banerji*. 2005. **Developing Communication Skills.** Macmillan, Chennai.
3. *Wren, P.C. and H. Martin***.** 1998**. High School English Grammar and Composition.** Macmillan.

15UPY13A	CORE-- I:MECHANICS, PROPERTIES OF MATTER AND ACOUSTICS	SEMESTER-I

Total Credits: 4

6 Hours/Week

OBJECTIVE:

1. To enable students learn the basic principles, theory and concepts of Mechanics, Matter and Sound.

CONTENTS

UNIT -I

Conservation Law: Impulse – Impact – Direct and oblique impact – Final velocity and loss of kinetic energy –Centripetal Force-Motion of a particle in a vertical circle – Centrifugal Force.

Collisions: Impulse and linear momentum – Collision-one dimensional inelastic collisions – completely inelastic collision, velocity of centre of mass – elastic collisions in one dimension: stationary target, moving target and its special cases.

UNIT- II

Moment of Inertia: Definition-conservation of angular momentum – torque - Parallel and perpendicular axes theorem – M.I. of rectangular Lamina and triangular lamina – M. I of a solid sphere.

Simple harmonic motion: Simple harmonic oscillator – potential energy and kinetic energy and their average values – Simple pendulum – Compound pendulum: graph between time period and distance from centre of gravity-Condition for minimum time period – Torsional pendulum.

UNIT -III

Gravitation: Kepler's Law of Planetary motion – Newton's Law of gravitation – Boy's method for G – Gravitational potential – Gravitational field at a point due to spherical shell – Variation of 'g' with latitude, altitude and depth.

Elasticity: Elastic modules – Poisson's ratio – relation between them – Expression for bending moment – Cantilever-determination of Young's modulus by non-uniform bending- I section girders.

UNIT -IV

Surface Tension: Surface Tension –Surface Energy-Excess of Pressure over a curved surface – Angle of Contact-Variation of surface tension with temperature – Jaeger's Experiment.
Viscosity: Definition –Stoke's law- Poiseuille's formula-Rotation viscometer- Viscosity of gases– Meyer's Modification of Poiseuille's formula-Rankine's method.

UNIT -V

Theory of vibrations: Simple Harmonic vibration – Progressive waves – properties – Composition of two S.H.M. and beats – stationary waves – Properties- Melde's Experiment – Transverse and longitudinal modes

Acoustics: Acoustics of buildings: Requisites of good acoustics – Sabine's reverberation formula. Ultrasonics-Production of ultrasonic waves: Magnetostriction method, Piezo electric method – Properties and application.

TEXT BOOKS:

1. *Robert Resnick, David Halliday and Kenneth S.Krane.* 2001. **Physics.** [5th Edition] Wiley India, New Delhi
2. *Brij Lal and Subrahmanyam N.* 2003. **Properties of Matter**, S.Chand and Co, New Delhi
3. *Brij Lal and Subrahmanyam N.* 2008. **A Text Book of Sound.** [2nd Edition], Vikas Publishing House, New Delhi

REFERENCE BOOKS:

1. *Murugesan R.* 2002. **Mechanics, Properties of matter and Sound.** S.Chand and Co, New Delhi
2. *Sears Semansky and Ground.* 2011. **University Physics.** [13th Edition] Addison-Wesley, Boston
3. *Ghosh M.* 1984. **A Text books of Sound.** Chand and Co, New Delhi
4. *Mathur D.S.* 2008. **Elements of Properties of Matter.** S. Chand and Co, New Delhi
5. *Mathur D.S.* 2006. **Mechanics.** S. Chand and Co, New Delhi

15UMA1AE	ALLIED-I: MATHEMATICS - I	SEMESTER – I

Total Credits: 3
7 Hours / Week

OBJECTIVES:

1. On completion of this course the students should gain knowledge about solving equations, solving first and second order differential equations using Laplace transforms,
2. To know about the concept of Fourier series which will be useful in their field of study.

UNIT- I

THEORY OF EQUATIONS

Polynomials Equations with real coefficients irrational roots, complex roots-symmetric function of roots- Transformation of equations by increasing or decreasing roots by a constant-Reciprocal Equations – Newton's method to find a root approximately.

UNIT- II

MATRICES

Eigen Values and eigen vectors, Cayley-Hamilton theorem (without proof) – Verification and computation of inverse.

UNIT- III

TRIGONOMETRY

Expansion in series-Expansion of $\cos^n\theta$, $\sin^n\theta$, in a series of cosines and sines of multiples of θ-Expansions of cos nθ and sin nθ in powers of sines and cosines – hyperbolic functions and inverse hyperbolic functions.

UNIT -IV

LAPLACE TRANSFORMS

Definition-Laplace Transform of standard functions - linearity property-First shifting theorem-Transform of tf(t),f(t)/t and derivatives-Inverse Laplace transforms of standard functions .

UNIT -V

APPLICATIONS OF LAPLACE TRANSFORMS AND FOURIER SERIES

Application of Laplace transforms of differential equations of first and second order – Fourier series of functions in (0,2π).

TEXT BOOK:

1. *Kandasamy,P. and P.Thilagavathi K*. 2004. **Allied Mathematics**. Volume I and II, S. Chand and Company Ltd., New Delhi.

REFERENCE BOOKS:

1. *Manichavasagam Pillai T.K and Narayanan S. 2002.* **Trigonometry**. Viswanathan Publishers and Printers Pvt.Ltd.
2. *Narayan S and Manicavachagam Pillai T.K. 2002.* **Ancillary Mathematics**. Viswanathan Publishers and Printers Pvt. Ltd.

15UTL21U	பகுதி – 1: தமிழ் தாள் - 2	இரண்டாம் பருவம்

Total Credit: 4

Hours per week: 6

(இரண்டு ஆண்டுகள் தமிழ் பயிலும் மாணவர்களுக்கு உரியது)

சமய இலக்கியங்கள்

அலகு -1 சைவ வைணவ இலக்கியங்கள்

1. திருஞானசம்பந்தர் – தோடுடைய செவியன் (11 பாடல்கள்)
2. குலசேகர ஆழ்வார் – திருவேங்கட மலைத்தொடர்பு வேண்டல்

அலகு -2 கிறித்துவ இசுலாமிய இலக்கியங்கள்

1. கண்ணதாசன் – இயேசு காவியம் – மலைப்பொழிவு
2. உமறுப்புலவர் - சீறாப்புராணம் – மானுக்குப் பிணை நின்ற படலம்

அலகு -3 சமயச் சான்றோர் வரலாறு

1. சைவ சமயச் சான்றோர்

   திருநாவுக்கரசர், மாணிக்கவாசகர்
2. வைணவ சமயச் சான்றோர்

   பெரியாழ்வார் , ஆண்டாள்
3. கிறித்துவ சமயச் சான்றோர்

   கால்டுவெல், ஜி.யூ.போப்
4. இசுலாமிய சமயச் சான்றோர்

   குணங்குடி மஸ்தான் , சவ்வாதுப் புலவர்

அலகு – 4 சமய இலக்கிய வரலாறு

1. சைவம் 2. வைணவம்

அலகு - 5 இலக்கணம்

1. பெயர்ச்சொல்
2. வினைச்சொல்
3. இடைச்சொல்
4. உரிச்சொல் – பொது இலக்கணம்

பார்வை நூல்கள்

1 . தமிழ்த்துறை வெளியீடு

2. தமிழ் இலக்கிய வரலாறு – பேராசிரியர் முனைவர் பாக்யமேரி

15UHL21H	PART – I: HINDI - II	SEMESTER- II

Total Credit: 4
Hours per week: 6

(Modern Poetry, Novel, Translation & Letter Writing)

1. Modern Poetry: Shabari – By Naresh Mehtha

Publishers: Lokbharathi Prakashan I Floor,Duebari Building Mahathma Gandhi Marg, Allahabad -1.

2. Novel: Seva Sadhan – By Prem Chand

3.Translation: Hindi – English Only, anuvadh abyas – iii) lessons.1 – 10 only publisher: dakshin bharath hindi prachar sabha,
Chennai 600 017.

4. Letter Writing: (Leave letter, Job Application, Ordering books, Letter to Publisher, Personal letter).

15UML21M	PART-I: MALAYALAM - II	SEMESTER- II

Total Credit: 4
Hours Per Week: 6

PAPER II PROSE: NON-FICTION

This Paper will have the following five units:

UNIT I & II

Biography

UNIT III, IV & V

Travelogue

TEXT BOOKS:

1. Unit I & II *Changampuzha Krishna Pillai: Nakshatrangalude Snehabhajanam –M.K. Sanu* (D.C. Books, Kottayam).
2. Unit III, IV & V Kappirikalude Nattil – *S.K. Pottakkadu* (D.C. Books, Kottayam)

REFERENCE BOOKS:

1. Jeevacharitrasahithyam –Dr. K.M. George(N.B.S. Kottayam)
2. Jeevacharitrasahithyam malayalathil- Dr. Naduvattom Gopalakrishnan(Kerala Bhasha Institute, Trivandrum)
3. Athmakathasahithyam malayalathil –Dr. Vijayalam Jayakumar(N.B.S. Kottayam)
4. Sancharasahithyam Malayalathil-Prof.Ramesh Chandran. V,(Kerala Bhasha Institute, Trivandrum)

15UFL21F	PART – I: FRENCH - II	SEMESTER- II

Total Credit: 4
Hours Per Week: 6

French Language for Under-graduate Degree Programmes

Compétence Culturelle	Compétence De communication	Compétence grammaticale
UNITÉ 6 – Super!		
• L'égalité homme/femme	• INTERACTION: Exprimer des sentiments, exprimer la joie, le plaisir, le bonheur • RÉCEPTION ORALE: Comprendre un jeu radiophonique • RÉCEPTION ÉCRITE: Comprendre des announces • PRODUCTION ÉCRITE: Écrire des cartes postales	• Les noms de professions masculine/feminine • Le verb finir et less Verbes du groupe en-ir • Le present de l'impératif • Savoir(present) • Le participle passé: Fini, aimé, arrive, dit,écrit • Quel(s), quelle(s)..: Interrogatif et Exclamatif • À + infinitive • Les articles: n,une,des
UNITÉ 7 – Quoi?		
• Le 20 siécle: Petits progrés Grand progrés	• INTERACTION: Decrire quelque chose, une personne • RECEPTION ORALE: Comprendre un message publicitaire • RÉCEPTION ÉCRITE: Comprendre un dépliant touristique • PRODUCTION ÉCRITE: Écrire des petites annonces	• On • Plus, moins • Le verbe aller: • Present, impératif • Aller + infinitife • Le pluriel en –x
UNITÉ 8 – Et aprés		
• Nouvelles du jour	• INTERACTION: Raconteur,situer un récit dans le temps	• L'imparfait:: quel-Ques forms pour introduire le récit:Il

	• RÉCEPTION ORALE: Comprendre une description • RÉCEPTION ÉCRITE: Comprendre un test • PRODUCTION ÉCRITE: écrire des cartes postales	faisait, il y avait, il Était • Un peu, beaucoup, trop,Assez • Trés • Le verbe venir: Présent, impératif • En Suisse, au Maroc, aux Etats-Unis
UNITÉ 9 – Mais oui!		
• La génération des 20-30 ans	• INTERACTION: Donner son opinion, Expliquer pourquoi • RÉCEPTION ORALE: Comprendre des informations à la radio • RÉCEPTION ÉCRITE: Comprendre un texte informatif • PRODUCTION ÉCRITE: éncrire un mél de protestation	• Répondre, prendre: Présent, impératif, part Passé • Parce que pourquoi • Tout/tous, toute/s Tous/toutes les… (répétition action)
UNITÉ 10 – Mais non!		
• De la ville à la campagne	• INTERACTION: Débat:: exprimer l'accord, exprimer le Désaccord • RECEPTION ORALE: Comprendre un message sur un répondeur téléphonique • RÉCEPTION ÉCRITE: Comprendre un témoignage • PRODUCTION ECRITE: Rediger des petites Announces immobilieres	• Le verbe devoir: Present et participe passé • Le verbe vivre, present • Aller + infinitive • Venir+ infinitive • Etre pour/contre

TEXT BOOK:

1. *Marcella Di Giura Jean-Claude Beacco,* **Alors I.** Goyal Publishers Pvt Ltd 86, University Block Jawahar Nagar (Kamla Nagar) New Delhi – 110007.

15UEG22E	PART – II: ENGLISH-II	SEMESTER II

Total Credit: 4
Hours Per Week: 6

OBJECTIVES:

1. To develop the language competence of the students.
2. To be enriched with functional English.

UNIT - I

PROSE

1. Words of Wisdom – Chetan Bhagat
2. Forgetting – Robert Lynd
3. My Early Days – Dr. Abdul Kalam

UNIT - II

SHORT STORIES

1. Am I Blue? – Alice Walker
2. Last Leaf – O Henry
3. Selfish Giant – Oscar Wilde

UNIT - III

ONE ACT PLAY

1. Soul Gone Home - Langston Hughes

UNIT - IV

FUNCTIONAL GRAMMAR

1. Lexical Skills and Question Forms
2. Idioms and Phrases – Subject-Verb Agreement
3. Spelling, Antonyms and Synonyms, Infinitives
4. Vocabulary, Report Writing
5. Plurals, Particles in Adjectives
6. Apostrophe, Archaic Words, Art of Persuasion
7. Syllables, Changing Adjectives to Nouns
8. Homonyms, Prepositions
9. Compound Words, Acronyms, Collective Nouns, Degrees of Comparison.

UNIT - V

COMPOSITION TASKS

1. Letter Writing - Structure
2. Business Correspondence – Memos, reports, proposals
3. Resume & C.V.
4. Advertisements
5. Notices, Agenda, Minutes
6. Circulars
7. Essay Writing
8. Précis Writing
9. Dialogue Writing
10. Soft Skills, Business English

TEXT BOOKS:

1. *Board of Editors.* 2012. **Radiance – English for Communication**, Emerald Publishers.
2. *Syamala, V*. 2002. **Effective English Communication for You**. Emerald Publisher, Chennai.

REFERENCE BOOKS:

1. *Rajamanickam. A.* 2001**. Everyman's English Grammar.** Macmillan.
2. *Krishna Mohan and Meera Banerji*. 2005. **Developing Communication Skills.** Macmillan, New Delhi.
3. *Wren, P.C. and H. Martin***.** 1998**. High School English Grammar and Composition.** Macmillan

15UPY23A	CORE- II: HEAT AND THERMODYNAMICS	SEMESTER-II

Total Credits:4
6Hours/Week

OBJECTIVE:

1. To enable students learn the basic principles and concepts of Heat and Thermodynamics

CONTENTS

UNIT- I

Thermometry: Temperature Coefficient of Resistance -- Platinum Resistance Thermometer – Thermocouple – Thomson Effect – Thomson Coefficient – Thermo Electric Thermometer – Helium Vapour Pressure Thermometer.

Calorimetry: Definitions – Newton's law of cooling – specific heat of a liquid-Joule's Electrical method- Calendar and Barne's continuous flow method – two specific heats of a gas – specific heat of a gas by Joly's differential steam calorimeter – Regnault's method – Dulong and Petit's law – variation of specific heat ad atomic heat with temperature.

UNIT- II

Kinetic theory of gases: Postulates **--** Mean free path – Degrees of freedom – Maxwell's Law of Equipartition of energy – Distribution of Velocity -- Transport phenomena – Viscosity and thermal conduction of gases – Vander walls equation – relation between Vander Wall's constant and critical constants-Temperature of Inversion – Liquefaction of Gases – Liquefaction of air, Oxygen, Hydrogen and Helium.

UNIT -III

Transmission of heat: Conduction, Convection and Radiation**--** Conduction – Co-efficient of the thermal conductivity – Cylindrical flow of heat – determination of thermal conductivity of rubber and glass – Lee's disc method. Radiation – Black body radiation – Wein's Law - Raleigh – Jean's Law – Stefan's law – Experimental Determination of Stefan's constant – Mathematical derivation of Stefan's law

UNIT- IV

Thermodynamics: First law of Thermodynamics – Isothermal and Adiabatic process –Determination of γ by Clement and Desorme's method – Second law of thermodynamics – Carnot's engine- Working efficiency – Carnot's refrigerator – Carnot's Theorem – Otto Cycle –Petrol and Diesel engines – Clapeyron Latent Heat Equation.

Statistical Thermodynamics: Ensembles – Types – Microcanonical Ensemble – Canonical Ensemble – Grand Canonical Ensemble – Comparison of Ensembles.

UNIT- V

Entropy: Entropy Change Reversible and Irreversible process – Third law of Thermodynamics --Temperature -Entropy diagram – Entropy of a perfect gas – Increase of entropy in any irreversible process – Thermo dynamics functions – Maxwell's thermodynamics relations and applications – Helmholtz and Gibb's Functions --Joule – Kelvin effect (theory)- Claussius and Clapeyron equation.

TEXT BOOKS:

1. *Brij Lal and Subrahmanyam N.* 2010. **Heat and Thermodynamics**. S Chand and Co, New Delhi
2. *Murugesan R. and Kiruthiga Sivaprasath*. 2002. **Thermal Physics**. [1st Edition] S Chand and Co, New Delhi
3. *Brij Lal, Subrahmanyam N. and Hemne P.S.* 2014. **Heat Thermodynamics and Statiatical Physics.** S Chand and Co, New Delhi

REFERENCE BOOKS:

1. *Zemansky and Dcltanann R.H.* 2012. **Heat and Thermodynamics.** [8th Edition] McGraw-Hill, New York
2. *Mathur D.S.* 2002. **Heat and Thermodynamics.** S Chand and Co, New Delhi
3. *Agarwal Singhal and Sathyaprakash*. 2009. **Heat and Thermodynamics.** Pragati Prakashan, Meerut

15UPY23P	CORE LAB – I: GENERAL EXPERIMENTS	SEMESTER-II

Total Credits:4
3Hours/Week

LIST OF EXPERIMENTS:

Any 12 Experiments

1. Young's Modulus-Uniform Bending (Microscopic Method)
2. Young's Modulus-Non-uniform Bending (Microscopic Method)
3. Compound Pendulum – determination of 'g' and 'K'
4. Torsional Pendulum – Rigidity Modulus
5. Rigidity Modulus – Static Torsion
6. Spectrometer – Refractive Index of a glass Prism
7. Spectrometer – Grating- Minimum deviation & Normal Incidence
8. Moment of a Magnet – Tan C position
9. Viscosity – Poiseuille's Method
10. Meter Bridge- Temperature Coefficient of resistance
11. Meter Bridge- Specific Resistance of a material
12. Specific Heat capacity of a Liquid – Newton's method of cooling
13. Sonometer – Frequency of a tuning fork
14. Post office box- Determination of Temperature Coefficient of Resistance
15. Post office box- Determination of Specific Resistance

15UMA2AE	ALLIED-I: MATHEMATICS - II	SEMESTER – II

Total Credits: 3
7 Hours / Week

OBJECTIVES:

1. On successful completion of course the students should have series of knowledge about the curvature, Beta, Gamma functions and its application.
2. To Learn the partial differential equation types and integration of vectors

CONTENTS

UNIT- I

Curvature – Radius of curvature – center of curvature – circle of curvature – Evaluation of double integrals - change of order of integration in double integrals- Application of double integral to find the area between curves.

UNIT- II

Evaluation of triple integrals – Beta and Gamma functions – relations between them – Evaluation of multiple integrals using Beta and Gamma functions.

UNIT- III

Solving second order linear differential equations with constant coefficients whose R.H.S is of the form ve^{mx}, where v is any function of x - Linear equations with variable coefficients.

UNIT- IV

Formation of partial differential equations by elimination of arbitrary constants and functions -Definitions of general, particular and complete solutions - solving standard forms f(p, q) = 0, f(x,p,q) = 0, f(y,p,q) = 0, f(z, p, q) = 0, f(x,p) = f(y,q), z = px +qy + f(p,q) - Lagrange's Differential equations Pp+Qq = R.

UNIT- V

Scalar and vector fields –Differentiation of vectors – Gradient, Divergence and Curl –Integration of vectors – line integral – surface integral – Green's theorem in the plane – Gauss divergence theorem – Strokes theorem – (Statements only).

TEXT BOOK:

1. *Kandasamy P. and Thilagavathi. K* ,2004, **Mathematics for B.Sc. Branch I.** Volume II, III and IV. S Chand and Company Ltd, New Delhi.

REFERENCE BOOK:

1. *Narayan S. and Manicavachagam Pillay T.K.* **Ancillary Mathematics.** Viswanathan Publishers and Printers Pvt. Ltd.

15UTL31U	பகுதி -1 : தமிழ் தாள் -3	மூன்றாம் பருவம்

Total Credits: 4
Hours / Week: 5

காப்பியம் – சிற்றிலக்கியம் – நாடகத்தமிழ்

அலகு -1 காப்பியங்கள்

1. சிலப்பதிகாரம் – மங்கல வாழ்த்துப் பாடல்
2. மணிமேகலை – மலர்வனம் புக்க காதை
3. சீவக சிந்தாமணி – பதுமையார் இலம்பகம் (முதல் 20 பாடல்கள்)

அலகு – 2 சிற்றிலக்கியங்கள்

1. கலிங்கத்துப்பரணி – களம் பாடியது
2. மீனாட்சியம்மை பிள்ளைத்தமிழ் – வருகைப் பருவம்

அலகு – 3 நாடகத்தமிழ்

1. சேர தாண்டவம் – பாரதிதாசன்

அலகு - 4 காப்பியம், சிற்றிலக்கியம் – வரலாறு

1. காப்பியங்களின் தோற்றமும் வளர்ச்சியும்
2. சிற்றிலக்கியத்தின் தோற்றமும் வளர்ச்சியும்
3. நாடகத்தின் தோற்றமும் வளர்ச்சியும்

அலகு- 5 இலக்கணம்

1. எழுத்து ,அசை, சீர், தளை, அடி, தொடை – விளக்கம்
2. அணி – உவமையணி, தற்குறிப்பேற்றஅணி
3. அலுவலகம் சார்ந்த கடிதம்–விண்ணப்பங்கள், வேண்டுகோள், முறையீடு

பார்வை நூல்கள்

1 . தமிழ்த்துறை வெளியீடு
2. இலக்கிய வரலாறு – பேராசிரியர் முனைவர் பாக்யமேரி
3. இதழியல் கலை - மா.பா.குருசாமி

15UHL31H	PART – I: HINDI -III	SEMESTER -III

Total Credits: 4
Hours/week: 5

(Poetry, History of Hindi Literature, Alankar)

1. **Poetry**: Kavya Prasar – By Dr.Balanath Puplisher: Jawahar Pusthakalay Sadar Bazaar, Mathura – U.P. 281 001. (Pracheen – Kabir, Tulsi, Sur & Meera, Aadhunic – Gupt, Prasad, Panth, Nirala, Dinakar, Agneya

Short Notes On Poets -Only the above mentioned.

2. History of Hindi Literature:

(Only Aadi Kaal and Bhakthi Kaal. Only a general knowledge.) ALANKAR: Anupras, Yamak, Slesh, Vakrokthi, Upama, Rupak,

REFERENCE BOOKS:

1. Hindi Sahithya Ka Saral Ithihass By Rajnath Sharma, Vinod Pustak Mandir, Agra – 282 002. Kavya Pradeep Rambadri Shukla, Hindi Bhavan, 36, Tagore Town, Allahabad – 211 002.
2. **Alankar:** Anupras, Yamak, Slesh, Vakrokthi, Upama, Rupak,

15UML31M	PART - I : MALAYALAM -III	SEMESTER III

Total Credits: 4
Hours / Week: 5

PAPER III- POETRY

This Paper will have the following five units:

Unit I, II & III
A part of Ezuthachan's Work

Unit IV & V
A Khandakavya of Vallathol

TEXT BOOKS:

Unit I, II & III
Karnnaparvam – Ezuthachan

(Poorna Publications, Calicut)

Unit IV & V

Achanum Makalum – Vallathol (D.C. Books, Kottayam)

15UFL31F	PART - I : FRENCH -III	SEMESTER -III

Total Credits: 4
Hours/week: 5

French Language for Under-graduate Degree Programmes

Compétence Culturelle	Compétence de Communication	Compétence Grammatical
UNITÉ 1- Excuses et vœux		
• Convivialité (lieux et société, l'apéritif)	• INTERACTION ORALE: Accueillir quelqu'un, s'excuser,remercier • RÉCEPTION ORALE: Comprendre des announces enregistrées • RÉCEPTION ÉCRITE: Compremdre une affiche • PRODUCTION ÉCRITE:Écrire des cartes de vœux	• Pronoms personnels toniques *moi,je…;toi…tu* • Pronoms personnels objets *Me,te,le…* • Lesverbsen-ercomme appeler,acheter • Lesadjectives possessives *nos,vos,leurs*
UNITÉ 2 – Bravo et merci		
• Communication et technologies (leportable, internet)	• INTERACTION ORALE: Interagir au téléphone , féliciter • RÉCEPTION ORALE: Comperendre une emission à la radio • RÉCEPTION ORALE: Comprendre une définition • PRODUCTION ECRITE: Écrire des plaques commemoratives	• Oui,que • Le passé composé • Le participe passé *J'ai eu,ella a été* • Longtemps,pendant …, de… à
UNITÉ 3 – Faire et dire		
• Jeunes : enquête	• INTERACTION ORACE: Demander de l'aide, donner des instructions • RÉCEPTION ORALE: Comprendre un message enregistré • RÉCEPTION ÉCRITE : Comprendre un article d'un magazine de consommateurs • PRODUCTION ÉCRITE :	• Ce/*cet,cette,ces* • Le verbe voir • Envoyer,appuyer • Les articles partitifs *du,de la (de l)',des,de*

	Écrire un règlement	
UNITÉ 4 – Faire ci ou faire ça		
• Les vacances des Français	• INTERACTION ORALE : Proposer quelque chose,accepter,refuser • RÉCEPTION ORALE : Comprendre une émission de cuisine • RECEPTION ÉCRITE : Comprendre une brochure d'informations • PRODUCTION ÉCRITE : Ecrire un'texte de promotion touristique	• *S'il y a du soleil* : L'hypothèse (supposition, Condition) la préposition *S i + indicatif* • *Sinon… ou + indicatif* • *Sortir,partir* • *Quelques, plusieurs* • *Le long de* • *Au milieu de…* • *Au sommet de…*
UNITÉ 5 – Cœur et santé		
• Author du Couple	• INTERACTION ORALE: Exprimer son intérêt pour quelqu'un, exprimer l'affection • RECEPTION ORALE: Comprendre une chanson • RECEPTION ÉCRITE: Lire un horoscope • PRODUCTION ÉCRITE: Écrire une letter au courrier du cœur	• J'étais…L'imparfait(1) • Aussi brilliant que… • Le plus beau, le moins cher • Le verbe connaître

TEXT BOOK:

1. *Marcella Di Giura Jean-Claude Beacco,* **Alors II .** Goyal Publishers Pvt Ltd 86, University Block ,Jawahar Nagar (Kamla Nagar), New Delhi – 110007.

15UEG32E	PART- II : ENGLISH -III	SEMESTER III

Total Credits: 4
Hours per week: 5

OBJECTIVES:

1. To develop the language competence of the students.
2. To be enriched with functional English.

UNIT –I

PROSE

1. On Habits – A. G. Gardiner
2. Men and Women – Virginia Woolf
3. Sweets for Angels – R. K. Narayan

UNIT –II

SHORT STORIES

1. The Ant and the Grasshopper – Somerset Maugham
2. A Day's Wait – Ernest Hemingway
3. The Doll's House – Catherine Mansfield

UNIT III

ONE ACT PLAY

1. The Bishop's Candlesticks- Norman McKinnel
2. A Kind of Justice- Margaret Wood

UNIT -IV

FUNCTIONAL GRAMMAR

1. The Noun
2. The Adjective
3. The Adverb
4. Sentence Structure
5. Sentence Pattern

UNIT -V

COMPOSITION TASKS

1. Human relationships in academic and professional life
2. Deciding on a career
3. Finding a Job
4. Going for an Interview
5. Writing Projects
6. Account of a task completed
7. Recommendation for promotion
8. Writing recording of achievement
10. Story Writing

TEXT BOOKS

1. *Daniel, James. P.C.* 2013. **Focus: A Course in Language and Communication Skills**, Harrows Publications, Bangalore, 560068.
2. *Daniel, James.P.C.* 1989. **English for Career Development, a Course in Functional** English, Orient Longman Private Limited Publications, Bangalore.

REFERENCE BOOKS:

1. *Rajamanickam. A.* 2001**. Everyman's English Grammar.** Macmillan,
   Chennai.
2. *Krishna Mohan and Meera Banerji*. 2005. **Developing Communication Skills.** Macmillan, New Delhi.
3. *Wren, P.C. and H. Martin***.** 1998**. High School English Grammar and Composition.** Macmillan, Chennai.

15UPY33A	CORE- III: OPTICS	SEMESTER-III

Total credits:4

4Hours/Week

OBJECTIVE:

1. To enable students understand the behavior of light, concepts in physical and geometrical optics and their applications.

CONTENTS

UNIT- I

Geometrical Optics: Aberrations - Spherical aberrations in lens - Coma - Astigmatism - Chromatic aberration - dispersion by a prism - Cauchy's dispersion formula - dispersive power --Achromatism in prism - dispersion without deviation - chromatic aberrations in a lens - circle of least confusion - achromatic lens - condition for achromatism of two thin lenses separated by a finite distances. Eye pieces – Huygens and Ramsden eyepieces – Cardinal Points –Comparison

UNIT- II

Interference: Fresnel's Biprism – Interference in thin films due to reflected light – Fringes produced by a wedge shaped thin film – Newton's rings – Refractive index of the Liquid – Michelson interferometer – Determination of a wavelength of monochromatic light – Difference -- Wavelength between two neighbouring spectral lines – Jamin's Refractometer – Rayleigh's Refractometer -- Fabry Perot Interferometer.

UNIT- III

Diffraction: Fresnel's assumptions – rectilinear propagation of light – half period zone – Zone Plates – Zone Plate and Convex lens – Fresnel and Fraunhofer diffraction – Fraunhofer diffraction at a Single slit – Diffraction grating – Determination of Wavelength -- Resolving power and Dispersive power of Grating.

UNIT -IV

Polarization: Brewster's law --Double Refraction – Huygen's explanation --Optic axis in the plane of incidence, inclined and perpendicular to the crystal surface – Production and Detection of Plane, Circularly and Elliptically Polarized light – Optical Activity – Fresnel's explanation – Specific rotation – Laurent's Half Shade Polarimeter. Microscopes - Electron Microscope, SEM, TEM, STEM.

UNIT- V

Laser and Fibre Optics: Spontaneous and Stimulated emission – Einstein's coefficient – Optical Pumping and Population Inversion – Lasing action -- He-Ne, CO_2 laser.

Optical fibres –Critical Angle – Modes of Propagation –Numerical Aperture and Acceptance Angle (Expression) – Types of Optical fibres – Fibre optic communication system – Fibre optic sensors.

TEXT BOOKS:

1. *Brij Lal and Subrahmanyam N.* 2006. **A Text book of Optics.** S Chand and Co, New Delhi
2. *Murugeshan R. and Kiruthiga Sivaprasath Er.* 2008 **Modern Physics.** S Chand and Co, New Delhi

REFERENCE BOOKS:

1. *Ajoy Ghatak*. 2006. **Optics.** [3rd Edition] Tata McGraw Hill Publishing Company Ltd, New York
2. *Murugesan R.* 2010. **Optics and Spectroscopy.** S Chand and Co, New Delhi

15UCY3AA	ALLIED –II: CHEMISTRY I	SEMESTER III

Total Credits: 3
Hours / Week: 4

OBJECTIVES:

1. The students shall gain knowledge in the basics of chemistry.
2. To understand chemical bonding in biomolecules and the techniques involved in the bioscience.

UNIT – I

Chemical bonding:

1. Octect rule – types of bond – Covalent – electrovalent. Molecular Orbital theory, bonding, antibonding, and nonbonding orbitals. MO configuration of H_2, N_2, O_2, F_2- bond order – diamagnetism and paramagnetism.

2. Ionic Bond: Nature of ionic bond, structure of NaCl, KCl and CsCl, factors influencing the formation of ionic bond.

3. Covalent bond : Nature of covalent bond, structure of CH_4, NH_3, H_2O, shapes of $BeCl_2$, BF_3, based on VSEPR theory and hybridization.

UNIT – II

Solutions:

1. Normality, molarity, molality, molefraction, formality, moleconcept.
2. Primary and secondary standards – preparation of standard solutions.
3. Principle of Volumetric analysis (with simple problems).
4. Acid & Bases - Introduction - Definition based on Arrhenius concept and Lewis concept. Ionic product of water- pH, pKa, pKb - Buffer – definition - Buffer solution. Simple calculations based on pH and pOH.

UNIT–III

Basic Organic Chemistry:

1. Electron displacement effect in organic compounds - Inductive effect – Electromeric effect - Resonance effect, Hyperconjugation, Steric effect, acidity of organic acids and bases.

2. Isomerism, Symmetry of elements (Plane, Centre and Axis of symmetry), Molecules with one chiral carbon and two adjacent chiral carbons – Optical isomerism of tartaric acid, Enantiomers – Diastereomers – Separation of racemic mixture - Geometrical isomerism (maleic & fumaric acid).

UNIT – IV

1. **Surface Chemistry:**
   Adsorption – Chemisorption - Physisorption. Difference between chemisorption and physisorption - Applications of adsorption - Factors influencing adsorption. Isobar, Isostere.

2. Chromatography - Principle & applications of Column, Paper and Thin Layer Chromatography.

UNIT – V

Dyes

1. Terms used – Chromophore, Auxochrome, Bathochromic shift, Hypsochromic shift, Hyperchromic shift, Hypochromic shift. Classification of dyes based on chemical structure & application- Preparation of azo (Methyl orange) and triphenyl methane (Malacite green) dyes.

TEXT BOOKS:

1. *Madan R. D*, 2001. **Modern Inorganic Chemistry.** Second Edition, S. Chand & Company, New Delhi.
2. *Puri , Sharma, Pathania,* 2004. **Principles of Physical Chemistry**. Vishal Publishing Company, Jalandhar.
3. *Jain M. K. S, Sharma.C*, **Organic Chemistry**, First Edition, 2001. Shoban Lal Nayin Chand, Jalandhar.
4. *Gopalan R,* **Elements of Analytical Chemistry**, 1991. Sultan Chand & Sons, New Delhi.

5. *Lee J. D.* **Concise Inorganic Chemistry**, 1996. Fifth Edition, Black Well science, New Delhi.
6. *Peter Atkins*, **The Elements of Physical Chemistry**, 2001. Third Edition, Oxford & IBH Pvt Ltd, New Delhi.
7. *Arun Bahl,* **Advanced Organic Chemistry**, 1997. First Edition, S. Chand & Co Ltd, New Delhi.

15UPY3SA	SKILL BASED SUBJECT-I : PRINCIPLES OF PROGRAMMING CONCEPTS AND C PROGRAMMING	SEMESTER-III

Total credits:3

3Hours/Week

OBJECTIVES:

1. To enable students learn the basic principles and concepts of C Programming language

CONTENTS

UNIT- I

Introduction – character sets – constants – keywords – and identifiers – variables – variables – data types – declaration of variables – assigning values to variables – defining symbolic constants.

UNIT- II

Arithmetic operators – relational operators – logical operators – assignment operators – increment and decrement operators – conditional operators – special operators – arithmetic expression – evaluation of expression. – precedence of arithmetic operators – some computer problems – type conversion in expression – operator precedence and associativity – mathematical functions.

UNIT- III

Reading and writing character – formatted input and output – decision making : IF statement : Simple IF – IF ELSE – Nesting of IF.. ELSE – ELSE. IF Ladder – Switch Statement – operator – go to statement – while .. do while – For loop – Jumps in loops – simple programs.

UNIT- IV

Arrays : Introduction – One dimensional array – declaration of array – Initiating on two and multidimensional arrays – declaring and initializing string variables – reading strings from terminal – writing strings on the screen – Arithmetic operations on characters – simple programs.

Need for user defined functions – A multifunction program – RETURN values and their types – functions calls – category of functions – no arguments and no return values – simple programs.

UNIT- V

Conversion of Temperature from C to F and F to C – Determination of Velocity of Light – Foucalt's Rotating Mirror method – Determination of G by Boy's Method – Young's Modulus – Uniform and Non Uniform method – Determination of Frequency: Sonometer – Spectrometer: Refractive index and Dispersive power of Prism – Newton's rings: Radius of Curv

TEXT BOOKS:

1. *Balagurusamy E.* 2012. **Programming in ANSI C.** [6th Edition], Tata McGraw Hill Publishing Company Ltd, New York
2. *Karthikeyan E.* 2008. **A Textbook on C.** Prentice Hall India, New Delhi
3. *Palaniswamy S.* 2004. **Physics Through C Programming.** Pragati Publication

REFERENCE BOOKS:

1. *Ashok N. Kamthane*. 2011. **Programming in C. [**2nd Edition], Pearson Education, Chennai
2. *Yaswanth, Kanitkar*. 2012. **Let Us C.** [13th Edition], BPB Publication, New Delhi
3. *Gotfried B.* 2010. **Programming with C.** [3rd Edition], Tata McGraw Hill Publishing Company Ltd, New York

15UTL41U	பகுதி – 1 தமிழ் தாள் – 4	நான்காம் பருவம்

Total Credits:4
Hours / Week: 5

(இரண்டு ஆண்டுகள் தமிழ் பயிலும் மாணவர்களுக்கு உரியது)

சங்க இலக்கியமும் நாட்டுப்புற இலக்கியமும்

அலகு – 1 எட்டுத்தொகை

1. குறுந்தொகை – (நெய்தல், பாடல் எண் : 57 – சிறைக்குடி ஆந்தையார்)
(மருதம், பாடல் எண்: 61 – தும்பிசேர்கீரன்)
(முல்லை, பாடல் எண்: 167 - கூடலூர்கிழார்)
2. கலித்தொகை – (குறிஞ்சிக்கலி, பாடல் எண் :16 – கபிலர்)
3. அகநானூறு – (பாலை, பாடல் எண் : 43 - நல்லந்துவனார்)
4. புறநானூறு – (பா.எண் : 279 – ஒக்கூர் மாசாத்தியார், பா.எண்: 312 - பொன்முடியார்)

அலகு - 2 பத்துப்பாட்டு

1. முல்லைப்பாட்டு – நப்பூதனார்

அலகு - 3 நாட்டுப்புறவியல்

1. நாட்டுப்புறப்பாடல்கள் – அறிமுகம்
2. தாலாட்டுப் பாடல்கள்
3. தொழிற்களப் பாடல்கள்

அலகு - 4 இலக்கிய வரலாறு

1. பத்துப்பாட்டு
2. எட்டுத்தொகை

அலகு - 5 இலக்கணம்

1. அகத்திணை – விளக்கம்
2. புறத்திணை – விளக்கம்

பார்வை நூல்கள்

1 . தமிழ்த்துறை வெளியீடு
2. இலக்கிய வரலாறு – பேராசிரியர் முனைவர் பாக்யமேரி
3. நாட்டுப்புற இயல் ஆய்வு – சு. சக்திவேல்

15UHL41H	PART-I :HINDI-IV	SEMESTER-IV

Total Credits: 4
Hours/week: 5

(**Drama, One Act Play, General Essay**)

1. **Ladai** Sarveshwar Dayal Saksena Publisher : Vani Prakashan New Delhi – 110 002.

2. **One act play :** Ekanki Panchamruth (Excluding Bohr Ka Thara)
Publisher: Govind Prakashan Mathura

3. **General essay**

Book for reference : Aadarsh Nibandh Vinodh Pustak Mandir Hospital Road, Agra – 28

15UML41M	PART-I: MALAYALAM-IV	SEMESTER -IV

Total Credits: 4
Hours / Week: 5

Drama & Folklore Paper IV. Drama & Folklore

Unit I, II & III A Drama

Unit IV & V Folklore

TEXT BOOKS:

1. Unit I, II & III **Lankalakshm**i – *C. N. Sreekantan Nair* (D.C. Books, Kottayam).
2. Unit IV & V **Oru Vadakkanveeragatha –** *M.T. Vasudevan Nair* (Puthariyamkam, Sahithya Kairali Publications, Bhagavathinada P.O.

REFERENCE BOOKS:

1. **Natyasasthram,** *K.P. Narayana Pisharodi*, Trans. (Kerala Sahithya Akademi, Thrissur).
2. **Malayala Nataka Sahithya Charithram**, *G. Sankara Pillai* (Kerala Sahithya Akademi, Thrissur).
3. **Malayala Nataka Sahithya Charithram**, *Vayala Vasudevan Pillai* (Kerala Sahithya Akademi Thrissur).
4. **Natakam – Oru Patanam** (*C. J. Smaraka Prasanga Samithi*, Koothattukulam).
5. **Natakaroopacharcha**, *Kattumadam Narayanan* (NBS, Kottayam)
6. **Folklore –** *Raghavan Payyanadu* (Kerala Bhasha Institute, Trivandrum)

15UFL41F	PART-I: FRENCH-IV	SEMESTER-IV

Total Credits: 4
Hours/week: 5

French Language for Under-graduate Degree Programmes

Compétence Culturelle	Compétence de Communication	Compétence Grammatical
UNITÉ 6 – Problémes problems		
• Le bénvolat	• INTERACTION ORALE: Interroger sur la tristesse, l'abattement, exprimer sa sympathie, rassurer • RÉCEPTION ORALE: Comprendre une interview à la radio • RECEPTION ÉCRITE: Comprendre un test de magazine • PRODUCTION ÉCRITE: Écrire une letter a un(e) amie	• Les pronoms indfinis rien, quelque chose • Le verbe crier • Du pluriel: eau, eu, al • Se soigner, s'excuser, se renseigner, s'appeler • La phrase ngative: ne… plus, ne… jamais, ne… rien, ne… personne
UNITÉ 7 – C'est qui? C'est comment?		
• Les classes socials	INTERACTION ORALE: Décrire quelqu'un RECEPTION ORALE: Comprendre un bulletin météo RECEPTION ÉCRITE: Comprendre une courte interview PRODUCTION ÉCRITE: Écrire des notices biographiques	• Les adjectifs qualificatifs: Formes au masculin et au féminin • ll fait beau, il neige, il pleut… • Le verbe décrier • Les verbs en –indre • Les adjectifs possessifs féminins mon, ton, son devant voyelle ou h
UNITÉ 8 – Et après? Et après		
• La mémoire et l'histoire	• INTERACTION ORALE: Raconter une anecdote, une histoire, attire l'attention • RÉCEPTION ORALE: Comprendre une interview à la radio	• L'imparfait(2) • Les verbs en – oir • Les pronoms démonstratifs ça et cela • Prés de… Loin de…

	• RÉCEPTION ÉCRITE: Comprendre des faits divers • PRODUCTION ÉCRITE: Écrire une bréve	• La forme passive
UNITÉ 9 – Sûr et certain		
• L'université en France	• INTERACTION ORALE : Expreimer un point de vue, exprimer une certitude • RÉCEPTION ORALE : Comprendre et apprecier un poème • RÉCEPTION ÉCRITE : Comprendre un appel à participer à la vie collective • PRODUCTION ÉCRITE : • Ecrire une letter de motivation	• Le futur des verbes *parler, Avoir,être,voir* • Le verbe *valoir* • Par • Les pronoms démonstratifs *celui-ci, cella –là*
UNITÉ 10 – Peut –être…peut-être		
• Le système de santé en France	• INTERACTION ORALE : Exprimer une incertitude, exprimer l'évidence • RÉCEPTION ORALE : Comprendre et apprecier une chanson • RECEPTION ÉCRITE : Comprendre un débat d'idées • PRODUCTION ÉCRITE : Écrire au courier des lecteurs	• Les pronoms personnels objets,indirect *lui, leur* • L'impératif affirmative + COD et COL • Les verbes *en – ayer* • Linterrogation à inversion

TEXT BOOK:

1. *Marcella Di Giura Jean-Claude Beacco,* **Alors II .** Goyal Publishers Pvt Ltd 86, University Block ,Jawahar Nagar (Kamla Nagar), New Delhi – 110007.

15UEG42E	PART – II ENGLISH - IV	SEMESTER IV

Total Credits: 4
Hours per Week: 5

OBJECTIVES:

1. To develop the language competence of the students.
2. To be enriched with functional English.

UNIT -I

1. Mobile and Mixed-up – Anil Darker
2. My Vision for India – Dr. Abdul Kalam
3. Common Sense – Sedgwick, Woodworth

UNIT -II

SHORT STORIES

1. A Room 10 x 8 –K.S. Duggal
2. A Face on the Wall – E.V. Lucas

UNIT -III

SHORT PLAY

1. The Death Trap – H. H. Munro
2. The Never Never Nest – Cedric Mount

UNIT- IV

FUNCTIONAL ENGLISH

1. Communication Skills – Listening, Telephone, Resume & E-Mail
2. Interview & Group Discussion, Parts of the Exercises in each chapter.

UNIT -V

COMPOSITION TASKS

1. Public Speaking – speaking on an official occasion
2. Participating in a meeting
3. Airing grievances
4. Interview Skills
5. Conducting an Interview
6. Interviewing the expert
7. Netiquette
8. Negotiation Skills

TEXT BOOKS:

1. *Nayar, Nandini.2014.* **Treasure Hunt.** Board of Editors, Foundation Books, Chennai.
2. *Daniel, James .P.C*. **1989. English for Career Development, a Course in Functional English**, Orient Longman Private Limited Publications, Bangalore.

REFERENCE BOOKS:

1. *Rajamanickam. A.* 2001**. Everyman's English Grammar.** Macmillan, *Chennai.*
2. *Krishna Mohan and Meera Banerji*. 2005. **Developing Communication Skills.** Macmillan, New Delhi.
3. *Wren, P.C. and H. Martin***.** 1998**. High School English Grammar and Composition.** Macmillan, Chennai.

15UPY43A	CORE- IV:ATOMIC PHYSICS AND SPECTROSCOPY	SEMESER-IV

Total credits:4

4Hours/Week

OBJECTIVE:

1. To acquaint students with detailed study of an atom, its various states and the application of observed theories.

CONTENTS

UNIT - I

Positive Rays: Positive rays – Discovery – Properties – Positive ray analysis – Thomson's Parabola method – action of Electric and Magnetic fields – Determination of e/m – determination of mass – discovery of stable isotopes– Limitations – Dempster's mass spectrograph –Aston's mass spectrograph- mass defect and packing fraction – polarization of X-rays – scattering of X-rays (Thomson's formula)

UNIT - II

Structure of the Atom: The Bohr atom model – Critical Potentials – Method of excitation of atoms – Experimental determination of critical potentials by Davis and Goucher's method.

Sommerfield's relativistic model– Vector atom model – Quantum numbers associated with Vector atom model – coupling schemes (LS, JJ coupling) – Pauli's exclusion principle – Periodic classification of elements.

UNIT - III

Magneto Optical Properties of Spectrum: Magnetic dipole moment due to orbital motion of the electron – Magnetic dipole moment due to spin – The Stern and Gerlach experiment –Spin-Orbit Coupling.

Optical spectra – Fine Structure of the sodium D line – Zeeman effect – Experiments – Lorentz classical theory – Expression for the Zeeman shift – Larmor's theorem – Quantum mechanical explanation of the normal

Zeeman effect – Anomalous Zeeman effect – Paschen – Back effect – Stark effect

UNIT - IV

X-ray Spectra: X-ray – Coolidge tube – Properties -- X-ray diffraction- Bragg's law- Bragg's spectrometer -- Powder crystal method – X-ray Spectra – Characteristics and Continuous X-ray spectrum – Moseley's law (Statement, Explanation and Importance) – Compton effect – Expression for change of wave length

UNIT - V

Molecular Spectra: Theory of the origin of pure rotational spectra of a molecule -- Theory of the origin of vibration-rotation – Rayleigh's scattering -- Infrared Spectrometer – Raman Effect – Instrumentation – Quantum Theory of Raman Effect – Applications – Ultraviolet Spectroscopy – Infrared Spectroscopy – Raman Spectroscopy

TEXT BOOKS:

1. *Murugeshan R and Kiruthiga Sivaprasath Er.* 2008. **Modern Physics**. S Chand and Co, New Delhi
2. *Arthur Beiser*. 2008. **Concepts of Modern Physics.** [6th Edition] Tata McGraw Hill Publishing Company Ltd, New York

REFERENCE BOOKS:

1. *Sehgal D.L, Chopra K.L and Sehgal N.K.* 1983. **Modern Physics.** S Chand and Co, New Delhi
2. *Galsstons S.* 2014. **Source book on Atomic Energy.** [3rd Edition], Krieger Publishing Company, Florida
3. *Rajam J. B.* 2010. **Atomic Physics.** S Chand and Co, New Delhi
4. *White H.E.* 1934. **Introduction to Atomic Spectra.** Tata McGraw Hill Publishing Company Ltd, New York

15UPY43P	CORE LAB- II: GENERAL EXPERIMENTS	SEMESTER - IV

Total credits:4
2Hours/Week

LIST OF EXPERIMENTS:
Any 12 Experiments

1. Air wedge – Thickness of a wire
2. Young's Modulus – Koenig's Method – Non Uniform bending
3. Young's Modulus – Koenig's Method – Uniform bending
4. Spectrometer – (i-i) Curve
5. Spectrometer – (i-d) Curve
6. Comparison of Viscosities – Capillary Flow Method
7. Characteristics of a Junction Diode
8. Newton's rings – Refractive index of a lens
9. Potentiometer- Low range Voltmeter calibration
10. Potentiometer- High range Voltmeter calibration
11. Lee's Disc method – Thermal conductivity of a bad conductor
12. Viscosity – Stoke's Method
13. Carey Foster's Bridge – Temperature Coefficient
14. Zener diode – Characteristics
15. LASER- Determination on wavelength and particle size

15UCY4AA	ALLIED –II: CHEMISTRY- II	SEMESTER- IV

Total Credits: 3
Hours / Week: 4

OBJECTIVES:

On successful completion of this course the students shall gain knowledge in the basics of chemistry which helps bioscience students to understand the periodic table, IUPAC nomenclature of organic compounds, enzyme kinetics and water technology.

UNIT - I

Periodic Table

1. Long form of periodic table – Classification of elements on the basis of electronic configuration – Periodicity in properties – Causes of periodicity – atomic and ionic radii – electron affinity – ionization energy – electronegativity – Pauling and mullikan scale – Allred and Rochow's scale – factors affecting the magnitude of electronegativity – application of electronegativity.

UNIT- II

1. Carbohydrates: Classification, preparation, properties & structure of glucose, fructose, inter conversion of glucose to fructose and fructose to glucose, mutarotation.
2. Vitamins: Harmones, classification of vitamins – fat soluble & water soluble examples. Sources of vitamins – diseased caused by deficiency of vitamins.

UNIT- III

1. IUPAC Nomenclature of organic compounds – alkanes, alkenes, alcohols, ethers, aldehydes, ketones, carboxylic acids(dicarboxylic), benzene and naphthalene derivatives.

2. Heterocyclic Compounds – Preparation and properties of Furan, pyrrole, pyridine & thiophene.

UNIT -IV

Kinetics:

1. Rate, rate law, order and molecularity, derivation of rate expressions for I and II order kinetics.

2. Catalysis – homogenous, heterogeneous catalysis, enzyme catalysis (Definition only), enzymes used in industry.

UNIT- V

Water Technology:

1. Hard water – types, disadvantages, determination by EDTA titration.

2. Softening methods – Zeoite – demineralization – reverse osmosis – purification of drinking water, BOD,COD.

TEXT BOOKS:

1. *Madhan. R.D.* **Modern Inorganic Chemistry**, 2001. Second Edition, S. Chand & Company, New Delhi.
2. *Puri, Sharma, Pathania*, **Principles of Physical Chemistry**, 2004. Vishal Publishing Company.
3. *Jalandhar, M. K. Jain, S. C. Sharma*, **Organic Chemistry**, 2001. First Edition, Shoban Lal Nayin Chand, Jalandhar.
4. *Sheik Mideen .A*, **Engineering Chemistry – I,** 2002. Meenakshi publications, Arpakkam.
5. *Lee J. D,* **Concise Inorganic Chemistry**, 1996. Fifth Edition, Black Well science, New Delhi.
6. *Peter Atkins*, **The Elements of Physical Chemistry**, 2001. Third Edition, Oxford & IBH Pvt Ltd, New Delhi.
7. *Arun Bahl*, **Advanced Organic Chemistry**, 1997. First Edition, S. Chand & Co Ltd, New Delhi.

15UCY4AP	ALLIED PRACTICAL -I	SEMESTER- IV

Total Credits: 2
Hours / Week: 3

I Volumetric analysis:

1. Estimation of Sodium Hydroxide using standard Sodium Carbonate.
2. Estimation of Hydrochloric acid using standard Oxalic acid.
3. Estimation of Oxalic acid using standard Sulphuric acid.
4. Estimation of Ferrous sulphate using standard Mohr salt solution.
5. Estimation of Oxalic acid using standard Ferrous sulphate solution.
6. Estimation of Ferrous ions using Mohr salt solution.

II Organic Analysis:

1. To distinguish between aliphatic & aromatic.
2. To distinguish between saturated & unsaturated.
3. Detection of Elements (N, S, Halogens).
4. Functional group tests for phenols, acids (mono & di), aromatic primary amine, monoamide, diamide, carbohydrate.
   Functional group characterized by Confirmatory test.

TEXT BOOK:

1. *Venkateswaran. V., R. Veeraswamy & Kulandaivelu. A. R.* **Basic Principles of practical chemistry**, *2004*. Sultan Chand & Co, Daryaganj, New Delhi.

15UPY4SA	SKILL BASED SUBJECT - II: OBJECT ORIENTED PROGRAMMING WITH C++	SEMESTER-IV

Total credits:3

3Hours/Week

OBJECTIVES:

1. To enable students learn the basic principles and concepts of Object Oriented Programming with C ++

CONTENTS

UNIT- I

Software evolution – Procedure Oriented programming object oriented programming (OOP) – Basic concepts benefits of OOP – Object oriented languages – Application of OOP – A simple C++ program – Structure of C++ program- Tokens – Key words- Identifiers and constants Basic data types – User defined Data Types – Derived data types – symbolic constants – Type compatibility – Declaration of variables – Dynamical Initialization of variables – Reference variables – Operators in C++ - Scope resolution operators.

UNIT- II

The main function – Function prototyping – Call by reference – Return by reference - Inline functions – Default arguments – Constant Arguments - Function overloading – Math library functions - classes and objects.

UNIT- III

Specifying a class - Defining Member Functions – Static Data Members – Static Member Functions – Arrays of Objects – Objects as Function arguments - Friend Functions – Return Objects – Constant Member Functions – Pointers to Members. Constructors and Destructors – copy constructor – dynamic constructor – constant objects - operator over loading and type conversions – overloading Unitary and Binary operators

UNIT- IV

Inheritance : Single, Multilevel, Multiple, Hierarchical and Hybrid - Extending classes – Pointers- Polymorphism – pointers to objects – this

pointer pointers to derived classes - Virtual functions – pure virtual functions – Managing console I / o operators.

UNIT- V

Classes or File stream operations – Opening and closing a file – Text file operations – Binary file operations – Error handling during file operations.

Templates: Function templates – Class Templates – Member Functions. Exception Handling: Basics and Mechanism.

TEXT BOOKS:

1. *Balagurusamy E.* 2013. **Object Oriented Programming with C++** [6th Edition], Tata McGraw Hill Publishing Company Ltd, New York
2. *John R. Hubbard.* 2000. **Programming with C++.** [2nd Edition], Tata McGraw Hill Publishing Company Ltd, New York

15UPY53A	CORE- V: CLASSICAL MECHANICS AND MATHEMATICAL PHYSICS	SEMESTER-V

Total Credits:4
4Hours/Week

OBJECTIVE:

1. To enable students acquire the problem solving ability and to apply the equations for different physical problems.

CONTENTS

UNIT - I

Lagrangian Formulation

Constraints and Degrees of Freedom – Generalized coordinates – Generalized displacement – Velocity – Acceleration – Momentum – Force – Potential Energy – D'Alembert's Principle – Lagrangians equation from D'Alembert's principle – Application of Lagrange's equation of motion to Linear Harmonic Oscillator, Simple Pendulum and Compound Pendulum.

UNIT - II

Hamiltonian Formulation

Phase Space – Hamiltonian function – Hamiltonian Principle – Hamilton's canonical equations of motion- Physical significance of H – Applications of Hamiltonian equations of motion to Simple Pendulum, Compound Pendulum and Linear Harmonic Oscillator – Principle of Least Action – Canonical Transformations – Generating Functions – Advantages and Examples of Canonical Transformations.

UNIT - III

Special Functions

Definition – The 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 – Problems.

UNIT - IV

Matrices

Introduction – special types of Matrices – Transpose of a Matrix – The Conjugate of a Matrix – Conjugate Transpose of a Matrix – Symmetric and Anti symmetric – Hermitian and skew Hermitian – Orthogonal and Unitary Matrices – Properties – Characteristics equation – Roots and characteristics vector – Diagonalization of matrices – Cayley – Hamilton theorem – Problems

UNIT - V

Vector Calculus

Δ Operator – Divergence – Second derivative of Vector functions or fields – The 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 it's proof in the simple problems – Stoke's and its proof with simple problems.

TEXT BOOKS:

1. *Gupta B.D.* 2004. **Mathematical Physics**. [3rd Edition], Vikas Publishing House, New Delhi
2. *Gupta, Kumar and Sharma*. 2012. **Classical Mechanics.** Pragati Prakashan, Meerut
3. *Sathiya Prakash.* 2014. **Mathematical Physics.** [6th Edition] S Chand and Co, New Delhi

REFERENCE BOOKS:

1. *Rajput B.S.* 2011. **Mathematical Physics.** [23rd Edition], Pragati Prakashan, Meerut
2. *Dass H.K.* 2010. **Mathematical Physics.** S Chand and Co, New Delhi

15UPY53B	CORE- VI: ELECTRICITY AND MAGNETISM	SEMESTER-V

Total credits:3
4Hours/Week

OBJECTIVE:

1. To enable students learn the basic principles, theories and concepts of electricity and magnetism.

CONTENTS

UNIT -I

Gauss theorem and its applications

Gauss Law – Applications – Field due to a uniformly charged sphere – Coulomb's Theorem – Mechanical force experienced by unit area of a charged conductor—Energy stored per unit volume in the medium surrounding the charged conductor.

Capacitance and Capacitors

Capacitance of a Spherical capacitor and Cylindrical capacitor -- Force of attraction between charged plates of a capacitor – capacity of a parallel plate capacitor -- Effect of introducing a dielectric slab between the plates – Capacitors In-series and Parallel -- Types of capacitors – Guard ring, Mica and Electrolytic.

UNIT- II

Thermo Electricity : Seebeck effect – Laws of thermo e.m.f – Peltier effect; Peltier Coefficient – determination of Peltier co-efficient – thermo dynamical consideration of Peltier effect – Thomson effect – Thomson Co-efficient – e.m.f generated in a thermocouple taking both Peltier effect and Thomson effect in the metals – Thermo electric power – Application of thermodynamics to Thermocouple – Thermoelectric diagrams and their uses.

UNIT- III

Magnetic Effects of Electric current: Growth and decay of current in an inductive – resistive circuit – charging and discharging of a capacitor through a resistance – charging and discharging of capacitor through an inductance – oscillatory circuits- Force on a current carrying conductor –

Force between two parallel current carrying conductors -- Theory of Ballistic Galvanometer.

UNIT- IV

Dynamics of charged particles

Charged particles in a uniform and constant electric field – Charged particles in an alternating electric field – Charged particles in a uniform and constant magnetic field – magnetic focusing – charged particles in combined electric and magnetic field when the fields are parallel and are in mutually perpendicular direction. A conducting rod moving through a uniform magnetic field – inductance in series – in parallel – self inductance of coaxial cylinders – self inductance of toroidal coil of rectangular cross section – circular cross section – Grassot Fluxmeter – comparison with Ballistic galvanometer – rotating magnetic field.

UNIT- V

Magnetic Properties of materials

Electron theory of magnetism -- dia, para, ferromagnetism and their properties -- Magnetic field B - Magnetization M -- Magnetic field intensity H -- Magnetic Susceptibility and Magnetic Permeability - Magnetic materials and magnetization- Magnetic Hysterisis – area of the hysterisis loop - Determination of susceptibility- Guoy's method – Magnetic circuits – Circuits comparison of magnetic application with electrical circuits.

TEXT BOOKS:

1. *Brijlal and Subramaniam.* **Electricity and Magnetism.** S Chand and Co, New Delhi
2. *Murugesan R.* 1995. **Electricity and Magnetism**. [7th Edition], S Chand and Co, New Delhi

REFERENCE BOOKS:

1. *Vasudeva D.N.* 2011. **Fundamentals of Magnetism and Electricity.** S Chand and Co, New Delhi
2. *Duggal B.D. and Chhabra C.L.* **Fundamental of Electricity and Magnetism** Vishal Publishing Co, Jalandhar
3. *Mathur D.S.* 2000. **Mechanics.** S Chand and Co, New Delhi

15UPY53C	CORE- VII: APPLIED ELECTRONICS	SEMESTER-V

Total credits:3
4Hours/Week

OBJECTIVES:

1. To make students learn fundamentals of electronics and apply in their everyday life

CONTENTS

UNIT- I

Semiconductor Fundamentals

Energy band in solids – Types of semiconductors – majority and minority charge carriers.

Diodes, Rectifiers and Filters Characteristics of PN Junction—Zener diode – Zener diode as voltage regulator – Half wave and Full wave rectifier – Bridge rectifier and ripple factor -- Filter circuits.

Special purpose diodes: LED, Photodiode and Tunnel diode, SCR.

UNIT- II

Transistor and Transistor biasing: Transistor action – Common Emitter and Common base connections – Relation between α and β – Characteristics of CE connection – Transistor load line analysis – DC load line – Operating point.

Need for transistor biasing – Stabilization – Essentials of transistor biasing circuit – Stability factor – Base resistor method for transistor biasing – Voltage driver biasing

UNIT- III

Amplifiers: Voltage and power amplifiers – Classification of amplifiers – RC coupled Amplifier – Transformer couples amplifier – Power amplifiers – Class A, Band C amplifiers – Push-Pull amplifiers.

Oscillators: Introduction - Types of oscillators - Fundamental principle of oscillators--Hartley oscillators –Analysis - Colpitts oscillators –Analysis - Phase shift oscillators-Analysis - Wien bridge oscillator - Analysis - Crystal oscillator – Analysis.

UNIT- IV

Modulation and Demodulation: Modulation -- Types – Amplitude Modulation – Modulation factor – Analysis of AM wave –Side band frequencies in AM wave – Transistor AM modulator – Power – Limitations of AM-- Frequency modulation – Demodulation – AM diode detector – AM radio receivers – super heterodyne receiver – FM detection.

Multivibrator – Types of multivibrator – Astable – Monostable – Bistable multivibrators.

UNIT- V

Power Electronics: JFET – Difference between JFET and BJT – Principle and working of JFET – Characteristics and Parameters of JFET.

MOSFET – Working, characteristics of Depletion and Enhancement MOSFET

Uni junction transistor – Constructions – Operations - equivalent circuit of UJT – Characteristics of UJT - advantages of UJT – UJT relaxations Oscillator.

TEXT BOOKS:

1. *Metha V.K. and Mehta R.* 2010, **Principles of Electronics**, [11th Edition], S Chand and Co, New Delhi
2. *B L Theraja.* 2006. **Basic Electronics.** S Chand and Co, New Delhi.
3. *Millman J. Halkias C. and Chetan Parikh.* 2009, **Integrated Electronics**, [2nd Edition] Tata McGraw Hill Publishing Company Ltd, New York

REFERENCE BOOKS:

1. *Chattopadhyaya D. and Rakshit P.C.* 2014. **Foundation of Electronics.** New Age International, New Delhi
2. *Murugeshan R and Kiruthiga Sivaprasath Er.* 2008. **Modern Physics**. S Chand and Co, New Delhi

3. *Sedha R.S.* 2008. **A Text Book of Applied Electronics**. [3rd Edition], S Chand and Co, New Delhi
4. *Millman and Halkias.* 1967. **Electronics Devices and Circuits.** Tata McGraw Hill Publishing Company Ltd, New York

15UPY53D	CORE- VIII: NUCLEAR PHYSICS	SEMESTER-V

Total credits:4

4Hours/Week

OBJECTIVES:

1. To make students acquire fundamental knowledge about the theoretical concepts of elementary particles

CONTENTS

UNIT- I

Introduction to the Nucleus: General properties of Nucleus (Size, Mass, Density, Charge, Spin, Angular momentum, Magnetic dipole moment) – Binding energy – BE/A and stability of Nucleus – Packing fraction – Nuclear stability – Nuclear forces – Definition – Properties – Meson theory – Model of Nuclear Structure – The Liquid Drop model – Semi-Empirical mass formula – The Shell model – Evidence for Shell model – The collective model.

UNIT- II

Detector and Particle Accelerators: Interaction between the energetic particles and matter – Heavy charged particles – Electrons – Gamma ray-Ionization chamber – Solid State detector – GM counter – Wilson Cloud chamber – Nuclear emission – Linear accelerators – Cyclotron – Betaron.

UNIT- III

Radioactivity: Natural Radioactivity – Alpha, Beta and Gamma rays – Properties – Determination of e/m of Alpha particle – Determination of Charge of Alpha particle – Determination of e/m of Beta particle – determination of Wavelength of Gamma rays (Dumond Spectrometer) – Origin of Gamma rays – Laws of Radioactivity – Soddy-Fajan's displacement law – Law of Radioactive disintegration – Half life period – Mean life period (Definitions, Expression) – Units of Radioactivity – Artificial Radioactivity – Preparation of radio elements – Application of radio isotopes.

UNIT- IV

Nuclear Fission: Nuclear fission – Energy released in Fission – Bohr and Wheelers theory of Nuclear fission – Chain reaction – Multiplication factor – Critical size – Natural Uranium and chain reactions – Atom Bomb – Nuclear reactor.

Nuclear Fusion: Nuclear fusion – Source of Stellar energy – Carbon Nitrogen cycle – Proton-Proton cycle – Hydrogen bomb – Controlled thermo nuclear reactions.

UNIT -V

Cosmic rays: Cosmic rays – Origin of cosmic rays – Latitude effect – Azimuth effect – Attitude effect – Seasonal, Diagonal changes – Primary and Secondary Cosmic rays cascade theory of shower – Pair production and Annihilation – Van Allen Belts.

Elementary particles: Introduction – particles and antiparticles – Antimatter – The fundamental interactions – Classification of elementary Particles - The Quark model.

TEXT BOOKS:

1. *Murugeshan R. and Kiruthiga Sivaprasath Er.* 2008. **Modern Physics.** S Chand and Co, New Delhi
2. *Tayal D.C.* 2011. **Nuclear Physics**. Himalaya Publishing House, Mumbai

REFERENCE BOOKS:

1. *Arthur Beiser*. 2008. **Concepts of Modern Physics.** [6th Edition], Tata McGraw Hill Publishing Company Ltd, New York
2. *Richtmyer F.K.* 1956. **Introduction to Modern Physics**. Tata McGraw Hill Publishing Company Ltd, New York

15UPY5EA	ELECTIVE- I: MATERIAL SCIENCE	SEMESTER-V

Total credits:4
4Hours/Week

OBJECTIVES:

1. To enable students to acquire the fundamental knowledge in Mechanical behavior of materials and dielectrics.

CONTENTS

UNIT - I

Engineering materials and chemical bonding

Classification of engineering materials – levels of structure – structure-property relationship in materials – stability and metastability – bond energy – bond type and bond length – ionic and covalent bonding – variation in bonding character and properties.

UNIT - II

Mechanical behavior of materials

Elastic behavior – atomic model of elastic behavior – Young's modulus – Poisson's ratio – shear modulus – bulk modulus – the modulus as a parameter of design – rubber like elasticity – plastic deformation – tensile stress - strain curve.

UNIT - III

Magnetic materials and dielectric materials

Terminology and classification – magnetic moment due to electron spin – ferromagnetism and the domain structure – soft and hard magnetic materials. Polarization – electronic, ionic, orientation and space charge polarization – temperature and frequency effects – electric breakdown – ferroelectric materials.

UNIT - IV

Smart Materials

Definition of smart materials - Types- Piezoelectric materials-Materials for MEMS and NEMS- Ferrofluid- Magnetic shape-memory alloys (MSMAs)- Shape memory alloy (SMA)- One way and Two way memory

effect- Dielectric elastomers (DEs)- Light sensitive materials- Smart catalysts

UNIT - V

Non-destructive testing

Radiographic methods – photo-elastic methods – magnetic methods – electrical method – ultrasonic method. Equipments used for NDT – metallurgical microscope - electron microscope – scanning electron microscope (SEM).

TEXT BOOKS:

1. *Raghavan, V.* 1990. **Materials Science and Engineering – A first course.** [3rd Edition] Prentice Hall, New Delhi
2. *Arumugam.* 1990. **Materials Science.** Anuradha agencies & publishers.
3. *Gandhi, M.V. and Thompson,* B.S. 1992. **Smart Materials and Structures.** Chapman & Hall.

REFERENCE BOOKS:

1. *Kittel C.* 2012. **Introduction to Solid State Physics.** [8th Edition], Wiley India, New Delhi
2. *Manchandra V.K.* 1992. **A Text Book of Materials Science.** New India Publishing House.
3. *Myer Kutz,* 2006. **Mechanical Engineers' Handbook**: **Materials and Mechanical Design**. [3rd Edition], John Wiley & Sons, Inc.
4. *Culshaw B Smart,* 1996. **Structures & Materials.** Artech House.

15UPY5EB	ELECTIVE- I: ENERGY PHYSICS	SEMESTER-V

Total credits:4
4Hours/WeeK

OBJECTIVES:

1. To enable students learn fundamentals of energy sources and its applications.

CONTENTS

UNIT-I

ELECTRICAL ENERGY

Heat developed in current carrying conductor – Application of heating effect – Electric heater or stove – Electric radiation and Electric Iron – Electric welding and electric furnace – Carbon arc – Electric Lamp – Efficiency of a Lamp – Measurement of Electric Power.

UNIT – II

OPTICAL ENERGY

Characteristics of Light – Light sources – LED, LASER – optical fibre – Light propagation through optical fibres: Basic optical laws used in optical fibres – Optical parameters of optical fibres: Acceptance angle and Numerical aperture – Types of optical fibres: Based on material, Number of modes and refractive index profile – Fibre optical communication system – Block Diagram – Source – Transmitter – Optical fibre – Receiver.

UNIT – III

ATOMIC AND MOLECULAR ENERGY

Degrees of freedom – Number of Degrees of Freedom of Mono, Di and Tri Atomic system – Maxwell's Law of equipartition of Energy – Molar Specific heat capacity at constant volume and constant pressure – Total Internal Energy and Ratio of Heat capacities in monoatomic gas, Diatomic gas, Non Linear and Linear type of Tri atomic gas molecular system. Gas and Vapour Distinction – Measurement of saturated and unsaturated vapour Pressure: Regnault's statistical method – Their characteristics – Graphical Illustration of Gas laws.

UNIT – IV

THERMAL ENERGY

Definition of Total thermal Energy density - Spectral Energy density – Spectral Emissive power – Emissivity – Emissive power – Absorptive power – Reflective power – Kirchoff's Law of radiation and its proof – verification of Kirchoff's Results: Ritche's Experiment. Distribution of Energy in the thermal spectrum – Lummer and Pringsheim Experiment and its Results – Wien's Displacement Law and Radiation Law – Rayleigh Jean's Law Planck's Radiation Law – Deduction of Wien's Law and Rayleigh – Jean's Law from Planck's law. Solar constant – Temperature of sun – Disappearing filament optical Pyrometer - Pyroheliometers: Angstrom Pyroheliometer – Water flow Pyroheliometer.

UNIT – V

NON CONVENTIONAL ENERGY

SOLAR ENERGY: Solar radiation – Solar radiation outside the earth's atmosphere Solar radiation at the earth's surface – Solar Thermal Energy – Solar Thermal devices and systems: Solar water heater – Sub components of solar water heater – Solar Cooker and its merits and demerits.

WIND ENERGY: Power in the wind – Types of wind energy systems – Horizontal axis wind Turbine – Vertical axis wind Turbine.

OCEAN ENERGY: Tidal Energy – Ocean Thermal Energy Conversion (OTEC) – Closed Cycle OTEC system – Open Cycle OTEC System.

TEXT BOOKS:

1. *Rai G.D.* 2004. **Solar Energy Utilization.** Khanna Publishers, New Delhi.
2. *Brij Lal and Subrahmanyam N.* 2010. **Heat and Thermodynamics**. S Chand and Co, New Delhi
3. *Maheshwar Dayal*. 1991. **Renewable Energy Environment and Development.** Konark Publication, New Delhi
4. *Sukhatme S.P. and Nayak J. K.* 2009. **Solar Energy.** [3rd Edition], Tata McGraw Hill Publishing Company Ltd, New York

REFERENCE BOOKS:

1. *Brijlal and Subramanyam N.* 2001. **Electricity and Magnetism.** S Chand and Co, New Delhi
2. *Senthil Kumar I.G.* 2013. **Engineering Physics.** VRB Publications, Chennai
3. *Singhal, Agarwal and Prakash*. 2009. **Thermodynamics and Statistical Physics.** Pragati Prakashan, Meerut
4. *Mathur D.S.* 2002. **Heat and Thermodynamics.** S Chand and Co, New Delhi
5. *Rajam J.B. and Arora C.L.* 1981. **A Text Book of Heat and Thermodynamics.** S Chand and Co, New Delhi

15UPY5EC	ELECTIVE- I: AGRICULTURAL PHYSICS	SEMESTER-V

Total credits:4

4Hours/Week

OBJECTIVES:

1. To make students aware of the different concepts of Physics in Agriculture and its varied applications.

CONTENTS

UNIT – I

SOIL PHYSICS

Mechanical composition of soil – physical properties of soil, pore space, bulk density, particle density – classification – significance of clays – plasticity, shrinkage, flocculation and deflocculation – Soil structure – soil colour – Thermal properties of soil and soil temperatures types of soil water – its retention, movement – viscosity, swelling – soil moisture losses – Elementary ideas of soil water conservation.

UNIT – II

WATER PHYSICS

Water qualities – Rain fall – Ground water – surface water pollution – instrumentation and sampling – water quality monitoring

UNIT – III

Principle of production of A.C. – Average value of A.C. voltage or current – R.M.S. value of alternating voltage or current – power consumed in A.C. Circuits – kilo watt hour – A.C. generator – Three phase A.C. – Distribution of three phase A.C. Three phase four system – The choke- The transformer – Transmission of electric power over long distances.

UNIT – IV

HYGROMETRY

Absolute Humidity – Relative Humidity – Dew point, Daniell's Hygrometer, Regnault's hygrometer. Advantages of Regnault's hygrometer – wet and Dry and Bulb hygrometer

PUMPS

Water pumps – common pump – force pump – Fire engine, inflator (or) compression pump – pressure after n strokes – Exhaust pump (or) common air pump.

UNIT – V

SOLAR COLLECTOR AND APPLICATIONS

Solar Air heaters- Application of solar air heaters. Solar Drying with various driers – Heating and Drying of Agricultural products – Theory of solar drying – moisture content and its measurement – solar ponds – Application of solar ponds – Solar pumping – Solar pump system components – Turbine driven pump – Application of solar energy to agricultural crops.

TEXT BOOKS:

1. *Brij Lal and Subrahmanyam N.* 2010. **Heat and Thermodynamics.** S. Chand and Co, New Delhi

2. *Mathur D.S.* 2006. **Mechanics**. S Chand and Co, New Delhi

3. *Rai G.D.* 2004. **Solar Energy Utilization.** Khanna Publishers, New Delhi

REFERENCE BOOKS:

1. *Buckman H.O. and Brady*. 1990. **Nature and properties of Soil.** [10th Edition], Maxwell Macmillan International, London

2. *William A. Jury, Wilford R. Gardner and Hale Gardner W.* 1972. **Soil physics.** Wiley, New York

3. *KohnKe H.* 1988. **Soil physics.** Tata McGraw Hill Publishing Company Ltd, New York

4. *John C. Rodda, Richard A. Downing, Frank M. Law*, 1976, **Systematic Hydrology**, Newnes Butterworths

15UPY5SA	SKILL BASED SUBJECT-III : DIGITAL ELECTRONICS	SEMESTER-V

Total credits:3

3Hours/Week

OBJECTIVES:

1. To enable students learn the basic concepts Number System, Boolean Algebra and its applications.

CONTENTS

UNIT - I

Number System, Binary Arithmetic and Codes

Binary Numbers- Octal numbers- Hexadecimal numbers (Conversion of one number system into other)

Arithmetic operation – Binary Addition – Binary subtraction – 1's complement subtraction - 2's complement subtraction

Codes – Binary coded decimal – BCD addition and subtraction – Weighted binary codes – Non- weighted codes- Excess 3 codes – Grey code – Error detection and correction codes – ASCII & EBCDIC codes

UNIT - II

Boolean algebra and Minimization techniques

Boolean logic operations – Logic AND, OR, NOT, ExOR, NOR, ExNOR operations – Basic laws of Boolean algebra – Boolean addition and multiplication – Properties of Boolean algebra – De Morgan's theorems. Minimization and Boolean expressions – Minimization using algebraic method – SOP and POS – Minterm – Maxterm – Karnaugh map (upto four variables only)

UNIT- III

Logic gates and Arithmetic Circuits

OR, AND, NOT, NAND, NOR ExOR, ExNOR gates – Universal building blocks – Mixed logic symbols. Arithmetic circuits – Half adder – Full adder – Half Subtractor – Full Subtractor - K-map simplifications – Parallel binary adder – Parallel binary subtractor – Binary to Grey code converter – Grey to Binary converter

UNIT - IV

Flip-flops and their applications

SR flip-flop – Clocked SR flip flop – D flip-flop JK flip-flop – T flip-flop – Triggering of flip-flops – Level triggering – Edge triggering – Master-Slave JK flip-flop

Applications: Shift Registers – 3 and 4-bit shift registers – Counters – 4 bit Ripple binary counter – MOD 3 counters – MOD 6 counters and Decade counter (all MOD counters using JK flip-flop only)

UNIT - V

A/D and D/A Converters and Memory Devices

A/D Converters – Simultaneous type and counter type – D/A Converters – Weighted resistors type – R-2R ladder type

Memory Devices: Classification of memories – ROM – Architecture of ROM – 32 x 4 ROM using OR gates – Diode matrix ROM – PROM, EPROM, EEPROM, RAM (Basic ideas only)

TEXT BOOKS:

1. *Salivahanan S. and Arivazhagan S.* 2009. **Digital Circuits and Design.** Vikas Publishing House, New Delhi

2. *Malvino and Leach.* 2010. **Digital Principles and Applications**, Tata McGraw Hill Publishing Company Ltd, New York

REFERENCE BOOKS:

1. *Moris Mano*. 2004. **Digital Logic and Computer Design.** Pearson India, New Delhi

2. *Gothmann W.H.* 2009. **Digital Electronics.** Phi Learning, New Delhi

15UPY63A	CORE- IX: QUANTUM MECHANICS AND RELATIVITY	SEMESTER-VI

Total credits:4
5Hours/Week

OBJECTIVES:

1. To enable students learn fundamentals of wave mechanics, Schrodinger wave equations and its applications along with fundamental concepts in Relativity and Astrophysics.

CONTENTS

UNIT I

Wave Properties of Matter: Introduction – Phase velocity and Group velocity – Analytical expression for a group of waves – Nature of De'Broglie relation – Derivation of the De'Broglie relation – Phase velocity of De'Broglie waves – Relation between the Phase velocity and the wavelength of De'Broglie wave – De'Broglie wavelength associated with a particle of mass M and kinetic energy – Verification of De'Broglie relation – Davisson and Germer's experiments – G P Thomson's experiments.

UNIT II

Uncertainty Principle: Introduction – Uncertainty Principle – Elementary proof between – Displacement and Momentum – Energy and Time – Physical Significance of Heisenberg's Uncertainty Principle – Illustration – Diffraction of electrons through a slit – Gamma ray microscope thought experiment – Application – Non-existence of free electrons in the nucleus – Size and Energy in the ground state of Hydrogen atom

UNIT III

Schrödinger's Wave Equation: Introduction – Wave function for a free particle – Schrödinger's One dimensional wave equation – Time-dependent and Time independent – Physical interpretation - Limitation – Normalization of wave function – Operators – Eigen function – Eigen Value – Eigen Value Equation – Operator for Momentum, Kinetic Energy and Total Energy – Postulates of Quantum Mechanics – Orthogonality of

Energy Eigen function – Proof – Probability current density – Ehrenfest's theorem – Statement and proof.

UNIT IV

Relativity: Galilean Transformation equation – Ether Hypothesis – Michelson-Morley experiment – Explanation of the Negative results – Special theory of Relativity – Lorentz transformation equation – Length contraction – Time dilation – Addition of Velocities – Variation of Mass with velocity – Mass energy equivalence–Minkowski's Four dimensional Space-time Continuum—General theory of relativity.

UNIT V

Astrophysics: The Harvard classification of stars – Luminosity of a star – Stellar evolution –Milky way – Masses of stars –Galaxy – Expanding Universe -- White Dwarfs – Chandrasekhar limit – Black Holes – Supernova explosion – Gravitational Potential energy of a star – Internal temperature of a star – Internal Pressure of a star -- Big-bang theory.

TEXT BOOKS:

1. *Gupta, Kumar and Sharma*. 2012. **Quantum Mechanics.** [31st Edition], Jai Prakash Nath Publications, Meerut
2. *Murugeshan R. and Kiruthiga Sivaprasath Er.* 2008. **Modern Physics**. S Chand and Co, New Delhi
3. *Aruldas*. 2008. **Quantum Mechanics.** [2nd Edition], PHI Learning, New Delhi
4. *Agarwal B.K. and Prakash Hari*. 2007. **Quantum Mechanics. [**1st Edition], PHI Learning, New Delhi

REFERENCE BOOKS:

1. *Schiff L.I.* 1968. **Quantum Mechanics.** [3rd Edition], Mcgraw-Hill College, Blacklick
2. *Richtmyer and Et Al F.K.* 1956. **Introduction to Modern Physics.** Tata McGraw Hill Publishing Company Ltd, New York

15UPY63B	CORE- X: SOLID STATE PHYSICS	SEMESTER-VI

Total credits:4

5Hours/Week

OBJECTIVES:

1. To enable students to acquire the fundamental knowledge of bond theory and formation of different materials.

CONTENTS

UNIT- I

Crystal Structures: Crystallography: Distinction between crystalline and amorphous solids – Different features of the crystal – Crystal lattice – Basis – Crystal structure – Unit cell – Number of lattice points per unit cell- Bravais lattices – Miller indices – Elements of Symmetry – Structure of KCl and NaCl crystal – Atomic Packing – Atomic radius –-Lattice constant and density- Crystal structures (SC, HCP, FCC, BCC) – Interplanar distance.

UNIT -II

Bond theory of solids: Classification of solids – Basics of Bond theory in crystals – Ionic, Covalent, Metallic, Molecular and Hydrogen bonding -- Optical properties of solids.

Thermal properties of solids: Specific heat capacity of solids – Einstein's theory of specific heat of solids –Debye's theory of specific heat capacity of a solid -- Fermi levels .

UNIT- III

Free electron theory: Drude Lorentz theory – Explanation of Ohm's law – Electrical conductivity – Thermal conductivity – Wide-Mann and Franz law – Sommerfield model – Schottky effect.

Hall Effect: Hall voltage and Hall coefficient – Mobility and Hall angle – Importance of Hall effect – Experimental determination of Hall coefficient.

UNIT- IV

Dielectrics: Dielectric constant and displacement vector- Clausius Mossotti relation- Atomic or molecular polarizability – Types of polarizability

Super conductivity: Phenomena – Magnetic properties – Meissner effect – Experimental facts – Isotopes effect – Thermodynamic effect – Types of Superconductors – Applications -- BCS Theory.

UNIT -V

Magnetism: Introduction – Dia, Para and Ferromagnetic materials -- Langevin's theory of diamagnetism – Langevin's theory of paramagnetism – Ferromagnetism – Domain theory of Ferromagnetism Hysteresis based on domains – Antiferromagnetism – Ferrimagnetism – Ferrites – Ferro electricity – Ferroelectric crystals -- Nuclear magnetic resonance.

TEXT BOOKS:

1. *Gupta and Kumar.* 2012. **Solid State Physics**. K.Nath & Co, Meerut
2. *Murugeshan R. and Kiruthiga Sivaprasath Er.* 2008. **Modern Physics.** S Chand and Co, New Delhi
3. *Pillai S.O.* 2010**. Solid State Physics.** [6th Edition], New Age Publisher, New Delhi

REFERENCE BOOKS :

1. *Charles Kittel*. 2004. **Introduction to Solid State Physics.** [8th Edition], John Wiley & Sons, New York
2. *Dekker A.J.* 1969. **Solid State Physics**, Macmillan India. New Delhi

15UPY63P	CORE LAB –III: GENERAL EXPERIMENTS	SEMESTER -VI

Total credits:4
3Hours/Week

LIST OF EXPERIMENTS :
Any 12 Experiments

1. Young's Modulus – Cantilever – Static method
2. Young's Modulus – Cantilever – Dynamic method
3. Spectrometer –Refractive index of a hollow Prism
4. Spectrometer – Cauchy's constant and Dispersive Power of the Prism
5. Resistivity of Semiconductors – Four Probe method
6. Band gap energy of a semiconductor
7. Zener diode characteristics
8. Hall Effect
9. Ballistic Galvanometer – Comparison of Mutual Inductance
10. Ballistic Galvanometer – Calibration of Ammeter and Voltmeter
11. Characteristics of UJT
12. Power Supply Construction (3V and 5V)
13. Hartley Oscillator
14. Colpitt Oscillator
15. RC Coupled Amplifier – Single Stage.

15UPY63Q	CORE LAB- IV: DIGITAL ELECTRONICS AND MICROPROCESSOR	SEMESTER -VI

Total credits:3
3Hours/Week

LIST OF EXPERIMENTS :
Any 12 Experiments

1. Sine wave generator using 741 IC
2. Square wave generator using 555 IC
3. Verification of Truth tables of IC gates: OR, AND, NOT, XOR, NOR and NAND.
4. NAND as universal building block- AND, OR, NOT
5. NOR as universal building block- AND, OR, NOT
6. De Morgan's theorem verification
7. Study of RS Flip-Flop.
8. Study of Shift –Registers –Serial in Parallel out.
9. Half Adder and Full Adder
10. Half Subtractor and Full Subtractor
11. 8085 ALP for 8 bit Addition and Subtraction
12. 8085 ALP for 8 Bit Multiplication and Division
13. 8085 ALP for finding the Biggest number element in the array and Sum of the elements in the Array
14. 8085 LED Interfacing
15. 8085 traffic Light Controller

15UPY63R	CORE LAB- V: COMPUTER PROGRAMMING	SEMESTER -VI

Total credits:3
3Hours/Week

LIST OF EXPERIMENTS :
Any 12 Experiments

1. Conversion of Temperature from C to F
2. Conversion of Temperature from F to C
3. Determination of Velocity of Light – Foucalt's Rotating Mirror method
4. Determination of G by Boy's Method
5. Young's Modulus – Uniform Bending method
6. Young's Modulus – Uniform Non Uniform method
7. Determination of Frequency: Sonometer
8. Spectrometer: Refractive index and Dispersive power of Prism
9. Newton's rings: Radius of Curvature.
10. Determination of acceleration due to gravity as a function of altitude
11. Solution of quadratic equation
12. Trace of a matrix
13. Arranging the elements of an array in the ascending order
14. Arranging the elements of an array in descending order
15. Matrix Addition, Subtraction and Multiplication

15UPY6EA	ELECTIVE- II: FUNDAMENTALS OF NANOSCIENCE	SEMESTER-VI

Total Credits:4
4Hours/WeeK

OBJECTIVES:

1. To enable students learn fundamentals of Nanoscience, nanomaterials synthesis mechanisms and applications.

CONTENTS

UNIT - I

Introduction to Nanotechnology

Scientific revolution, Historical milestones, Emergence of Nanotechnology, Definition of nanotechnology, Bohr radius, Quantum confinement, Nanosized effects, Challenges in Nanotechnology

UNIT - II

Synthesis of Nanomaterials

Physical method: Ball Milling, Sputter deposition, electric arc deposition, Ion beam technique. Chemical method: Wet chemical synthesis – sol-gel processing, co-precipitation, hydrothermal, chemical vapor condensation, chemical bath deposition

UNIT - III

Types of Nanostructures

Definition of a Nano system - Types of Nanocrystals-One Dimensional (1D)-Two Dimensional (2D) –Three Dimensional (3D) nanostructured materials - Quantum dots - Quantum wire - CORE-/Shell structures

UNIT - IV

Functional Nanomaterials

Carbon (CNT, graphene), Noble Metals (Au, Ag), Metal oxides (TiO2, SnO2, ZnO), Semiconductors (CdS, CdSe, CdTe), Magnetic nanoparticles, Semiconductor Nanocomposites

UNIT - V

Applications of Nanomaterials

Applications in Physics: Nanoelectronics, Quantum dot and Dye sensitized solar cells, Photovoltaics, Hydrogen Production, Quantum electronic devices, CNT based transistor and Field Emission Display, Other applications: Nanosensors, Nanomedicine, Nanorobotics.

TEXT BOOKS:

1. *Viswanathan B.* 2006. **Structure and Properties of Solid State Materials** [2nd Edition], Oxford: Alpha Science International
2. *Pradeep T.* 2007. **Nano-The Essentials.** Tata McGraw-Hill publishing company limited, New Delhi

REFERENCE BOOKS:

1. *Wilson M. Kannangara K. Smith G. Simmons M. and Raguse B.* 2005. **Nanotechnology: Basic Science and Emerging technologies**, [1st Edition], Overseas Press India Pvt Ltd, New Delhi.
2. *Hari Singh Nalwa.* 2002. **Nano Structured Materials and nanotechnology.** (Concise Edition) Academic Press.

15UPY6EB	ELECTIVE- II: OPTICAL FIBRES AND FIBRE OPTIC COMMUNICATION SYSTEMS	SEMESTER-VI

Total credits:4

4Hours/WeeK

OBJECTIVES:

1. To enable students learn fundamentals of Fiber optics and their communication mechanisms along with their applications.

CONTENTS

UNIT – I

FIBRE CLASSIFICATION

Propagation of light waves in an optical fibre – Acceptance angle and Acceptance cone of a fibre – Numerical Aperture (NA) – NA of a graded Index Fibre – Mode of propogation. Fibres – classification – stepped index fibre – stepped index monomode fibre – Graded index multimode fibre – Comparison of step and graded index fibres.

UNIT – II

FIBRE FABRICATION AND CABLES

Classification of Techniques – External chemical vapour deposition – Characteristics – Internal chemical vapour deposition (1st method only) – Characteristics – Phasil system Fibre cable construction – losses incurred during installation of cable – Testing of cables – cable selection criteria.

UNIT – III

FIBRE LOSSES AND DISPERSION IN OPTICS

Attenuation in optic fibre – Rayleigh Scattering losses – Absorption losses – Bending losses – Radiation induced losses – Inherent defect losses – CORE- and Cladding losses. Dispersion in an Optical Fibre – Inter-modal dispersion – Material Chromatic Dispersion – Dispersion Power penalty – Total Dispersion delay.

UNIT – IV

LIGHT SOURCES FOR OPTICAL FIBRES

LED – The process involved in LEDS – Structures of LED – Fibre – LED Coupling – Modulation bandwidth and Spectral Emission of LEDS.

UNIT – V

APPLICATIONS

Introduction – Video Link Satellite Link – Computer Link – Nuclear Reaction Link – Community Antenna Television – Switched Star CATV – Networking

TEXT BOOK:

1. *Subir Kumar Sarkar*. 2007. **Optical Fibres and Fibre Optic Communication Systems.** [4th Edition] S Chand and Co, New Delhi

REFERENCE BOOK:

1. *Thyagarajan K. and Ajoy Ghatak.* 2004, **Introduction To Fiber Optics.** Cambridge University Press, New Delhi

15UPY6EC	ELECTIVE- II: BIO-PHYSICS	SEMESTER-VI

Total credits:4
4Hours/WeeK

OBJECTIVES:

1. To enable students learn fundamentals of Biophysics, Molecular Kinetics and Radiation Biology.

CONTENTS

UNIT – I

STRUCTURE OF BIOMOLECULES

Introduction - Atomic structure - Hydrogen atom - Bonds between atoms and molecules - secondary or weak bonds - Bond energy - Disulphate bonds – Peptide bond - Structure of Proteins - Molecular weight determination - Kinetic methods - Static methods - Structure of nucleic acids - DNA - RNA.

UNIT – II

KINETICS OF MOLECULES I

Diffusion: Factors affecting diffusion - Simple diffusion – Fick's law of diffusion - Diffusion of electrolytes - Biological significance of diffusion
Osmosis: Osmosis - Osmotic pressure - Laws of osmosis - osmometry - osmotic pressure of electrolytes.
Filteration : Filteration - Passage of fluid though blood vessels - Formation of Urine- Dialysis Principle of dialysis in artificial kidney - kinds of dialysis.

UNIT – III

KINETICS OF MOLECULES II

Adsorption: Adsorption - Factors affecting adsorption - Adsorption of ions by Solids and Liquids - adsorption of Gases by solids - Biological significance of adsorption.
Hydrotropy : Hydrotropy - Biological importance of hydrotropy.
Precipitation: Precipitation - Biological significance.

Colloids: Types of colloids - characteristics of colloids - stability of colloids - Gel - Emulsions - Techniques for the separation of colloids - Biological importance of colloids – Gibb's Donnan Equilibrium.

UNIT - IV

OPTICAL TECHNIQUES IN BIOLOGICAL STUDIES

Characteristics of light- compound · microscope - Ultraviolet microscope - Electron microscope - Transmission electron microscope - Scanning Electron microscope - Monochromator – Light sensitive detectors- Spectrophotometer - Atomic absorption flame photometer – Electromagnetic radiation Spectroscopy - Ultraviolet, visible, infrared and fluorescent spectroscopy – Atomic absorption and emission spectroscopy - mass spectroscopy - Raman spectroscopy – x ray diffraction crystallography.

UNIT -V

BIOELECTRICITY AND RADIATION BIOLOGY

Membrane potential - Resting membrane potential - Action potential and nerve impulse conduction Rate of nerve impulse conduction- Recording of nerve impulses by C.R.O – Resting membrane potential -.J Injury potential- Monophasic and diphasic action potentials - Radioactivity - Natural radioactivity Artificial or induced radioactivity – Radioactive disintegration - units of Radioactivity.

TEXT BOOKS:

1. *Subramanian, M.A.* 2006. **Biophysics: Principles and Techniques**. MJP Publishers, Chennai [Units II, IV & V]
2. *Palanichamy, S. and Shanmugavelu, M.* **Principles Of Biophysics.** Palani Paramount Publications, Palani (Units I & III)

REFERENCE BOOKS:

1. *Thiravia* Raj, *S.* **Biophysics.** Saras Publications, Nagerkoil
2. *Daniel, M.* 1998. **Basic Biophysics for Biologist.** Agro-bios, Jodhpur.
3. *Pattabhi, V. and Gowtham, N.* 2011. **Biophysics.** [2nd Edition], Narosa Publishing House, New Delhi

15UPY6ED	ELECTIVE- III SPACE PHYSICS	SEMESTER-VI

Total Credits:4
4Hours/WeeK

OBJECTIVES:

1. To make students learn fundamental concepts of Space Physics, Stellar Evolution and the theories of Universe, Galaxies and Star Clusters.

CONTENTS

UNIT-I

Astronomical instruments

Optical telescope - reflecting telescope - types of reflecting telescope - advantages of reflecting telescope - Radio telescopes - astronomical spectrographs - photographic photometry - photo electric photometry - detectors and image processing.

UNIT-II

Solar system

The sun-physical and orbital data - Photosphere - Chromosphere - corona - solar prominences - sunspot - sunspot cycle - theory of sunspots - solar flare - mass of the sun - solar constant - temperature of the sun - source of solar energy - solar wind. Other members of the solar system - Mercury - Venus - Earth - Mars - Jupiter - Saturn - Uranus - Neptune - Pluto - Moon - Bode's law - Asteroids - comets - Meteors.

UNIT-III

Stellar Evolution, Binary and variable stars

Birth of a star - Death of a star - Chandrasekhar limit - white dwarfs - Neutron stars - black holes - Quasars - Nebulae - Supernovae

Binary stars - Origin of Binary stars. Variable stars - Cepheid variables - RV Tauri variables - long period variables - irregular variables - flare stars.

UNIT-IV

Magnitudes, distance and spectral classification of stars

Magnitude and brightness - apparent magnitude of stars - absolute magnetic of stars - relation between apparent magnitude and absolute magnitude of stars - Luminosities of stars - measurement of stellar distance - Geometrical parallax method - distance from red shift measurement - Harvard system of spectral classification .

UNIT-V

Theories of the universe, galaxies and star clusters

Origin of the universe - the big bang theory - the steady state theory - the oscillating universe theory - Hubble's law.

Galaxies - types of galaxies - Milky Way - star clusters - open clusters - globular clusters.

TEXT BOOKS:

1. *Krishnasamy, K.S.* 2002. **Astro Physics – A Modern Perspective**. New Age International Pvt Ltd, New Delhi.
2. *Murugesan, R.* 2003. **Modern Physics**, [11th Edition] S Chand & Company Ltd, New Delhi.

REFERENCE BOOKS:

1. *Baidyanath Basu*, 2001. **An Introduction to Astro physics**, 2nd printing, Prentice Hall of India Private limited, New Delhi.
2. *Kumaravelu, S.* 1993. **Astronomy**, Janki calendar corporation, Sivakasi.
3. *Baker and Fredrick*, 1964**. Astronomy.** [9th Edition] Van No strand Rein hold Co, New York.
4. **Illustrated World of Science Encyclopedia** - Vol I and Vol VIII - Creative world publication - Chicago.

15UPY6EE	ELECTIVE –III: GEOPHYSICS	SEMESTER-VI

Total Credits:4
4Hours/Week

Objectives:
1. To enable students to learn fundamental concepts of Seismology, Geophysics and Geomagnetism

UNIT- I
Introduction and Seismology

Introduction - Seismology: P waves, S waves, their velocities - Time distance curves and the location of epicenters - Effect of boundaries - Major discontinuities and resulting phase of seismic waves - Derivation of properties from the velocities

UNIT - II
Surface Waves and Seismometry

Surface waves: Rayleigh waves and Love waves - Study of earth by surface waves. **Seismometry:** Horizontal seismograph and seismography equation – Strain seismograph.

UNIT - III
Earthquakes and Gravity

Earthquakes: Focus, magnitude, frequency - Detection and prediction - Gravity: The potential (Laplace's equation and Poisson's equation) - Absolute and relative measurements of gravity - Hammond Faller method - Worden gravimeter.

UNIT - IV
Geomagnetism and Internal structure of the Earth

Geomagnetism: Fundamental equations - Measurements: method of Gauss, saturation induction magnetometers, proton precession magnetometers, alkali vapour magnetometers - Theories of earth's magnetism - Causes of the main field -Dynamo theories – Internal structure of the earth: The CORE- variation of mechanical properties with depth - Materials and equation of state of the interior of the earth.

UNIT - V
Geochronology and Geothermal Physics

Geochronology: Radioactivity of the earth - Radioactive dating of rocks and minerals Geological time scale - The age of the earth - Geothermal physics: Flow of heat to the surface of the earth - Sources of heat within the earth - Process of heat transport internal temperature of the earth.

TEXT BOOKS:

1. *Garland, G.D.* l979. **Introduction to Geophysics**, [11th Edition], WB Saunder Company, London
2. *Cook, A.H.* 1973. **Physics of the Earth and Planets**. [1st Edition], McMillan Press, London

15UPY6EF	ELECTIVE –III:MEDICAL PHYSICS	SEMESTER-VI

Total credits:4

4Hours/WeeK

OBJECTIVES:

1. To enable students learn fundamental concepts Radiation Physics and its applications in medical fields.

CONTENTS

UNIT-I

X-RAYS

Electromagnetic spectrum - production of x-rays - x-ray spectra - Brehmsstrahlung - Characteristic x-ray - X-ray tubes - Coolidge tube - x-ray tube design - tube cooling - stationary mode - Rotating anode x-ray tubes - Tube rating - quality and intensity of x-ray. X-ray generator circuits - half wave and full wave rectification - filament circuit - kilo voltage circuit - high frequency generator - exposure timers - HT cables.

UNIT-II

RADIATION PHYSICS

Radiation units - exposure - absorbed dose - rad gray - kera relative biological effectiveness - effective dose - sievert - inverse square law - interaction of radiation with matter - linear attenuation coefficient. Radiation Detectors -Thisble chamber - condenser chambers - Geiger counter - Scintillation counter - ionization chamber - Dosimeters - survey methods - area monitors - TLD and semiconductor detectors.

UNIT-III

MEDICAL IMAGING PHYSICS

Radiological imaging - Radiography - Filters - grids - cassette - X-ray film - film processing - fluoroscopy - computed tomography scanner - principle function -display - generations - mammography. Ultrasound imaging - magnetic resonance imaging - thyroid uptake system - Gamma camera (Only Principle, function and display)

UNIT-IV

RADIATION THERAPY PHYSICS

Radiotherapy - kilo voltage machines - deep therapy machines - tele-cobalt machines - Medical linear accelerator. Basics of Teletherapy units - deep x-ray, telecobalt units, medical linear accelerator - Radiation protection - external beam characteristics - phantom - dose maximum and build up - bolus - percentage depth dose - tissue - air ratio - back scatter factor.

UNIT-V

RADIATION PROTECTION

Principles of radiation protection - protective materials - radiation effects - somatic, genetic stochastic and deterministic effect, Personal monitoring devices - TLD film badge - pocket dosimeter.

TEXT BOOKS:

1. *Thayalan, K.* 2003. **Basic Radiological Physics.** Jayapee Brothers Medical Publishing Pvt Ltd, New Delhi
2. *Williams and Wilkins,* 1990. **Christensen's Physics of Diagnostic Radiology**: Curry Dowdey and Murry - Lippincot
3. *Khan, F.M.* 2003 **Physics of Radiation Therapy** - Williamd and Wilkins, [3rd Edition]
4. *Bushberg, Seibert, Leidholdt, Boone Lippincot Williams and Wilkins*, 2002. **The Essential Physics of Medical Imaging**: [2nd Edition]

REFERENCE BOOKS:

1. *Lippincot Williams and Wilkins,* 1998. **Nuclear Medicine Physics**: Chandra Publishers
2. *John R Gunni ingham and Johns,* 1990. **The Physics of Radiology.** Charles C Thomas USA
3. *William R Hendee* 1992. **Medical Imaging Physics** - Mosby, [3rd Edition]
4. *Govindarajan, K.N.* 1992. **Advanced Medical Radiation Dosimetry**: Prentice - Hall of India Pvt Ltd, New Delhi

15UPY6SA	SKILL BASED SUBJECT–IV: MICROPROCESSORS	SEMESTER-VI

Total credits:3

3Hours/Week

OBJECTIVES:

1. To foster students learn the basic concepts of Microprocessors, semiconductor memories and its programming.

CONTENTS

UNIT - I

Microprocessor and Data Representation

Basic concept – what is Microprocessor, 4, 8, 16, 32 – Organization of Microprocessor – Microprocessor Programming – Instruction – Machine and Mnemonic codes – Machine and Assembly Language Programming – High level Language programming – Timing diagram conventions.

Representation of Integers – Positive integers – Maximum Integer – Negative Number representation – Minimum Integer - Representation of Real numbers – Conversion of Real numbers – floating point notation – Representation of Floating numbers – Binary Arithmetic, Addition and Subtraction of Binary Integers – Over flow and Under flow addition of floating numbers – Character representation.

UNIT - II

Programming a Microprocessor

Organization of 8085 – Data and Address buses addressing – The I/O devices – Register in 8085 – Instruction types – Classification of Instruction – Addressing modes – Programming the 8085 –The Programming process – machine language programming – Assembler Programming – The instruction format, Assembler directives, Constant in assembly programming – Language for writing algorithms – The Stack – Subroutines.

UNIT - III

Semi Conductor Memories

Introduction – Registers – Primary memory – Mass storage, cache – off line backup – memory chips – static and dynamic RAMs, ROMs and their

versions characteristics of memories: Memory chip capacity and organization – memory size – combining the chips together with example electrical signals. Static RAM : Organisation of 6264 – Read and write cycle of 6264 – dynamic RAMS : Organisation of 51100 x – Read and write cycle of 51100 x RAS only fresh hidden fresh – Burst and distributed i.e., fresh – pseudo static ram and automatic refresh – page mode operation of dynamic RAM – Nibble mode operation – Static column mode – Prove requirements of DRAMS MTBF computation.

UNIT - IV

Microprocessor Timings

Timing and control unit – Basic concept – The Fetch operation – The executive cycle – Machine cycle and state – Instruction and Data flow – Timing of Intel 8085, 8085 buses – Opcode fetch cycle – Memory and I/O read and write cycle – Interrupt timings – The Halt and Hold states – Register organization – General purpose register – The Stack.

UNIT - V

Interfacing Memory and I/O Devices

Introduction – Address space partitioning – The Address map – Address decoding – Using the 1 of N decoder – Memory Interfacing – Bus connection and 2 line control – Access time computations – Data transfer schemes – Programmed data transfer – Synchronous transfer – Asynchronous transfer – Interrupt driven data transfer – Multiple Interrupt enabling – disabling and Masking Interrupt – Direct Memory access data transfer – Multiple DMA devices – DMA transfer in an 8085 based system – Serial data transfer.

TEXT BOOKS:

1. *Aditya P Mathur.* 1990. **Introduction to Microprocessors.** [3rd Edition] Tata McGraw Hill Publishing Company Ltd, New York
2. *Nagoor Kani A.* 2012**. Microprocessors And Microcontrollers.** [2nd Edition], Tata McGraw Hill Publishing Company Ltd, New York

REFERENCE BOOKS:

1. *Ramesh S. Gaonkar*. 2002. **Microprocessor Architecture.** Programming, and Applications with the 8085. Prentice Hall, New Delhi
2. *Ramachandran K.* 2009. **Mechatronics and Microprocessors.** Wiley India Pvt. Ltd, New Delhi

15UED34V	NMEC-I: PRINCIPLES OF PHYSICS- I	SEMESTER-III

Total Credits:2
2Hours/Week

OBJECTIVES:

1. To enable non-major Physics students to create interest in Physics and to make them aware with fundamental concepts of Physics

CONTENTS

UNIT - I

Mechanics

Particle- Rest and motion- Motion in one two and three dimensions- position, displacement and distance – Speed and Velocity – Acceleration – Momentum- Force- Equations of Motion – Newton's Laws of motion – Applications of Newton's law of motion

UNIT - II

Electromagnetic waves

Characteristics – Hertz experiment – Electro Magnetic Spectrum – uses – types of spectra – Fluorescence – Phosphorescence – Raman effect- Applications

UNIT - III

Heat

Heat energy- Units- Specific heat capacity – Newton's law of cooling – Boyle's law – Charle's law – Gas equation – Kinetic theory of gases – Postulates – Degrees of freedom – Isothermal and Adiabatic processes

UNIT - IV

Sound

Transverse and longitudinal waves – Relation between frequency, wavelength and velocity –Doppler effect (quantitative idea) – Applications – Laws of transverse vibration of stretched strings – Ultrasonics – Applications – Reverberation – Acoustics of buildings

UNIT - V

Optics

Lens – Types – Defects of eye – Laws of reflection and refraction – Conditions for total internal reflection – Dispersion – Scattering – Rayleigh scattering – colour of sky – Raman Effect

TEXT BOOKS:

1. *Brij Lal and Subrahmanyam, N.* 2010. **Heat and Thermodynamics**. S Chand and Co, New Delhi
2. *Brij Lal and Subrahmanyam, N.* 2008. **A Text Book of Sound.** [2nd Edition], Vikas Publishing House, New Delhi
3. *Mathur*, *D.S.* 2002. **Heat and Thermodynamics.** S Chand and Co, New Delhi
4. *Murugesan*, 2002. **Mechanics, Properties of Matter and Sound**. S Chand and Co, New Delhi
5. *Brij Lal and Subrahmanyam*, *N.* 1994. **A Textbook of Optics**, [4th Edition] S Chand and Co, New Delhi.

REFERENCE BOOK:

1. *Resnick and Halliday,* **Principles of Physics.** 2015. [9th Edition], Wiley Publication

15UED44V	NMEC-II: PRINCIPLES OF PHYSICS- II	SEMESTER-IV

Total Credits:2

2Hours/Week

OBJECTIVES:

1. To enable non-major Physics students to create interest in Physics and to make them aware with fundamental concepts of Physics

CONTENTS

UNIT - I

Gravitation

Newton's law of gravitation – Universal gravitational constant – Acceleration due to gravity – Variation of 'g' with altitude – Inertial mass – gravitational mass – Orbital velocity – Time period of a satellite – Uses of Satelites

UNIT - II

Properties of Matter

Elasticity – Stress – Strain – Elastic limit – Hooke's law – Experimental verification of Hooke's law- Three moduli of elasticity – Pascal's law – Applications – Viscosity – Coefficient of Viscosity – Streamline flow and Turbulent flow – Reynold's number – Stoke's law – Surface Tension – Forces of Cohesion and adhesion – Experimental determination of surface tension of water by capillary rise method- Applications

UNIT - III

Electricity and Magnetism

Electric Current – Current density – Ohm's law – Electrical resistivity and conductivity – Resistance – Specific resistance – Resistors in Series – resistors in parallel – Kirchoff's law – Faraday's laws – Verification of Faraday's laws – Basic properties of magnets – Magnetic moment – magnetic Field – Magnetic induction – Magnetic lines of force – Classification of magnetic materials – uses.

UNIT - IV: Modern Physics

Nucleus – Nuclear Structure – Mass number – Atomic number – Nuclear mass – Binding energy – X-rays – Properties of X- rays and its

applications – Radioactivity – Properties of alpha, beta and gamma rays – Half life period- Applications

UNIT – V: Electronics and Digital Electronics

Intrinsic and Extrinsic semiconductors – P and N type – PN junction diode – Characteristics – Binary numbers – Conversion of binary-to-decimal and decimal-to-binary – logic gates – AND, OR and NOT gates

TEXT BOOKS:

1. *Murugesan, 2002.* **Mechanics, Properties of matter and Sound.** S Chand and Co, New Delhi
2. *Brijlal and Subramaniam*, 2010. **Electricity and Magnetism**, S Chand and Co, New Delhi
3. *Murugesan, R.* 2003. **Modern Physics.** [11th Edition], S. Chand and Co, New Delhi
4. *Malvino and Leach*, 2010, **Digital Principles and Applications**, Tata McGraw Hill, New Delhi.

REFERENCE BOOKS:

1. *Resnick and Halliday,* 2015. **Principles of Physics**, [9th Edition], Wiley Publications.
2. *Metha, V.K. and Mehta R.* 2010. **Principles of Electronics**, [11th Edition] S Chand and Co, New Delhi

15UED44V	NMEC – II : EVERY DAY PHYSICS - II	SEMESTER – IV

OBJECTIVE:

1. To enable non-major Physics students to create interest in Physics and to make them aware with fundamental concepts of Physics

CONTENTS

UNIT- I

Force and Energy

Force-Newton's Laws of motion – circular motion – centripetal force – centrifugal force. Centrifuge – washing machine.

Energy – different forms of energy – Law of conservation of energy. Electric bulb – tube light – CFL, LED bulbs.

UNIT -II

Mobile Technology

Mobile Technology – GSM, CDMA – Mobile phone Features – 2G, 3G, 4G and 5G networks.

UNIT -III

Nano Technology

Nano Technology – Everyday applications of Nano technology – Medicine – Electronics – Environment – Consumer products.

UNIT -IV

Geo Physics :

Gravitation – The Moon and Tides – Earthquake – Richter scale – Thunder and lightning – Lightning arrestors.

UNIT -V

Fossil Fuel Energy :

Fossil Fuels – Definition – Energy Production – How Fossil Fuels work – Oil – Coal – Natural Gas – Advantages and Disadvantages of Fossil Fuels.

TEXT BOOKS :

1. The Learner's series – **Every day science**, Infinity Books, New Delhi.

06/04/2016
BoS Chairman/HoD
Department of Physics
Dr. N. G. P. Arts and Science College
Coimbatore – 641 048

Dr. P. R. MUTHUSWAMY
PRINCIPAL
Dr. NGP Arts and Science College
Dr. NGP - Kalapatti Road
Coimbatore - 641 048
Tamilnadu, India